Pulp and Paper Sludge Listing Determination

Status Briefing
11 June, 1997
EDF vs. Browner
1991 Consent Decree

- Agency is required to promulgate a listing determination for sludges from pulp and paper mill effluent following promulgation of the effluent guideline regulation issued under the Clean Water Act for pulp and paper mills.

- However, "EPA shall not be required to ... promulgate such a listing determination if the final rule for the pending effluent guideline rulemaking ... to regulate the discharge of dioxins from pulp and paper mills is based on the use of oxygen delignification, ozone bleaching, prenox bleaching, enzymatic bleaching, hydrogen peroxide bleaching, oxygen and peroxide enhanced extraction, or any other technology involving substantially similar reductions in uses of chlorine-containing compounds." (emphasis added)

- If EPA concludes that the final effluent guideline regulation is based on use of such a process and that, as a result, no listing determination is required, EPA shall so inform plaintiff in writing within 30 days of the promulgation of the effluent guideline regulation."(emphasis added)
Consent Decree Interpretations

- Relevant consent decree language.
  - Paragraph 1(1) requires us to make a listing determination for sludge from pulp and paper mills. It states that we are “not required to propose or promulgate a listing determination” if we conclude that the final effluent guideline is based on any of 6 specified technologies (or any other technology achieving substantially similar reductions in chlorine use).
  - If we make such a decision, we must notify EDF in writing within 30 days of the promulgation of the guideline.

- Record needed to satisfy consent decree obligation.
  - Decree only requires a finding that the guideline is based on one of the specified technologies. It does not require us to assess the impact of the guideline on sludge.
  - It appears that one of the specified technologies (oxygen and peroxide enhanced extraction) is part of the treatment train OW considered for all categories of pulp and paper mills. That is all we need to state in our letter to EDF—and all that OGC recommends we discuss in that letter.
Additional OPTIONAL decision on whether listing is warranted even if decree is satisfied.

OSW may wish to look at data on sludge and effluent quality to see what impact the new guideline is likely to have on dioxin levels. OGC encourages this, but recommends that it be done as part of a separate decision on the merits of listing pulp and paper sludges independent of the determination that we have discharged our consent decree obligations. That way, EDF will not be able to dispute such data in the context of enforcing the decree.
1997 Effluent Guidelines

- EPA's Office of Water will promulgate effluent limits based on Option A technology.
  » Option A technology:
    - Conventional pulping followed by complete (100%) substitution of chlorine dioxide for elemental chlorine.
    - Also includes the following four elements:
      1. Effective brownstock washing
      2. Elimination of hypochlorite
      3. Oxygen and peroxide enhanced extraction
      4. Closed brownstock pulp screen room operation
- BAT limits for TCDD, TCDF, chloroform and 12 chlorinated phenolics are being set at the point where the wastewater containing the pollutants leaves the bleach plant.
  » "While no mill is required to install EPA's model BAT technology, establishing limitations at the bleach plant thus ensures that none of these pollutants will be discharged at concentrations greater than the levels achievable through implementation of that technology." (Effluent guidelines preamble)
Description of Technologies

Taken from OW's Summary of Technologies for Pulp and Paper Industry

- **Chlorine Dioxide Substitution (ClO₂)**
  
  ClO₂ substitution is the replacement of chlorine gas used in the first bleaching stage for delignification. ClO₂ is a more powerful oxidizing agent, providing 2.63 times the oxidizing power of an equivalent amount of chlorine.

- **Oxygen Enhanced Extraction**

  Conventional bleaching is made up of an acidic chlorination stage followed by an alkaline extraction stage, which constitute the first two bleaching stages. Elemental oxygen addition to the first extraction stage reduces the need for subsequent bleaching. Pollution loads are reduced 25-30%.

- **Peroxide Enhanced Extraction**

  Similar to oxygen extraction in that a small percentage of hydrogen peroxide (H₂O₂) is added to the alkaline extraction stage. This reduces the need for subsequent chlorine bleaching chemicals. Peroxide can also be added with oxygen to further reduce bleaching chemical usage.
# Sludge Management Practices

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<td>Burn for Energy</td>
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<td>Surface Impoundment</td>
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<td>Land Apply</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Origin of Data

- The majority of data was collected by the pulp and paper industry
  - The 1988 104-mill study and NCASI annual updates
  - Other data collected for the rulemaking activity
- Pros: Consistent labs which follow EPA QA/QC procedures.
  - EPA did split some samples with industry and there was agreement in data analysis.
- Cons: No EPA oversight on sampling and handling on annual update data.
- OW also collected data for the effluent guideline rulemaking, although most was effluent data with limited sludge sampling.
Risk Considerations

- In 1990 OSW performed a risk assessment in response to a 1988 consent decree in EDF and NWF v. Thomas. The risk assessment was based on a data with a mean of 162.9 ppt TCDD and 90th percentile of 293 ppt TCDD.

- In November 1991, we issued a letter to the plaintiffs in which EPA concluded that, under then current conditions, dioxin contained in pulp and paper mill sludges did not pose an unreasonable risk to human health and the environment when disposed of in land fills and surface impoundments.

  » The major potential risk to human health is contamination of surface waters and fish bioaccumulation. EPA concluded that risks to humans were minimal because: 1) almost all of the facilities have run-off controls that would mitigate potential risk, and 2) the incorporations of more realistic assumptions and site specific information in the risk assessment showed the risks to human health to be low, even without run-off controls.

  » When evaluating risk to wildlife, the Agency found potential risk to certain animals that might actively forage in the disposal units. However, EPA concluded that significant levels of foraging or other biological activities did not exist that would lead to significant exposure.
In December 1994, the Agency re-evaluated the risks associated with land application. It was concluded that pulp and paper sludge application scenarios would potentially present risks to some species of terrestrial wildlife due to TCDD and, to a lesser extent, TCDF toxicity.

A mean of 32 ppt TCDD and 107 ppt TCDF was used in the risk assessment. For high end exposure, a 90th-percentile of 186 ppt TCDD and 1582 TCDF was used.

From this effort, a Memorandum of Understanding was agreed to between pulp and paper mills that land apply sludge, and EPA. It was agreed that any sludge to be land applied would not exceed 10 ppt TEQ, and that annual reports would be submitted to the Agency.

Current risks are yet to be determined, but a brief review of the data suggests a mean of 7 ppt TCDD and 33 ppt TCDF, with a 90th-percentile of 17 ppt TCDD and 65 ppt TCDF.
1996 Profile of Dioxin Levels in Sludge

- About half of the mills did not detect TCDD in their sludge
- More mills detected TCDF in their sludge, but TCDF is considered 1/10 the toxicity of TCDD
- Only three mills that are partial A or Option B had levels above 10 ppt TEQ. Those facilities do not land apply their sludge.
Kraft Mill Sludge TEQ Concentrations
(NCASI 1996 Data)

Action Level for
Land Application
Kraft Mill Sludge TCDD Concentrations
(NCASI 1996 Data)

Mills to the right of the line did not detect TCDD in their sludge.
Kraft Mill Sludge TCDF Concentrations

(NCASI 1996 Data)

Mills to the right of the line did not detect TCDF in their sludge.
1996 Profile of Dioxin Levels in Option A Mills

- 11 of the 87 kraft pulp mills meet Option A for all bleach lines
- All Option A mills have levels below 10 ppt TEQ
TEQ For Option A Mills
(NCASI 1996 Data)
Comparison of Mill Technology

- Boise Cascade Corp (St. Helens, OR)
- Bowater (Calhoun, TN)
- Champion International (Quinesec)
- Alabama River Pulp (Claiborne, AL)

TEQ (ppt)
Papergrade Sulfite Mills

- Papergrade sulfite mills are divided into three categories, based on the types of mills.
  - Segment A (calcium and magnesium mills)
    - Effluent limits based on the three factors:
      1. Improved pulp cleaning.
      2. Totally-chlorine free (TCF) bleaching; and
      3. Use of oxygen and peroxide enhanced extraction
  - Segment B (ammonium) and Segment C (speciality-grade mills)
    - Effluent limits based on the following factors:
      1. 100% substitution of chlorine dioxide for chlorine
      2. Elimination of hypochlorite as bleaching agent; and
      3. Use of oxygen and peroxide enhanced extraction
- See chart for 1994 data. 1996 data just received and will be plotted.
Sulfite Mill Sludge Concentrations
(NCASI 1994 Data)
Work in Progress

- Gathering additional sludge data, including revised data for some of the mills which did not report annual data for the 1994 and 1996 dioxin profiles.
- Contacted Canadian provinces for any data they may have. Awaiting call back on report that is being compiled.
- EMRAD to review current data to assess potential risk issues.
- Preparation of 30-day letter.
- Preparation of any docket materials.