

US EPA ARCHIVE DOCUMENT

## **Response to Comments**

### **July 5, 2001 Federal Register Notice on Spent Catalysts from Dual-Purpose Petroleum Hydroprocessing Reactors**

**April 2002**

**U. S. Environmental Protection Agency  
Office of Solid Waste**

### **Note on Response to Comments Document**

All comments received pursuant to EPA's July 5, 2001 (66 FR 35379) notice of opportunity for public comment on spent catalysts from dual-purpose petroleum hydroprocessing reactors are reproduced in this document verbatim. EPA has not made any edits to the original comments, except for reorganization of various sections of the comments to facilitate EPA's responses in a concise manner. One exception to this is the numbering of the footnotes. Due to reorganization of sections of the comments' text, the footnote numbering indicated in this document does not correspond to the original footnote numbers.

The comments and their respective EPA responses are numbered accordingly in this document. Sections of comments (e.g., introductions and background information on the commenter) that do not require a specific EPA response are located in the appendix to this document.

### **List of Commenters**

1. The Ferroalloys Association (TFA)  
Docket No. F-2001-PR2P-00001
2. The American Petroleum Institute (API)  
Docket No. F-2001-PR2P-00002
3. Chevron  
Docket No. F-2001-PR2P-00003
4. The National Petrochemical & Refiners Association (NPRA)  
Docket No. F-2001-PR2P-00004

## Response To Comments

### *Comment TFA-2 (page 2)*

#### The Gulf Chemical Settlement

Gulf Chemical & Metallurgical Corporation (“Gulf”) is a member of TFA and its Spent Catalyst Recycling Group. As referenced in the Notice, Gulf appealed EPA’s rule listing spent hydroprocessing catalyst as hazardous waste. Gulf Chemical & Metallurgical Corp. v. U.S. Environmental Protection Agency, Case No. 98-1683 (D.C. Circuit). Gulf appealed because (among other reasons) spent catalyst generated from dual-purpose reactors was sometimes being designated as spent “hydrocracking” catalyst (i.e., not listed under the Rule), where it seemed obvious that this material was covered by the definition of “hydrotreating” in the Rule and should be regarded as hazardous waste.

EPA agreed that spent catalysts which perform a hydrotreating function (removal of nitrogen and sulfur compounds and metals from the feed stream) are regulated as hazardous wastes even though they also perform conversion to lighter fractions (cracking). EPA agreed to issue the November 29, 1999 Memorandum (published with the Notice) in return for Gulf’s dismissal of its appeal.

Gulf agrees with EPA that the agency was fully within its authority to issue the Memoranda, and that the Memoranda are legally valid as they stand. TFA and Gulf do not oppose EPA’s solicitation of comment on the November 29, 1999 Memorandum, and indeed applaud EPA’s goal of “good government”. However, the November 29, 1999 Memorandum is the result of a settlement of the above appeal between EPA and Gulf, and as such EPA is not free to change the November 29, 1999 Memorandum without Gulf’s express consent.

*Response TFA-2 (page 2):* The Agency thanks the commenter for its support of EPA’s memoranda. The present notice does not result in any changes from the November 29, 1999 memorandum and therefore the commenter’s concerns regarding changes to this memo are moot.

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### *Comment TFA-3 (pages 2-3)*

#### Summary of TFA’s Comments

TFA supports EPA's interpretation of the Rule as expressed in the Memoranda and the specific interpretations sent to Chevron and Motiva<sup>1</sup>. The Background Document<sup>2</sup> shows that EPA has a good understanding of the various uses and technologies of hydroprocessing in petroleum refineries.

The Memoranda are a correct and sufficient interpretation of the Rule as it applies to dual-purpose hydroprocessing reactors, and do not need to be changed. Experience in the field shows that the Memoranda are effective in clarifying for refineries and recyclers the regulatory status of such dual-purpose catalyst. Based on information available to TFA members, it appears now that most or all spent hydroprocessing catalyst that is used for more than "minimal and incidental" hydrotreating/hydrorefining is being classified as K171/K172. Previously, some of this material was being sent to Subtitle D industrial waste landfills.

It would not be necessary to address the issues raised in the Memoranda or the Notice, however, if EPA would classify all hydroprocessing catalyst as listed waste under a non-source specific "F" code. As shown below, this step can be easily justified by data and information in the record. It would remove any need for case-by-case technical interpretation of the function of spent hydroprocessing catalyst, and the reclassification would streamline and simplify management of this material from generation to final disposition.

*Response TFA-3 (pages 2-3):* We thank TFA for comments supporting our interpretation of the rule as it applies to dual purpose reactors. We note, however, that classification of all hydroprocessing catalysts as listed under one "F" code is beyond the scope of this current notice and comment action. See more detailed responses to comments TFA-5 and TFA-11 below on the regulatory status of spent catalyst.

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*Comment TFA-5 (pages 3-4)*

In the June 1, 2000 Memorandum EPA selected a narrative criteria to determine the point where spent catalyst will not be regarded as resulting from either hydrotreating or hydrorefining: when the catalyst performs no more than "minimal and incidental" hydrotreating or hydrorefining, it will be considered simply spent hydrocracking catalyst, which was not considered under the Rule. While it could be said that some form of "bright line" or numerical standard would be attractive, the "minimal and incidental" threshold works well in these circumstances. First, there is nothing whatsoever unique about EPA applying a narrative standard on a case basis. Take for example the notion of "best

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1 Shieldalloy had not yet joined the TFA Spent Catalyst Recycling Group when the November 29, 1999, memorandum was issued.

2 U.S. EPA: Background Document – Clarifying the Scope of Petroleum Hazardous Waste Listings: Supplemental Information Regarding Petroleum Hydroprocessing Units, June 2001 (Docket PR2P S0001).

available control technology” under the Clean Air Act.<sup>3</sup> Every day EPA evaluates proposed emission rates and application of control strategies and decides whether a particular proposed emission source will meet the regulatory narrative definition of BACT. The agency uses its technical expertise, past precedent, existing policy and guidelines, and information from the proposed source to make a regulatory decision. Here (as will be shown below) the universe of hydrocracking applications is comparatively small, and making the correct case-by-case spent catalyst classification is far easier for the EPA and refiners than application of BACT to a wide variety of air pollution sources.

Second, a narrative standard is appropriate because hydroprocessing technology is rapidly changing.<sup>4</sup> It has a wide range of refinery applications,<sup>5</sup> and because (in part) of tightening environmental requirements for fuels, will find even wider use in the future.<sup>6</sup> A narrative standard allows the agency the flexibility to apply its expertise to deal with future changes in hydroprocessing applications. And as shown by the two interpretations referred to in the Notice (relating to Chevron two-stage Isocracker and Motiva’s H-Oil unit), EPA is perfectly able to make an informed decision when a reactor performs no more than “minimal and incidental” hydrotreating.

*Response TFA-5 (pages 3-4):* The Agency agrees that the narrative criteria is appropriate for determining whether a catalyst is performing more than “minimal and incidental” hydrotreating or hydrorefining in a unit that also performs hydrocracking functions, and agrees that the points raised in these comments further support that proposition. The Agency considers this approach consistent with the regulatory language and with the intention stated in the 1998 preamble and the November 1999 memorandum to adopt an operational approach to defining hydroprocessing catalysts. A spent catalyst removed from a unit that is designed to perform hydrotreating or hydrorefining operations is a “spent hydrotreating catalyst” or a “spent hydrorefining catalyst” within the meaning of the regulation, even if the unit also performs a hydrocracking function.

The Agency also agrees that the “minimal and incidental” criterion is sufficiently clear. EPA issued a memorandum on June 1, 2000 (and republished in the July 5, 2001 FR Notice) that clarifies that catalysts from petroleum hydroprocessing reactors are not considered a listed waste (meeting the definitions of either K171 or K172) solely because some minimal and incidental amount of

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<sup>3</sup> “Best available control technology” (“BACT”) is defined as: “an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of such pollutant.” (40 CFR Section 51.66)

<sup>4</sup> See, e.g., George, et al., “Hydrocracking to Achieve Product Flexibility”, NPRA AM-94-19 (Docket PR2P S0016).

<sup>5</sup> See generally, Background Document.

<sup>6</sup> Heckel, et al. “Developments in Distillate Fuel Specifications and Strategies for Meeting Them”, NPRA 1998 (Docket PR2P S00017).

hydrotreatment of feeds occurs in such units. The scope of the hazardous waste listings for K171 and K172 includes spent catalysts removed from a reactor that performs a hydrotreating or hydrorefining function, including a spent catalyst from any dual purpose reactor designed and operated to hydrotreat or hydrorefine petroleum feedstock, as well as hydrocrack the feed in the same reactor. Thus, when hydrotreating is clearly designed to be one of the functions of a hydroprocessing operation, then the spent catalyst is within the scope of the listing. At present, we are aware of three types of specific dual purpose units (H-oil, L-C fining, and T-star units), that both hydrocrack petroleum feedstock and perform hydrotreatment or hydrorefining functions. As noted in the Federal Register notice, the Agency determined that these reactors perform more than “minimal and incidental” hydrotreating or hydrorefining, and that spent catalysts from these units are within the scope of the listing. The Agency is not aware of other specific dual purpose units in which there might be more than minimal and incidental treatment, but where there is still some question as to whether they fall within the scope of the listing. However, for any other cases in which it is not clear, the Agency can provide case-by-case determinations.

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*Comment TFA-4 (page 3)*

EPA Properly Interpreted the Rule in the Memoranda

The Memoranda and the letters to Motiva and Chevron (cited at 66 Fed. Reg. 35382-3) properly interpret the Rule: catalyst from hydroprocessing reactors, which perform a hydrotreating/hydrorefining and a hydrocracking function, are properly classified as K171/K172 hazardous wastes. EPA chose to regulate as listed wastes all spent hydrotreating and hydrorefining catalyst. Spent hydrotreating and hydrorefining catalysts which perform additional functions (in this case, hydrocracking) are still performing a hydrotreating or hydrorefining function, and therefore are properly regulated as listed hazardous waste.

*Comment TFA-6 (page 4)*

TFA strongly supports EPA’s “functional” approach to classifying spent catalyst. In particular, EPA recognized that refineries often use multi-reactor hydroprocessing units, where some reactors in the unit may perform hydrotreating, some hydrocracking, and others both functions. 66 Fed. Reg. 35382. It is therefore important to examine the function of the catalyst in each reactor in order to correctly characterize the spent catalysts generated by the reactor.

EPA’s advice to Chevron summarized in the Notice is instructive. The Chevron Isocracking unit (considered in the industry to be a hydrocracking unit) has two stages (see discussion below). The reactors in the first stage will generate spent hydrotreating catalyst; those in the second stage generate spent hydrocracking catalyst. 66 Fed. Reg. 35383.

*Comment TFA-8 (page 5)*

TFA supports EPA's finding that many of the reactors in single and multi-stage hydrocracking units are performing a hydrotreating function under the Rule. With regard to the Chevron Isocracker with two stages and off-take to a fractionator between the stages, EPA states:

"The most common Isocracking unit configuration is the two-stage unit consisting of two reactor stages and a product distillation section. Generally, the first stage catalyst performs denitrication and desulfurization of the hydrogenated gas oil feed with minimal hydrocracking. Before the feed is sent to the second stage reactor stage, it is passed through a product fractionator, which removes the conversion of products of the first stage to avoid re cracking in the second stage. Hydrocracking of the feed occurs in the second stage reactor. The relatively low operating temperatures of this stage result in good selectivity and product quality. Complete conversion of the feed is accomplished by recycling all unconverted material back to the second state reactor (Dahlberg, 1995).<sup>7</sup>

Typically the first reactor in a two-stage hydrocracker achieves some molecular conversion (cracking) along with removal of nitrogen, sulfur, and metals (treating)<sup>8</sup> and therefore should be considered a dual-purpose reactor.

*Response TFA-4 (page 3), TFA-6 (page 4), and TFA-8 (page 5):* EPA thanks the commenter for its support of the Agency's approach to categorizing catalyst as listed hazardous waste or solid waste not meeting the listing description, depending on the function of the catalyst. The Agency agrees with the commenter that it is important to consider all activities of a catalyst, such as in two-stage units. EPA would like to emphasize that this concept of considering all activities within the unit was discussed in detail in the preamble to the 1998 final rule. According to the preamble:

In addition to the issue of defining hydrocracking units that are not subject to the K171/K172 listing, there is disagreement among commenters from the petroleum industry and catalyst reclaimers regarding the classification of guard beds. These units, also known as desulfurization pretreaters, are used to extend the life of the downstream catalytic bed (e.g., reformer, hydrocracker, isomerization reactor) by removing sulfur, oxygen, nitrogen, and/ or heavy metals... EPA agrees that these pretreatment units, or "guard units," should be covered under the listing descriptions in today's rule. (August 6, 1998; 63 FR 42155 - 42156)

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*Comment TFA-7 (page 4)*

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<sup>7</sup> Background Document 5.2, 5.6.

<sup>8</sup> See Maheshri, et al. "Hydrocracker Advanced Control Improves Profitability", (Docket No. PR2P S0022) at 86.



EPA seems to say in the Notice that it is aware of only three types of dual-purpose reactors, that is, those used in the following proprietary processes: H-Oil, LC-Fining and T-Star. 66 Fed. Reg. 35381. These processes all use ebullating bed reactors to process heavy feeds, and as EPA concludes, they are unquestionably dual-purpose reactors<sup>9</sup>. However, EPA has identified numerous other fixed-bed reactors as performing both hydrotreating and hydrocracking. See, for example (1) EPA's determination that Chevron's first stage Isocracker is a hydrotreater, and (2) the Background Document.

Mild hydrocracking units, for example, employ all dual-purpose reactors. These are single stage, once-through units, processing heavy feeds. As EPA concludes:

"The high rates of heteroatom removal realized with the mild hydrocracking process is characteristic of hydrotreating while the significant (30 percent) feed conversion is characteristic of hydrocracking. Given these product conversions/reductions and the type of catalyst(s) used in these types of processes, the conclusion can be drawn that both hydrotreating and hydrocracking occur in the mild hydrocracking process."<sup>10</sup>

*Comment TFA-9 (pages 5-6)*

EPA has correctly analyzed various specific hydroprocessing technologies in the Background Document, but due to the large diversity of applications of hydroprocessing, TFA offers the following as a way of classifying the various applications of hydroprocessing technology, and of determining whether the spent catalyst removed from a reactor can be classified hydrotreating/hydrorefining, hydrocracking, or dual-purpose.

Exhibit "A" shows the basic configurations of "hydrocracking" units. The following table explains the terminology used in Exhibit "A":

<u>TABLE 1</u>	
Hydrocracking Process Design Configuration Terminology and Nomenclature	
A-Reactors	hydrotreating and some hydrocracking
B-Reactors	hydrocracking and some hydrotreating; these reactors are upstream of any separation step and operate at relatively higher temperatures. The nitrogen content in the feed (N-slip) to these reactors can be in the range of 5-200 ppmw.
C-Reactors	hydrocracking and minimal hydrotreating; these reactors are downstream of a

<sup>9</sup> Coyler, "Ebullated-Bed Reactor Technology (Docket PR2P-0010), Table 2.

<sup>10</sup> Background Document 7.3.2; See also, Tables 7-1 through 7-4; Desai, et al. "Mild Hydrocracking: Low Cost Option for Distillate Production (Docket PR2P S0014).

	separation-step (“staging”) and operate at relatively lower temperatures under conditions of very low N-slip (<5 ppmw, typically 1-2 ppmw) and very low NH <sub>3</sub> content in the recycle gas.
SSOT	single-stage, once-through
SSREC	single-stage, recycle
TSREC	two-stage, recycle
SEPHT	separate hydrotreat (staging and recycle); Similar to TSREC

“Minimal and incidental” treatment occurs only in a reactor whose feed stream has already been treated to the maximum practicable level. In the catalyst industry, purity of the feed is normally defined by “nitrogen slip”, i.e., the concentration of nitrogen compounds, expressed as N, entering the reactor. Normally, only “C” reactors have feed streams treated to the maximum practicable level. As indicated, these reactors typically operate at 1-2 ppmw –slip.<sup>11</sup>

Note that all “C” reactors are the second stage of two-stage hydrocracking units, meaning the NH<sub>3</sub> and H<sub>2</sub>S, plus light hydrocarbons, are removed between the first and second stages.

All other reactors (A & B) in hydrocracking units will be dual-purpose reactors, because they function (in part) to remove heteroatoms from the feed stream.

*Comment TFA-10 (pages 6-7)*

To summarize:

- All ebullating bed residual hydrocracking units, such as H-Oil and LC-Finers, are dual-purpose reactors, performing both hydrotreating and hydrocracking functions.<sup>12</sup>
- All hydroprocessing reactors using catalysts containing noble metals (such as platinum) are performing no more than minimal and incidental hydrotreating, because they can tolerate virtually no heteroatoms in the feed without catalyst failure.
- All mild hydrocracking units are made up of dual-purpose reactors.<sup>13</sup>
- Multistage hydrocracking units will contain all dual-purpose reactors, or dual-purpose plus hydrocracking, depending upon the configuration and staging.

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<sup>11</sup> If the N-slip is at the lowest practicable treatment level, in most circumstances other heteroatoms such as sulfur and metals will be as well.

<sup>12</sup> Background Document 7.3.1; Colyer, *supra*.

<sup>13</sup> Background Document 7.3.2.

- Most hydroprocessing reactors which perform only minimal and incidental treatment are “C” reactors, preceded by one or more hydrotreating reactors and gas removal and fractionation.

Exhibit “B” is a list of two-stage hydrocracking units in the United States where the “C” reactor is currently being operated as a hydrocracking reactor, which does no more than minimal and incidental hydrotreating. There may be others,<sup>14</sup> where EPA could determine that the “C” reactor is performing only as a hydrocracking reactor, and only minimal and incidental treatment is occurring.

*Response TFA-7 (page 4), TFA-9 (pages 5-6), and TFA-10 (pages 6-7):* As the Agency stated in the June 1, 2000 memorandum, “dual purpose reactors generate spent catalysts that are listed hazardous wastes subject to regulation under RCRA Subtitle C.” In addition, “spent catalysts from hydrocracking reactors that do only minimal and incidental hydrotreating are not listed hazardous wastes.”

EPA cannot provide the type of generic interpretations suggested by the commenter in this notice. While the Agency has identified that spent catalyst from the three ebullating bed residual hydrocracking units studied fall within the scope of the K171 or K172 listings, the Agency has not studied the other situations well enough to make the same level of generalizations. The basis for determining whether or not a spent hydroprocessing catalyst is a listed hazardous waste is dependent on the function of the catalyst within the unit, not the operational name of the unit. If the regulated community has a question about a specific unit, they may write to EPA for a case-by-case determination. Also see responses to comment TFA-6 above on the function of hydroprocessing catalysts.

EPA appreciates the commenter’s suggestion of using “nitrogen slip” as a way of identifying whether a hydrocracking unit is a dual-purpose reactor and thus qualifying that its spent catalyst may be listed as a hazardous waste. EPA has not studied in detail the use of nitrogen slip in making determinations whether a reactor is a dual purpose unit. In addition, the Agency could not promulgate such a requirement under this notice. The institution of a nitrogen slip measure would represent far more than a simple clarification of the 1998 rulemaking and is therefore outside the scope of this notice.

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*Comment TFA-11 (pages 7-8)*

EPA Should Amend the Rule to List all Spent Hydroprocessing Catalysts as Hazardous Waste.

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<sup>14</sup> See the hydrocracking units (44) identified in Department of Energy’s Petroleum Supply Annual 2000.

The definitions of hydrotreating, hydrorefining and hydrocracking catalysts have been a challenge for EPA. For example, in the Background Document, EPA appears to be abandoning its distinction between hydrotreating and hydrorefining.<sup>15</sup>

As is evidenced by the Notice and attached Memoranda, EPA and the affected industry have struggled with the distinction between hydrotreating and hydrocracking reactors, and those which perform both functions.

When EPA conducted its sampling of hydrocracking units, it sampled the “C” reactor in the hydrocracking unit at the Shell refinery in Wood River, Illinois. The data show that this spent catalyst (most likely hydrocracking catalyst and therefore currently not covered by the Rule) is as deserving of the listed hazardous designation as the spent hydrotreating catalyst sampled in the same study.<sup>16</sup>

When faced with a similar problem with oily sludges generated at refineries, EPA consolidated all such waste sludges into two general “F” codes covering the entire class of wastes. This avoided the technical analysis needed to determine whether a sludge was, for example, generated in an “API separator”. 55 Fed. Reg. 46354 (November 2, 1990). EPA based its decision to convert these former refinery “K” wastes into an “F” listing on the grounds that all such sludges from oil refineries warrant treatment as hazardous wastes, regardless of the technical definition of the equipment which produced them.

In a guidance document relating to the above rulemaking, EPA stated:

“In developing the new listings, EPA concluded that sludges resulting from various petroleum refinery wastewater treatment sources contain similar levels of hazardous constituents as those generated in Dissolved Air Flotation (DAF) units and American Petroleum Institute (API) separators, which are already designated as K048 and K051, respectively. Consequently, the Agency promulgated the nonspecific source F037 and F038 waste listings to ensure that regulatory coverage was extended to all Petroleum floats and sludge resulting from primary wastewater treatment that are not covered under more unit-specific K designations.”<sup>17</sup>

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<sup>15</sup> Background Document at 3 fn.2.

<sup>16</sup> Compare Sample R2-CC-02 taken from a “C” reactor at Shell, Wood River, with Samples R8A-CC-01 and R20-CC-01 taken from ebullating bed, dual-purpose reactors at Amoco, Texas City and Star, Convent, LA. Table 3.3.4 in EPA: “Study of Selected Petroleum Residuals” (August 1996) (Docket PR2P 50020),

<sup>17</sup> EPA Document 530-SW-91-093B (February 1, 1991)

The same is true for spent hydroprocessing catalyst. Sampling data show that the environmental risk presented by all hydroprocessing catalyst is similar.<sup>18</sup> Listing all hydroprocessing catalyst as a hazardous waste would (i) include all waste of similar description and hazard, (ii) avoid technical distinctions based on the catalyst's use in the refinery, and (iii) be a significant step toward more efficient regulation of hazardous waste.

*Response TFA-11 (pages 7-8):* In the 1998 final rule, the Agency took no action with regard to spent hydrocracking catalyst. A listing determination for spent hydrocracking catalyst is outside of the scope of this proceeding. The suggestion of combining the "K" listings into one "F," non-specific source listing would require EPA to initiate a new proposed rule and is also beyond the scope of this proceeding.

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*Comment API-2 (pages 1-2)*

As explained below, API believes that the November 1999 Memo is much more than the mere guidance or "clarification" that EPA claims it to be. In fact, that Memo effectively attempts to revise retroactively the 1998 listing rule, and thus violates the rulemaking requirements of the Administrative Procedure Act, by purporting to expand the listing for spent hydrotreating (or hydrorefining) catalysts to certain non-listed spent hydrocracking catalysts (i.e., "dual purpose" catalysts), without having provided any prior notice or opportunity for public comment. That purported expansion is contrary to the language and stated intent of the 1998 listing rulemaking, and would largely negate the decision that spent hydrocracking catalysts are not covered by that final listing rule.<sup>19</sup>

In addition, the reasons proffered in the November 1999 Memo, and in the July 5, 2001, notice belatedly seeking comments on that decision, for such an expansion are arbitrary and inconsistent with the 1998 listing rule, as well as internally contradictory. If EPA believes that the 1998 listing rules did not achieve all of EPA's objectives – in particular, that spent catalysts from what have long been considered hydrocracking units and what EPA now calls "dual purpose" reactors or units should be listed as hazardous wastes -- EPA must go through the necessary rulemaking process to do so. The

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<sup>18</sup> See EPA Memorandum (October 28, 1999) (Docket PR2P-S0002)

<sup>19</sup> API understands that EPA decided in the 1998 rulemaking only that it was not listing spent hydrocracking catalyst at that time, although it could commence a separate rulemaking at a future date to decide whether to list those catalysts. 63 FR 42155 ("Spent hydrotreating and hydrorefining catalysts ... will be promulgated as hazardous wastes in today's rule; no action has been proposed to date for spent hydrocracking catalysts.") Nonetheless, the 1998 rulemaking notice was clear that spent hydrocracking catalysts were not covered by the listings promulgated at that time, id. ("spent catalyst from this [hydrocracking] unit would not be covered by" spent hydrotreating or hydrorefining listings)." See Memo dated October 28, 1999, from E. Cotsworth, EPA, to the Regional Offices, clarifying that although EPA had not yet made a final regulatory determination not to list (a "no-list" decision) hydrocracking catalyst, the final 1998 listing rule did not apply to hydrocracking catalysts. Attachment B.

post hoc invitation to comment on the November 1999 Memo provided by the July 5 notice does not remedy or substitute for EPA's prior failure to provide such an opportunity.<sup>20</sup>

Whether or not EPA ultimately agrees that it must follow notice-and-comment rulemaking procedures to address the status of so-called "dual-purpose" catalysts, these comments also provide specific suggestions for resolving that issue in a manner more consistent with the original intent of the 1998 rulemaking and with the realities of refining industry practices.

#### *Comment Chevron-1*

Chevron appreciates this opportunity to comment on EPA's effort to clarify its hazardous waste listing for spent hydroprocessing catalyst.

We endorse the comments provided separately by the American Petroleum Institute (API). We believe EPA's memorandum dated November 29, 1999, from Elizabeth Cotsworth to the EPA Regions was much more than the mere "clarification" that EPA claimed. The memo did not go through public review, but yet it has significant impacts on the refining industry.

The differences between hydrotreating, hydrocracking, and hydrorefining processes have long been well understood in industry, and this understanding formed the basis for identifying these catalysts during the initial listing investigation and the final 1998 rule. However, EPA's November 29 memo took an entirely new direction and abandoned the understanding that both industry and EPA had used during the listing process, as API's comments to this notice make clear.

#### *Comment NPRA-2*

NPRA believes that the November 29, 1999 memorandum on dual purpose catalysts caused some confusion, and although the June 1, 2000 memorandum somewhat clarified the Agency's position, NPRA suggests that both memoranda be formally withdrawn. It is our position that EPA should rely on the language in the preamble to the August 1998 final rule which added spent hydrotreating catalyst (K171) and spent hydrorefining catalyst (K172) to the list of hazardous wastes. That is, refinery units classified for DOE purposes as hydrocrackers would not be covered by the rule for K171 and K172 wastes.

*Response API-2 (pages 1-2), Chevron-1 and NPRA-2:* The Agency disagrees with the commenters. The Agency would like to reiterate a well-established position that letters to the regulated

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<sup>20</sup>API filed a lawsuit challenging the November 1999 Memo in early 2000. *API v. EPA*, No. 00-1069 (D.C. Cir.). In June 2001, API and EPA reached a settlement agreement in that case in which EPA agreed to publish notices soliciting and responding to comments on the November 1999 Memo. The July 5 notice satisfied the first part of EPA's obligation. After EPA has completed its duties under the agreement, API will request dismissal of its pending lawsuit. The settlement agreement does not affect API's view that the November 1999 Memo was an unlawful attempt at rulemaking without prior notice and comment; nor does it imply that this post hoc opportunity to comment rectifies that earlier failure.



community and memoranda are important elements of policy development. In order to provide detailed and complete interpretations of regulations, letters and memoranda serve to help the regulated community understand the Agency's position on regulatory matters. Furthermore, any complaints by commenters that EPA did not provide adequate opportunity to comment on the policies and principles embodied in the memoranda are certainly moot at this point, regardless of any commenter's position on the whether the memoranda constitute improper rulemaking. The Agency, through this notice and comment process has provided ample opportunity for all stakeholders to comment and has determined that its interpretation of the coverage of the listing is correct.

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*Comment API-3 (page 2)*

### Introduction and Background

At the outset, it must be noted that the problems addressed in these comments are largely of EPA's own making and were potentially avoidable. *First*, the genesis of the November 1999 Memo is clearly traceable to EPA's decision in the 1998 rulemaking to reject the comments of API and others urging EPA to tailor the proposed listing of spent hydrotreating and hydrorefining catalysts to cover only those plausible mismanagement scenarios which presented substantial risks to health or the environment, as provided by sec. 1004(5) and 3001(a), (b) of the Resource Conservation and Recovery Act (RCRA). In particular, API and others urged EPA to adopt a conditional or "contingent management" listing that would have excluded catalysts destined for recycling/reclamation, including metals recovery, which at the time accounted for approximately 80% of the spent catalysts. E.g., API Comments dated March 21, 1996, at 104- 107, Attachment C.

The predicted result of EPA's refusal to tailor the listings was that the costs related to reclamation rose substantially (up to \$500-800/ton) after the listings took effect in early 1999, while landfilling of the listed catalysts -- in compliance with Subtitle C of RCRA -- became relatively more practical and economical (about \$200/ton) than reclamation. Thus, as API had commented in 1996, id. at 102-104, the direct effect of EPA's "across-the-board" listings was that more spent catalyst was landfilled, while less was recycled and reclaimed. See, e.g., Attachments D3, D5, D6. This in turn resulted in less resource conservation, and less business for catalyst recyclers and reclaimers, which triggered the events that produced the November 1999 Memo, as explained below. If EPA had adopted conditional listings that excluded catalyst managed by recycling/reclamation, these results -- and the subsequent problems and confusion created by the November 1999 Memo -- could have been largely avoided.<sup>21</sup>

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<sup>21</sup> Although the July 5 notice did not officially reopen the 1998 listing rule, API urges EPA to consider amending the spent catalyst listings in order to encourage recycling and conservation of valuable resources, and to undo some of the consequences of the across-the-board listings. Specifically, in Attachment E we present an example of recovery of a valuable material (vanadium) from spent hydroprocessing catalysts that would be suitable for a conditional listing approach.

*Comment NPRA-4*

In addition, NPRA believes that, to encourage recycling as opposed to disposal, catalyst destined for reclaiming of metals should be excluded from the listing rule.

*Response API-3 (page 2) and NPRA-4:* Today's notice and the July 5 notice do not re-open any of the issues from the 1998 rulemaking. Nonetheless, as a courtesy, and because observations about the rulemaking are mingled with some of the commenter's comments on the July 5 notice, EPA will address some of the remarks about the rulemaking, including the suggestion that EPA should have adopted a different approach in the rule. EPA disagrees with the commenter that the Agency should have provided a conditional listing for catalysts destined for recycling. In the 1998 final rule, EPA pointed out that a conditional exclusion for recycling was not a strong option due to concerns of potential risks from management, such as improper storage (63 FR 42158): "EPA believes that the catalyst wastes present several risks beyond those necessarily associated with landfill disposal, including pyrophoric properties and significant levels of benzene and arsenic (all of which may pose risks via pathways other than groundwater exposure, including risks from improper storage or other handling, and risks from uncontrolled air emissions from thermal treatment). Thus, this waste is not a good candidate for a conditional listing. Given the hazardous nature of this waste, EPA believes it is entirely appropriate for it to be transported and stored as hazardous waste before recycling." Therefore, regardless of the costs of management practices, EPA is concerned about potential risks from the storage of these wastes.

The commenter also states that recycling costs rose substantially and that this is a principal reason for a lower quantity of catalyst waste being recycled. However, the commenter provides no documentation to support this claim. Additionally, other factors (not identified by the commenter) could also be responsible for the increase in landfilling rates identified by the commenter. EPA discusses recycling incentives in detail in the 1998 final rule comment response document (see section IV.C.5 of the comment response document). In general, some of the other incentives cited were liability concerns, the market price for vanadium, and corporate commitments to waste minimization principles. Available information indicates that management costs for catalyst recyclers increased only slightly as a result of the 1998 final rulemaking due to the need to manage secondary wastes generated as a result of the reclamation process as hazardous wastes, in compliance with the hazardous waste derived-from rule. Almost all of the catalyst reclaimers had Subtitle C storage permits prior to the 1998 final rule because many catalysts exhibit one or more of the hazardous waste characteristics and, therefore, had to be managed as hazardous wastes prior to the final listing determination. Although EPA does not dispute that there is a significant cost differential between the costs associated with reclamation and disposal of spent catalysts, the cost differential is not a result of the final listing determination. In addition, EPA does not expect a regulatory amendment changing the listing status of spent catalysts that are reclaimed or recycled to have any significant effect upon the future costs of waste management practices.

EPA wants to encourage recycling and reclamation of hazardous wastes, as well as the conservation of resources. It is a particularly important goal for the Agency to encourage the



reclamation of hazardous waste containing significant quantities of recoverable metals. The notice published with this background document encourages all parties to continue to work with EPA to identify ways in which the recycling of catalysts may be encouraged.

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*Comment API-4 (page 3)*

Second, the November 1999 Memo was the culmination of six months of ex parte, closed-door negotiations with the spent catalyst metals reclamation industry, in which EPA was exposed to one-sided, self-serving and second-hand information about refineries' management of spent catalyst from reclamation companies with a direct financial interest in having EPA expand the spent catalyst listings. During that lengthy process, despite the allegations being made about refineries' actions under the 1998 listing rule, EPA neither sought any first-hand information from the refining industry itself, nor asked the refiners to respond to those allegations. In fact, EPA did not even inform the refining industry that the Agency was engaged in such discussions with the reclaimers, or that there was an alleged problem with so-called "dual purpose" catalysts, until after the November 1999 Memo was released. Indeed, API was forced to obtain the documents detailing the extensive contacts between EPA and the reclaimers that resulted in the November 1999 Memo through a subsequent Freedom of Information Act request. Attachments D1-D15. Those documents clearly demonstrate that the issues and rationale ultimately incorporated by EPA in the Memo were inspired by the reclaimers. If EPA had simply sought the refining industry's responses to those issues before making its decision, many of the technical and legal problems created by the November 1999 Memo – including API's legal challenge to that Memo – potentially could have been prevented.

*Comment API-7 (pages 5-8)*

(b) Post-promulgation Ex Parte Discussions Between EPA and Metal Reclaimers

Notwithstanding the refining industry's understanding of the 1998 final rule, from May through November 1999, EPA engaged in ongoing correspondence and a series of private meetings with individuals and groups representing certain members of the industry that reclaims metals from spent catalysts (collectively, the "Reclaimers").<sup>22</sup> The apparent reason for those discussions is evident from the documents that the Reclaimers provided to EPA. Certain members of that industry had made capital and other investments in anticipation of EPA listing spent catalysts as hazardous wastes, in order to comply with RCRA Subtitle C requirements, and evidently in expectation that they would receive large volumes of catalysts from refiners after the new listings took effect. See, e.g., Attachment D3. See also affidavit of J. Jaffe, Gulf Chemical & Metallurgical, dated July 16, 1999, filed in API v. EPA,

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<sup>22</sup> One metals reclaimer, Gulf Chemical & Metallurgical, also challenged the 1998 spent catalyst listings in court. Although Gulf Chemical initially planned to challenge the spent catalyst listings and EPA's rejection of the conditional listing option, it changed its position in mid-1999 – in the midst of the Reclaimers' discussions with EPA – to assert that the spent catalyst listing definitions were too vague. See Attachment F. Gulf Chemical withdrew its challenge immediately after the November 1999 memo was issued.

No. 98-1683; Attachment F. However, as discussed above, the result of the across-the-board listings, and the related Land Disposal Restrictions<sup>23</sup>, was that in many locations it became more economical and practical to dispose of spent catalysts in Subtitle C landfills than to send them to metals reclamation. Thus, the volume of catalysts sent to metals reclaimers dropped significantly. See Attachments D3, D5, D6, D7, F.

In response, the Reclaimers began what became a six-month campaign to persuade EPA to include more catalysts under the listings, to increase the stringency of the Land Disposal Restrictions (“LDR”) for listed catalysts (see n. 11),<sup>24</sup> to change the “K” listings to non-source specific “F” listings, and to specify that reclamation was the preferred method of managing spent catalysts. See, e.g., The Ferroalloys Association’s Spent Catalyst Recycling Group “Request for Consideration: Correction and Clarification Amendments to 63 FR 42110,” August 12, 1999, at 14-18; Attachment D8.<sup>25</sup> In particular, the Reclaimers argued that the source-specific “K” listings for spent catalysts gave refiners too much discretion, and allowed them to manage catalysts from units that performed “multiple functions” or “dual purposes” (i.e., both conversion and contaminant removal) as non-hazardous hydrocracking catalyst. e.g., id. at 1, 5-8, 14-17; Attachments D6, D7. In fact, they acknowledged that the final rule “fail[s] to regulate ... spent catalysts ... from multi-functional hydroprocessing which are [sic] characterized as hydrocracking units....” Attachment D8 at p. 10.<sup>26</sup>

Various Reclaimers also acknowledged that the PSA definition relied on conversion as the distinguishing factor, that catalysts from so-called “multi-functional” or “dual purpose” reactors could meet both of the PSA definitions, that the rules “allow broad interpretation” of the listings by refiners, and that under the final rule refiners may classify their spent catalysts using Form EIA-820. See Attachments D6 - D8, D13.<sup>27</sup> See also Attachment F, Gulf Chemical Memorandum in Support of Motion to File Separate Brief, July 19, 1999, at 2 (EPA’s attempt to define the boundaries “is allowing

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<sup>23</sup> As API pointed out in its 1996 comments, much of the spent catalyst could meet the Land Disposal Restriction standards as generated, without any treatment other than stabilization; thus, the cost of land disposal would rise relatively less than the increased cost of recycling as a result of the listings. API Comments dated March 21, 1996 at 102, Attachment C.

<sup>24</sup> In particular, the Reclaimers urged EPA to make the LDR standards for spent *hydrorefining* catalyst identical to the standards for *hydrotreating* catalysts. See Attachment D8, at p. 16-18. EPA has not made any such change to the LDR rules.

<sup>25</sup> In addition to urging EPA to “clarify” that catalysts from “multi-functional” hydroprocessors should be included under the existing catalyst listing, some reclaimers also urged EPA to expressly list all spent hydrocracking catalyst as hazardous. “Request” at 14-18, Attachment D8.

<sup>26</sup> Although the August 12 “Request for Consideration” is equivalent to a Petition for Reconsideration or for Rulemaking, which EPA typically places in a public docket for comment prior to a decision, EPA did not make the August 12 document available until API requested it under FOIA, well after the November 1999 Memo was issued.

<sup>27</sup> One reclaimer acknowledged that “Under the Final Listing Rule, refineries may classify their spent catalysts using DOE annual form EIA-820, and the preamble seems to say that whatever the refinery selects will be the final classification .... provided that the classification is consistent with the PSA definitions ....” Attachment D13, at 2. API fully agrees with that statement.

refineries broad latitude to self-classify the various types of catalyst. For example, they appear to be able to clarify [sic] dual purpose catalysts as ‘hydrocracking’ (non-hazardous.)”), Attachment F.<sup>28</sup> However, the Reclaimers argued that disposal of catalyst classified as hydrocracking posed the same type of risks as hydrotreating and hydrorefining catalysts, and that some catalysts classified as hazardous under K171/K172 were being or could be landfilled without “proper” treatment. *e.g.*, Attachments D6-D8.<sup>29</sup>

Despite apparently conceding that the rules permitted refiners to classify catalysts from processes meeting the conversion-based PSA definition of hydrocracking, the Reclaimers nonetheless urged EPA to “clarify” that so-called “dual purpose” catalysts are subject to the spent hydrotreating catalyst listing. They argued that EPA should do so because of the possibility that refiners might take advantage of the broad PSA definitions and source-specific listings to “incorrectly classify” catalysts to avoid the hazardous waste listing. *See* Attachments D6 – D8. They also claimed that EPA’s general intent in the rulemaking was to list all spent *hydroprocessing* catalyst that could pose substantial risks to health or the environment (notwithstanding EPA’s repeated statements that *hydrocracking* catalyst was not covered by this listing). *See* Attachments D6, D8 at pp.4 –10.

The Reclaimers met with EPA Office of Solid Waste management and staff at least twice (May 24 and August 12) to make extensive presentations (Attachments D3 – D4, D9 – D11), and communicated frequently by telephone and mail throughout this process. Apparently, EPA management expressed their intent to act on the Reclaimers’ requests as early as August 1999. *See* Attachment D11. In October 1999, EPA sent questionnaires to various metals reclaimers soliciting information on how their customers (i.e., refiners) were using, classifying, managing, and disposing of catalysts, even though EPA recognized that the reclaimers’ information was likely to be “incomplete or second-hand.” Attachment D12.<sup>30</sup> At no time did EPA seek “first hand” information from the companies most involved and knowledgeable about these matters – the refiners themselves; nor did EPA even notify the refiners that EPA was interested in these questions.

The metals reclaimers initially urged EPA to adopt their position regarding “dual purpose” catalysts in the short-term through “technical corrections” to the 1998 rule, and to adopt some of their

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<sup>28</sup>This reclaimer appears to have reversed itself later and argued to EPA that the 1998 listings could be interpreted to include “dual purpose” catalysts. *See* Attachment D13. [Although the original reclaimer’s letter to EPA was claimed to be confidential, EPA provided that document to API in response to our FOIA request. Thus, EPA has determined that document is not confidential. Nonetheless, API leaves it to EPA to determine whether to place that document in the public docket. API will provide a copy of that letter to the docket if EPA so decides.]

<sup>29</sup>Despite this claim, in their August 12 Request, the Reclaimers acknowledged that (as API had pointed out in its 1996 comments on the proposed listing rule, *see* n.11) many of the listed catalysts can meet the LDR standards without extensive treatment. Attachment D8, at p. 12. In effect, what the Reclaimers were really arguing was that the standards can be met without the need for the treatment (e.g., thermal, vitrification) that they claimed EPA had “assumed” would be needed. *Id.* at pp. 12-13. It is possible that the Reclaimers believed that if such treatment were required, refiners would be less likely to send spent catalysts to landfills. *See* Attachments D3, D6, D8.

<sup>30</sup>Identical requests were sent to reclaimers CS Metals and Gulf Chemical on October 14, 1999. Attachment D2.

requests in the long-term through amendments to the listing rule. See Attachment D8 at 15-18. Near the end of their negotiations with EPA, however, one of the reclaimers urged EPA to adopt their position in a letter to the Regional Offices, without first amending the rules.<sup>31</sup> Less than a month later, on November 29, the Director of the Office of Solid Waste sent the Memo in question to all EPA Regional Offices, as well as to state solid waste officials and to the metals reclaimers' association. API was only informed of this development several days later when a copy of the Memo was delivered by mail, without any additional information, support or explanation.<sup>32</sup>

*Response API-4 (page 3) and API-7 (pages 5-8):* EPA does not understand the relevance of these comments. The genesis of the November 1999 memorandum was based on a reading of the brief filed by The Ferroalloys Association and a realization by EPA, noted in the July 5, 2001 *Federal Register*, that the Agency "had no dispute with the petitioner with regard to the regulatory status of the spent catalyst removed from dual purpose reactors. In fact, we saw no grounds for Gulf's challenge to the August 1998 rulemaking given that our interpretation of the final listing descriptions for K171 and K172 is that spent catalysts from petroleum hydroprocessing units that perform hydrorefining and hydrotreatment functions are captured by the listing." In fact, EPA developed the November 1999 memorandum only after having actually drafted a brief that to this effect that argued for dismissal of Gulf Metallurgical's lawsuit. Rather than continue unnecessary litigation, EPA settled the case by issuing the November 1999 memorandum. There is no indication anywhere in the record that EPA reached its conclusion as a result of meetings held with The Ferroalloys Association. Had the Agency done so, there would have been no need for The Ferroalloys Association to file its brief, which requested that the Agency's rulemaking be overturned. EPA believes it had adequate information at the time it issued the November 1999 memorandum as an interpretation of its petroleum listing rule.

In addition, the commenter acknowledges that there were various issues such as LDR treatment standards discussed at the meetings with TFA in addition to the regulatory status of dual-purpose catalysts. During initial meetings with EPA, TFA identified that spent catalyst from multi-functional (i.e., 'dual purpose') hydroprocessing units were potentially being mis-classified and brought this issue and other potential problems to the attention of EPA. EPA did not agree with TFA on all issues raised during the meetings, but did agree on the status of dual-purpose catalysts, the issue which was the subject of the November 1999 memorandum issued by EPA.

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<sup>31</sup>That reclaimer provided EPA a draft letter to serve as a model. Attachment D13. The November 1999 Memo resembles that draft letter in most respects.

<sup>32</sup>EPA apparently made no other effort to notify the refineries of this major development, either before or after the Memo was signed, other than posting it on its website. Soon after API became aware of the Memo, we requested and obtained -- on January 5, 2000 -- a meeting with the Office of Solid Waste, in which we raised our members' major procedural and substantive concerns. Although EPA apologized for their failure to communicate with the industry, that meeting produced no results other than the issuance of a second memo on June 1, 2000 (Attachment A) concerning "incidental and minimal" treatment ( see n.24, below). A second meeting with EPA staff in December 2000 was equally fruitless.

In October 1999, the Agency sent a letter to various reclaimers, not a “questionnaire”. This letter did not request information directly related to the subject of the notice, i.e., the scope of the listing regarding dual purpose reactors. Rather, the information requested in the letter included: trends in quantities of spent catalysts, the use of catalysts, quantities recycled, pretreatment of spent catalysts, other companies treating or recycling these wastes. As this letter noted, the Agency was attempting to determine an effective implementation strategy for the 1998 rulemaking. TFA indicated that various reclaimers had some information on these topics, thus the Agency decided to send the letter to request it. While EPA did not contact API at this time, this is not surprising given that EPA was then in litigation with API over aspects of the 1998 rulemaking.

Nevertheless, it is not improper for EPA to seek out the information it needs to properly clarify any issues and meet with various parties at their request, as was the case with The Ferroalloys Association. However, the Agency has understood the sensitive nature of this topic and made the effort to provide public notice and obtain comment in this proceeding and continues to believe, after having received comments from all sides, that the interpretation at issue was correct.

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*Comment API-5 (pages 3-5)*

(a) Summary of Listing Determination

All of the concerns raised by the November 1999 Memo and the July 5 notice flow from EPA’s efforts in the 1998 final listing rule to distinguish between catalysts used in three types of hydroprocessing – *hydrotreating* and *hydrorefining*, which are subject to the 1998 listings determination, and *hydrocracking*, which is not subject to any listing determinations. See n. 2, above; 63 FR 42155 (1998). Admittedly, this was a difficult task given that all three processes share some similarities, and that prior to the 1998 rulemaking, there was no single, universally accepted means of defining these terms.

In the 1995 proposed listing rule, EPA suggested that it might rely on definitions of these terms used by the Oil & Gas Journal, which defines *hydrorefining* as a process in which up to 10% of the feed is reduced (converted) in molecular size; *hydrocracking* as a process in which at least 50% of the feed is converted in size; and *hydrotreating* as a process involving essentially no conversion. 63 FR 57767, n. 7 (Nov. 20, 1995). Those definitions did not specify how a process with a conversion rate between 10 and 50% should be defined.

In the 1998 final rulemaking notice, EPA promulgated source-specific “K” listings for *hydrotreating* (K171) and *hydrorefining* (K172) spent catalysts. As EPA has explained, “K” listings (40 CFR sec. 261.32) apply to wastes from specific sources, such as process units, as opposed to “F” listings for wastes from “non-specific sources” (40 CFR sec. 261.31). Thus, the spent catalyst listings were clearly based on the processes (or units) from which the catalyst is removed, not on the function of the catalyst itself. Nowhere in the final rule did EPA even suggest that catalyst removed from a *hydrocracking* unit or process might also be considered listed *hydrotreating* catalyst.



In the final rule, EPA also rejected several suggestions, including those made by API and at least one catalyst reclaimer, for defining and distinguishing between non-listed *hydrocracking* and listed *hydrotreating/hydrorefining* catalysts on the basis of specific molecular conversion rates derived from the *Oil & Gas Journal* definitions. 63 FR 42155. See API Comments dated March 21, 1996, at 110-112, Attachment C. In large part, this was due to potential confusion over the classification of processes (as hydrorefining or hydrocracking) involving between 10 – 50% conversion rates.<sup>33</sup> Rather than dealing directly with that issue, EPA instead expressly chose to rely on a longstanding and commonly accepted classification system – not involving specific conversion rates -- used by the Department of Energy (“DOE”) in its Petroleum Supply Annual (PSA).<sup>34</sup> EPA quoted the PSA definition for *hydrocracking*:

A refining process that uses hydrogen and catalysts with relatively low temperature and high pressures for converting middle boiling or residual material to high-octane gasoline, reformer charge stock, jet fuel, and/or high grade fuel oil. The process uses one or more catalysts, depending upon product output, and can handle high sulfur feedstocks without prior desulfurization.

Id. (Emphasis added).

EPA also relied on and quoted the PSA definition for *hydrotreating*:

A refining process for treating petroleum fractions from atmospheric or vacuum distillation units (e.g., naphtha, middle distillates, reformer feeds, residual fuel oil, and heavy gas oil) and other petroleum (e.g., cat cracked naphtha, coker naphtha, gas oil, etc.) [i]n the presence of catalysts and substantial quantities of hydrogen. Hydrotreating includes desulfurization, removal of

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<sup>33</sup>The July 5 Federal Register notice incorrectly states (66 FR 35382) that the 1998 preamble rejected reliance on the *Oil & Gas Journal* definitions from concern that refiners could change operating conditions and classify a unit as a hydrocracker, without altering the amount of *hydrotreatment or hydrorefining* that occurs. However, the 1998 preamble did not mention the possibility of reclassifying a *hydrotreater* as a hydrocracker. Rather, EPA was concerned about the possibility of a *hydrorefiner* being reclassified simply by increasing its conversion rate, given that the *Oil & Gas Journal* defined hydrocracking and hydrorefining in terms of specific conversion rates. See 63 FR 42155. By contrast, hydrotreating was defined in the *Oil & Gas Journal* as effectively producing no conversion. Id. Thus, EPA apparently was not concerned about possible confusion between hydrotreaters and hydrocrackers at that time.

<sup>34</sup> "Upon reviewing all of the relevant materials available in the docket, the Agency believes that the simplest way to differentiate between hydrocracking units and other hydroprocessing units is to rely on the categorization used in the DOE's Petroleum Supply Annual." 63 FR 42155. EPA's reliance on source-specific listings and on the PSA definitions was consistent with its approach during the lengthy, pre-proposal information-gathering phase of this rulemaking and its concurrent 1996 study of additional refinery residuals, including spent *hydrocracking* catalyst. See 63 FR 42112. EPA's study plan, sampling, and listing were based on classification of the unit the catalyst was removed from, not on what treatment functions or degree of treatment the catalyst performed. In 1993, EPA began the hazardous waste listing evaluation process for petroleum refining residuals, gathering samples based on common industrial classifications used by the DOE and defined in its PSA. EPA used this standard classification system to identify the residuals to be considered for sampling, evaluation, proposal, and ultimately for listing.

substances (e.g., nitrogen compounds) that deactivate catalysts, conversion of olefins to paraffins to reduce gum formation in gasoline, and other processes to upgrade the quality of the fractions.

*Id.* (Emphasis added).<sup>35</sup>

Since the regulatory language of the listings promulgated in 1998 did not expressly define these terms, the definitions in the preamble were clearly intended to be controlling on both EPA and the regulated industry. Clearly, the primary difference between those definitions is that “conversion” of heavy molecules [fractions] into lighter molecules [fractions] is the main goal of *hydrocracking*, while “treatment” (i.e., quality control via contaminant removal) is the goal of *hydrotreating*. By contrast, both PSA definitions incorporate – explicitly or implicitly - sulfur removal as a potential part of the process (although that is not the primary purpose of the *hydrocracking* definition). Although the definitions overlap in that respect, there was no indication that the mere occurrence of some form or amount of “treatment” (e.g., desulfurization) in a process that otherwise plainly fits the definition of *hydrocracking* (i.e., conversion) negates that definition and transforms that process into *hydrotreating*.<sup>36</sup>

*Response API-5 (pages 3-5):* EPA disagrees with the points being addressed by the commenter: 1) dual purpose reactors do not qualify for the K-listings due to the manner in which the listings are phrased; and 2) EPA should have used conversion rate in the 1998 final rule to differentiate between hydrotreating/hydrorefining and hydrocracking.

Neither the “K” listing description codified in the regulatory language or in the preamble to the final rule limit the K171 and K172 waste codes to specific units. Both the final listing descriptions and the preamble language describe the scope of the listing based upon the function performed by the units or reactors from which the spent catalysts are removed. If the source of a spent catalyst is from a petroleum refinery industry reactor designed to perform hydrotreating or hydrorefining, then the waste should be properly classified as a K-listed waste (either K171 or K172). See API-12 for a more detailed discussion of the difference between and “F” listed waste and a “K” listed waste.

The commenter’s suggested use of conversion rate as a sole determinant of hydrotreating/hydrorefining versus hydrocracking is problematic. According to the response to comment document from the 1998 final rule, EPA dismissed the use of conversion rates. The *Federal Register* stated,

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<sup>35</sup>Since there is no PSA definition for *hydrorefining*, EPA defined that term in the 1998 preamble as “a refining process with more severe ... operating conditions than the catalytic hydrotreating process defined above ....” 63 FR 42155. Because the definition of *hydrorefining* is of little relevance to the status of *hydrocracking* or “dual purpose” catalysts, under the November 1999 Memo, these comments focus on the definitions of *hydrocracking* and *hydrotreating*.

<sup>36</sup>This focus on conversion – and not treatment – as the main factor for identifying and distinguishing between hydrocracking and hydrotreatment is entirely consistent with EPA’s own 1996 Study of Refinery Residuals, including hydrocracking catalyst. *See* pp. 12-13 & n.34, below.

“Reliance on specific conversion rates may allow for slight changes in operating and accounting practices to result in reclassification of units that would otherwise be considered hydrorefiners.” (August 6, 1998; 63 FR 42155)

EPA disagrees with the commenter that process units either conduct hydrocracking or conduct hydrotreating/hydrorefining. Specifically, the units EPA has identified as dual-purpose units covered by the listing are performing extensive treatment under the PSA treatment definition. EPA acknowledges that the preamble is potentially confusing as to the importance of conversion for classifying dual purpose units that are performing both significant hydrocracking and hydrotreating. EPA believes that the interpretation it has retained in this proceeding is most consistent with the preamble and rulemaking overall, in that it captures wastes from units that are designed to hydrotreat or hydrorefine waste under the PSA definitions. See response to API-6, below.

*Comment Footnote to API-5 (page 4, original footnote number 6)*

The July 5 Federal Register notice incorrectly states (66 FR 35382) that the 1998 preamble rejected reliance on the Oil & Gas Journal definitions from concern that refiners could change operating conditions and classify a unit as a hydrocracker, without altering the amount of hydrotreatment or hydrorefining that occurs. However, the 1998 preamble did not mention the possibility of reclassifying a hydrotreater as a hydrocracker. Rather, EPA was concerned about the possibility of a hydrorefiner being reclassified simply by increasing its conversion rate, given that the Oil & Gas Journal defined hydrocracking and hydrorefining in terms of specific conversion rates. See 63 FR 42155. By contrast, hydrotreating was defined in the Oil & Gas Journal as effectively producing no conversion. Id. Thus, EPA apparently was not concerned about possible confusion between hydrotreaters and hydrocrackers at that time.

*Response Footnote to API-5 (page 4, original footnote number 6):* Although the preamble refers specifically to hydrorefiners’ reclassifying themselves, EPA’s obvious underlying concern at the time, and now, was the potential for refineries that are engaging in activity (hydrorefining or hydrotreating) generating the wastes EPA intended to list escaping coverage by classifying themselves as hydrocrackers. EPA did not address in the preamble the specific subject of dual purpose reactors that are designed to both hydrotreat and hydrocrack. The preamble noted that definitions in the Oil and Gas Journal indicate that hydrotreating includes processes where essentially no reduction in the molecular size of the feed occurs, but does not indicate that no conversion would occur in hydrotreating, or that hydrotreating units could not be operated at more severe conditions to increase conversion rates and, thereby, not be subject to the listing without altering the amount of hydrotreating.

*Comment API-6 (page 5)*

In addition to adopting the PSA definitions – which were familiar to the industry from long use in submitting mandatory information annually to DOE on Form EIA-820 – EPA provided further



clarification of the distinction between listed *hydrotreating* catalyst and non-listed *hydrocracking* catalyst by expressly relying on the refineries' prior classification of their units on those forms. EPA stated in the preamble that:

Based on the Petroleum Supply Annual definitions ..., if a refinery has been classifying its hydroprocessor as a catalytic hydrocracker for the purposes of the DOE's Form EIA-820, spent catalyst from this unit would not be covered by K171 or K172 (with the exception of guard beds...). Conversely, if a refinery has been classifying its hydroprocessor as a hydrotreater .... spent catalyst from this unit would be classified as K171; spent catalyst from a similar unit processing residual fuel oil or heavy gas oil would be classified as K172 [hydrorefining]. 63 FR 42155. (Emphasis added.)

Nothing in that straightforward language even suggested that catalyst from a unit that has been properly classified as a *hydrocracker* under the PSA definition and on Form EIA-820 could somehow be considered as listed *hydrotreating* catalyst, whether or not some desulfurization or other "treatment" also occurred in the unit. Thus, although the 1998 final rule did not adopt API's suggestions for distinguishing between non-listed *hydrocracking* and the listed catalysts, the system EPA did adopt was familiar, well-established and clear to refiners, who reasonably expected EPA to stand by the definitions and guidance provided in the preamble when the rule took effect in February 1999.

*Response API-6 (page 5):* In these comments, as well as in other portions of their comments as noted in other responses, the commenter states that the preamble to the final rule did not mention dual purpose reactors and, with the exception of guard beds, if a refinery had been classifying hydroprocessing units as hydrocrackers for the purpose of the DOE form EIA-820, spent catalyst from such a unit should not be covered by K171 or K172.

EPA admits that confusion may have been created by the sentence in the preamble to the August 1998 final rule that states that "if a refinery has been classifying its hydroprocessor as a catalytic hydrocracker for the purposes of DOE's Form EIA-820, spent catalysts from this unit would not be covered by K171 or K172 (with the exception of guard beds...)." As detailed in the discussion of today's notice, when EPA wrote the section of the final rule preamble discussing the definitions of hydrotreating, hydrorefining, and hydrocracking, it did not have dual purpose hydroprocessing units in mind. As a result, the discussion did not address the unusual situation of petroleum hydroprocessing units or reactors that legitimately meet both the PSA definition of hydrotreating and the PSA definition of hydrocracking

The Agency's intention in the November 29, 1999 and June 1, 2000 memoranda was to address this confusion and clarify that spent catalysts removed from hydroprocessing units that meet the PSA definition of hydrotreating are listed hazardous wastes, even in cases where the unit also meets the PSA definition of hydrocracking. EPA also clarified that it does not consider spent catalysts from a petroleum hydroprocessing reactor to be a listed hazardous waste solely because some incidental and minimal amount of hydrotreatment of feeds occurs in a hydrocracking unit.

In addition, the Agency, in the November 1999 memorandum, clarified that the listing should not be interpreted as providing that spent catalysts from any hydrocracking process - regardless of whether or not hydrotreatment also occurs - are, by definition, outside the scope of the K171 and K172 listings.

EPA further disagrees with the underlying premise of the commenter's argument that the PSA definitions of hydrotreatment and hydrocracking are mutually exclusive. The definitions clearly overlap. Individual hydroprocessing units may meet both definitions. The fact that any unit can legitimately be classified as a hydrocracker does not preclude the unit from meeting the definition of a hydrotreater or a hydrorefiner.

Based on guidance provided in the preamble to the final rule, including EPA's use of definitions that categorize hydroprocessing units based on the function performed by the unit, and EPA's clear rejection in the final rule of general refining process definitions (*e.g.*, definitions provided by the Oil and Gas Journal, that base hydroprocessor definitions on the percent of conversion obtained within a unit), the Agency believes that the preamble reflects our intent to base the scope of the final listings on the function performed by the units or reactors in which spent catalysts are generated. Therefore, when EPA clarified in its November 29, 1999 and June 1, 2001 memoranda that spent catalysts removed from dual purpose reactors are included within the scope of the hazardous waste listings based on the function performed by dual purpose reactors, EPA was consistent with the overall thrust of the discussion provided in the preamble to the final rule.

*Comment API-8 (pages 8-9)*

(c) Relevant Provisions of the November 1999 Memo

In the November 1999 Memo, EPA adopted the Reclaimers' terminology and described "dual purpose" reactors as those that treat "feed to remove contaminants, such as sulfur ... (i.e., hydrotreating), in addition to converting petroleum molecules to light fractions (i.e., hydrocracking)." The Memo also stated that "it ha[d] come to the Agency's attention" that some parties believe that the 1998 final Listing rule allows refineries to "self-classify" spent catalysts from "dual purpose" hydroprocessors as non-listed hydrocracking catalysts.<sup>37</sup> EPA then acknowledged that it had relied on the PSA definitions of hydrocracking and hydrotreating, as used for completing Form EIA-820, as the simplest way to differentiate between hydroprocessing catalysts. Nonetheless, the Memo then purportedly "interpreted" the final rule to mean that the catalyst listings capture catalysts from a "dual

<sup>37</sup>EPA adopted the reclaimers' term "self-classify" in the November 1999 Memo, and in the July 5 Federal Register notice, as if self-classification was a new and suspect practice. However, the opposite is true; as a practical matter, "self-classification" has long been the typical method for generators to determine whether their wastes are hazardous. Generators of solid wastes routinely have to decide whether a given waste meets EPA's criteria for identification as hazardous waste - either by specific listing or by characteristic. Of course, the burden is on the generator to make that determination correctly, and the penalties for making an incorrect "self-classification" are steep.

purpose” unit in which hydrotreating (or hydrorefining) occurs, “regardless of whether hydrocracking also occurs” in the unit.

EPA’s primary explanation for this conclusion was simply that the PSA definitions and the final rule define hydrotreating and hydrocracking “on the basis of the type of hydroprocessing operation in which the catalyst was used.” The Memo also claimed that EPA’s “interpretation” was “consistent with the intent of the listing to identify wastes containing the hazardous constituents that are removed by catalytic hydrotreating or hydrorefining, regardless of whether hydrocracking is also occurring.”

The Memo went on to assert that, notwithstanding the statements in the preamble to the 1998 rule concerning Form EIA-820, refiners could not “self-classify” catalysts from “dual purpose” processors as non-listed *hydrocracking* catalysts by “merely identifying a unit as a hydrocracking unit when reporting to DOE.” The Memo claimed – inaccurately – that the preamble only said that “if a refinery has been classifying its hydroprocessor as a hydrocracker [in its reports to DOE], the unit would generally not be covered by K171/172.” (Emphasis added.) Despite the fact that the Memo acknowledged that the 1998 rule “relied on” the PSA definitions, it then asserted that classification of “dual purpose” catalyst as hydrocracking “based on the fact that some hydrocracking takes place” [even though consistent with the PSA definition] does not avoid the hazardous waste listing.

Finally, in response to the reclaimers’ request (and notwithstanding evidence to the contrary, see nn.11, 17, above), the Memo asserted that treatment of spent catalysts listed under K171 and K172 “may require a combination of thermal treatment ..., vanadium recovery, and stabilization ...” to achieve the land disposal restrictions.

*Comment Footnote to API-8 (page 8, original footnote number 21)*

EPA adopted the reclaimers’ term “self-classify” in the November 1999 Memo, and in the July 5 Federal Register notice, as if self-classification was a new and suspect practice. However, the opposite is true; as a practical matter, “self-classification” has long been the typical method for generators to determine whether their wastes are hazardous. Generators of solid wastes routinely have to decide whether a given waste meets EPA’s criteria for identification as hazardous waste – either by specific listing or by characteristic. Of course, the burden is on the generator to make that determination correctly, and the penalties for making an incorrect “self-classification” are steep.

*Response API-8 (pages 8-9) and Footnote API-8:* See the Agency’s response to comment API-13 for use of the term “dual-purpose.”

EPA disagrees with the comment that the type of “self-classification” advocated by the commenter in this case is a typical method for generators to determine whether their wastes are hazardous. As the comment notes, EPA may allow a type of “self-classification” by a generator under a hazardous waste listing, but the generator has the burden to make the determination correctly. This is far different from a determination advocated by the commenter that a generator may simply state that it reports a unit to the Department of Energy as a hydrocracker and the waste is absolutely excluded from

the hazardous waste listing. EPA still believes that the generator has the burden, in this case, to classify the unit correctly. In any event, generators will still self-classify in the usual sense under EPA's interpretation. The issue here is the basis for self-classification. The problem with the commenter's interpretation of the rule is that it allows generators to self-classify in ways that undercut the listing and exclude the precise wastes the listing is designed to capture.

[NOTE: THE FOOTNOTE AND RESPONSE WERE SEPARATED OUT PER ALAN'S COMMENTS. THE RESPONSE TO THE FOOTNOTE IS ESSENTIALLY THE SAME AS THE RESPONSE TO THE REST OF API-8. IS THERE ANY REASON TO HIGHLIGHT/EMPHASIZE THIS FOOTNOTE AS A SEPARATE COMMENT?]

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*Comment API-11 (page 9)*

Second, the November 1999 Memo effectively repudiates conversion as the main distinguishing factor between hydrocracking and hydrotreating catalysts, despite the fact that under the PSA definitions conversion is plainly the key difference between the two processes, since "treatment" (i.e., removal of contaminants) is common to both. See p. 5, above. The November 1999 memo virtually ignores that fact, and discusses "treatment" as if it were the sole factor that determines whether a catalyst is considered hydrocracking or hydrotreating. In effect, the memo asserts that the presence of any non-minimal amount of "treatment" completely overrides the PSA definition of hydrocracking (despite the statements in the 1998 preamble expressly relying on the PSA definitions), so that catalyst from a unit or process that otherwise unquestionably fits the PSA definition of *hydrocracking* cannot be so classified.<sup>38</sup>

*Response API-11 (page 9):* EPA disagrees with the commenter that the PSA definitions use conversion as a primary factor to determine the difference between hydrotreating or hydrorefining and hydrocracking. EPA acknowledges that the 1998 preamble is potentially confusing in that it indicated that units that previously have been classified as hydrocrackers are not covered by the listing. However, as detailed in the preamble (63 FR 42155; August 6, 1998), "Reliance on specific conversion rates may allow for slight changes in operating and accounting practices to result in reclassification of units that would otherwise be considered hydrorefiners. Similarly, use of fractionation could be interpreted to include stripper columns commonly employed after hydrotreating and hydrorefining." In effect, EPA chose to place more weight on the treatment portion of the PSA definition of hydrocracking over the use of numerical conversion rates. The PSA definitions of hydroprocessing take into account the function or operation performed by a reactor when distinguishing between hydroprocessing operations. EPA relied on the PSA definitions because they are operational definitions. Although a dual purpose reactor may meet the PSA definition of hydrocracking, the unit is

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<sup>38</sup>Despite the November 1999 Memo's complete disregard for conversion as the factor that distinguishes a hydrocracker, the June 2001 Background Document that accompanied the July 5 Federal Register notice ("Clarifying the Scope of Petroleum Hazardous Waste Listings: Supplemental Information Concerning Hydroprocessing Units") cannot avoid describing hydrocracking in relation to conversion and conversion rates.

also clearly designed to perform a hydrotreating function (i.e., designed to remove sulfur, nitrogen, and heavy metals from the feed). Therefore, it is EPA's determination that the spent catalyst from dual purpose units is listed hazardous waste because the final rule, as well as the PSA, defines a spent catalyst as hydrotreating/hydrorefining or hydrocracking on the basis of the type of hydroprocessing operation in which the catalyst was used. This is consistent with the intent of the listing to identify wastes containing the hazardous constituents that are removed by hydrotreating or hydrorefining, regardless of whether hydrocracking also is occurring.

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*Comment API-12 (pages 9-10)*

Third, as a result of the elevation of treatment to the sole determining criterion, the November 1999 Memo also effectively abandons – without rulemaking -- the source (i.e., unit) specific listing approach of the “K” listings, and moves to a function (or operation) based approach more like the non-source specific “F” listings.<sup>39</sup> That is, the Memo makes identification of the catalyst source irrelevant, since catalyst from any source -- even one that is undeniably a “hydrocracker” by definition and usage - is still covered by the K171 listing simply because some treatment also occurs in the source. As EPA later acknowledged (*see* n. 1, above), since some degree of “treatment” occurs in almost all types of traditional hydrocrackers, this approach could theoretically subject virtually all traditional hydrocracking catalysts to the K171 listing, despite 1998 rule's explicit confirmation (superficially reiterated in the November 1999 Memo itself) that hydrocracking catalyst is not subject to that listing determination.<sup>40</sup>

*Response API-12 (pages 9-10):* EPA disagrees. In this part of the comment, the commenter argues that the interpretation of the K171 and K172 listings to include catalysts from dual-purpose units would somehow run contrary to the intent of the K listings by using a “source” approach rather than a “unit” approach. The Agency points out that neither in the listing descriptions codified in the regulatory language nor in the preamble to the final rule did EPA limit the listings to specific units. Both the final listing descriptions and the preamble language describe the scope of the listing based on the function performed by the units or reactors from which the spent catalysts have been removed. In addition, while the commenter is correct that some K listings are unit specific (such as K051 - API separator sludge from the petroleum refining industry), many K listings are not unit specific, but process-specific from a particular industry. For example, there are 16 separate listings within the K-listings that specify “wastewater treatment sludge” from a particular industry (e.g., from the production of toxaphene (K041)). The wastewater treatment sludge listings are not necessarily from a particular type of unit.

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<sup>39</sup>In effect, this approach function-based grants the Reclaimers another of their specific requests, *see* p. 6 above, although even the Reclaimers recognized that a long-term expansion of the catalyst listings to should be accomplished by actually amending the “K” listings to “F” listings. *See, e.g.*, Attachment D8.

<sup>40</sup>EPA acknowledged this problem, as raised by API in response to the November 1999 Memo, in its June 1, 2000 Memo to the Regions. Attachment A. EPA partially addressed the problem in that memo by clarifying that the November 1999 determination does not apply to hydroprocessors that perform only “incidental and minimal” hydrotreatment. Unfortunately, as discussed below, EPA has failed to provide any guidance on what the term “incidental and minimal” actually means.



Instead, the listings can be derived from any wastewater treatment process involved in the production of the specified product. In fact, very few of the K listings actually specify a specific unit. The major difference between the F and K listings is that the K-listings generally identify wastes generated by a particular industry and are often more specific with regard to where the waste is formed. Therefore, the Agency's interpretation that spent catalyst from dual-purpose reactors is included in the listing is consistent with the Agency's designation of other K-listings.

Also see response to comment API-14 below for EPA's response regarding API's comment of "treatment" occurring in hydrocracking reactors.

*Comment API-13 (pages 10-11)*

Finally, the November 1999 Memo bluntly repudiated the clear statements in the 1998 preamble that refiners could rely on their prior EIA-820 classifications as a basis for determining whether catalyst from a specific unit was or was not covered by the listings.<sup>41</sup> In fact, the Memo significantly misquotes the preamble. The Memo claims that the preamble said if refinery has been classifying a unit as a hydrocracker on Form EIA-820, the unit "would generally not" be covered by K171/172. In fact, the preamble does not contain the qualifier "generally" at all. The preamble plainly said that catalyst from such a unit "would not be covered by K171 or K172 ..." 63 FR 42155. See p. 5, above. That statement was a clear, unequivocal and unqualified commitment, as binding on EPA as on the refiners. It is axiomatic that EPA is legally obligated to follow its own rulemaking decisions, and cannot disregard its regulatory commitments simply because it later changes its mind, without going through the rulemaking process.

The Memo apparently attempts to avoid the clear meaning of the 1998 preamble language by asserting that the rule does not permit refiners to "avoid" a listing by self-classifying a unit as a hydrocracker "based solely on the fact that some hydrocracking takes place ..." This is simply a meaningless non sequitur and does nothing to explain why EPA is apparently reneging on the preamble language. Further, it ignores the facts: (i) that there is no other basis on which to classify a unit as a hydrocracker except that "hydrocracking [as defined by the PSA] takes place;" and (ii) that in a given case, the classification of a so-called "dual purpose" unit on Form EIA-820 may fit perfectly and undeniably within the PSA definition of hydrocracking (e.g., where conversion is unquestionably the main purpose and treatment is relatively minor), and may be a longstanding classification that predates the 1998 listing by many years. In such a case, the refiner would be acting consistently with EPA's 1998 rules, as explained in the preamble, with no purpose of "avoiding" the listing. Yet the 1999 Memo declares that the refiner cannot rely on what the preamble plainly said it could. Even if EPA was attempting to address more questionable situations, i.e., where a refiner re-classified a unit on EIA-820

<sup>41</sup>In a letter dated June 1, 2000, from EPA to Motiva Enterprises, EPA again expressly repudiated the preamble statements regarding reliance on past EIA-820 classifications with regard to a unit that EPA conceded fits the PSA definition of "hydrocracker" and that had consistently been classified that way on EIA-820 forms for many years. See Attachment G.

after the 1998 rule was announced, and where the amount or importance of conversion is questionable, the Memo goes far beyond that.<sup>42</sup>

In addition, EPA's statement in the Memo (and the July 5 notice) that it relied on the PSA definitions as merely the "simplest" way to differentiate catalysts – and the implicit suggestion that makes the PSA definitions less conclusive – does not alter the fact EPA did rely on those definitions, and clearly led refiners to believe that they could rely on them, as well as on past EIA-820 classifications consistent with those definitions.<sup>43</sup>

*Response API-13 (pages 10-11):* As detailed in the response to API-6, EPA admits to causing confusion as a result of the preamble language about the use of form EIA-820. The Agency does not rely on reporting on other forms to make hazardous waste determinations and this listing is no different. If EPA wanted to rely on the designations on the EIA form as part of the listing determinations, it would have used that language directly in the regulation. The fact that this language was in the preamble showed that EPA simply wanted to provide guidance to the regulated community and the subsequent memoranda and letters clarify that the preamble language can be confusing in determining the regulatory status of waste derived from dual purpose reactors.

Dual purpose reactors are hydroprocessing reactors that are designed to perform hydrotreatment or hydrorefining functions while simultaneously conducting hydrocracking of petroleum feedstock. These reactors are designed to process heavy feeds such as atmospheric tower bottoms or vacuum reduced crude having a high content of contaminants such as metals, sulfur, and sediments. In such units, pretreatment of the feed to remove sulfur and other contaminants is not required, unlike typical second-stage hydrocracking reactors that generally accept pretreated feed. Another distinguishing factor that sets dual purpose reactors aside from the more traditional hydroprocessing reactors is that they are specifically designed or operated to treat and crack feedstock in the same catalytic bed. EPA has identified that three specific types of dual purpose hydroprocessing reactors are currently in use at petroleum refineries (i.e., H-Oil, the LC-Fining, and the T-Star), all of which are expanded- or ebullating-bed processes. However, the scope of the spent catalyst listings, as it applies to dual purpose units, is not limited to the three units named here. The scope of the hazardous waste listing is based upon the function performed by the reactor and is not specific to the name or brand of the reactor.

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<sup>42</sup>These comments only address cases where the unit or process in question clearly fits the PSA definition of hydrocracking. If a refiner actually misclassified a unit or a process as a hydrocracker, when it did not fit the PSA definition, in order to avoid the listing, the refiner would be subject to appropriate enforcement by EPA. If EPA was genuinely concerned about that possibility, it should have addressed the problem directly and properly through enforcement or by appropriate amendment of the rules, and not by an unlawful, post hoc "clarification" of the rules.

<sup>43</sup>In a June 1, 2000 letter to Motiva (Attachment G), the Office of Solid Waste asserts that its preamble statements regarding reliance on EIA-820 classifications are not binding because "EPA at that time was not presented with the classification of spent catalysts removed from units that perform both hydrotreating and hydrocracking functions." That statement is not only contradicted by other statements in the same letter, it is contrary to the fact that EPA was well aware during the listing rulemaking that hydrocrackers can and often do perform some hydrotreating. See pp. 12-13, below.

Comment API-14 (pages 11-12)

### Fundamental Flaws in EPA's Rationale<sup>44</sup>

EPA's explanations for claiming that virtually all "dual purpose" catalysts are covered by the spent hydrotreating catalyst listing is circular, irrational, internally inconsistent, arbitrary and factually incorrect.<sup>45</sup> Indeed, EPA's primary explanation for its conclusion is simply that the PSA definitions and the final rule define hydrotreating and hydrocracking "on the basis of the type of hydroprocessing operation in which the catalyst is used." This circular and meaningless statement is equivalent to saying that 'hydrocracking catalysts are those used in hydrocracking operations and hydrotreating catalysts are those used in hydrotreating operations.' Obviously, this does not explain why catalysts from "dual purpose" units must be classified exclusively as listed hydrotreating and not as non-listed hydrocracking catalysts, in cases where a "dual purpose" unit could properly fit within either PSA definition "on the basis of the type of hydroprocessing operation in which the catalyst was used." Most of the rest of EPA's rationale for its decision, in both the Memo and the July 5 notice, are essentially variations on this same theme.

For example, EPA basically asserts that the broad definition and listing of *hydrotreatment* contains no "exception" or "exclusion" for units or processes that also perform hydrocracking; thus, if the process involves any significant treatment, it does not matter whether the process plainly meets the PSA definition of hydrocracking, even if hydrocracking is undeniably the main purpose of the process. e.g., 66 FR 35380-35381.<sup>46</sup> EPA repeatedly asserts that the definition of hydrocracking cannot override the listing of hydrotreating catalysts, so it concludes that the listing must apply in every case where the catalyst could be classified as either hydrocracking or hydrotreating.

What EPA completely ignored is that, since almost all hydrocrackers perform some treatment, its November 1999 Memo effectively overrides and largely nullifies the 1998 decision that hydrocracking catalysts are not covered by the listing. In effect, what EPA is doing is to make that

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<sup>44</sup>The July 5 Federal Register notice embellishes on the November 1999 Memo's explanation in several respects. Although that post hoc notice cannot lawfully add weight to or rehabilitate the November 1999 Memo, any more than the Memo could lawfully revise the 1998 rule, we will address some of those recent embellishments where appropriate. Nonetheless, the Memo must stand or fall on its merits.

<sup>45</sup>The July 5 Federal Register notice also suggests another rationale that does not appear in the November 1999 memo, namely EPA's concern that defining hydrocracking catalyst solely in terms of conversion could allow refiners to reclassify a unit to avoid the listings by changing certain operating conditions without altering the amount of *hydrotreatment or hydrotreating* that occurs. 66 FR 35382. However, as explained in n. 6 above, the July 5 misstates what EPA was actually concerned about in the 1998 rulemaking. EPA was concerned then about the possibility of a *hydrotreater* being reclassified as a *hydrocracker* simply by increasing its conversion rate. See 63 FR 42155. EPA was not concerned about possible misclassification of *hydrotreaters* as hydrocrackers at that time.

<sup>46</sup>Contrary to EPA's suggestion, refiners are not seeking a "hydrocracking exemption" to the hydrotreating listing. To the contrary, all API and the refiners seek is for EPA to stand by its plain statements that hydrocracking catalyst is not covered by the 1998 listing. If EPA fails to do so, then those statements have no meaning.



1998 decision meaningless, and the PSA definition of hydrocracking based on conversion irrelevant. It is EPA that has created an enormous “exception” to its 1998 decision on the status of hydrocracking, i.e., hydrocracking catalysts are not covered by the K171 listing, except when they the hydrocracker may be considered a dual purpose unit. Of course, EPA is not authorized to simply read its own prior rulemaking decisions out of existence without going through the rulemaking process.<sup>47</sup>

*Response API-14 (pages 11-12):* The commenter takes issue with the manner with which EPA differentiates the terms hydrotreating, hydrorefining, and hydrocracking. While the Agency does not deny that conversion is one part of the PSA definitions, EPA determined in the 1998 final rule that conversion rate is not an appropriate means of differentiating between hydrotreating, hydrorefining and hydrocracking. This issue is highlighted for dual-purpose units. Assuming that a dual-purpose reactor has a significant amount of both conversion and treatment, a reliance on conversion to differentiate hydrotreatment from hydrocracking would allow the regulated community to improperly identify catalyst that is clearly within the scope of the listing. EPA’s position is not circular or meaningless. EPA is relying on the PSA treatment definition provided in the preamble and the promulgated regulatory language to conclude that a unit that is designed to hydrotreat within the meaning of the PSA definition, but also designed to simultaneously conduct hydrocracking, is covered by the listing.

The Agency addressed the issue of some treatment occurring in all hydrocracking units in a June 1, 2000 memorandum. It stated, “I would like to clarify that we do not consider spent catalysts from a petroleum hydroprocessing reactor to be a listed hazardous waste (meeting the definitions of either K171 or K172) solely because some incidental and minimal amount of hydrotreatment of feeds occurs in such unit. These catalysts are, however, subject to evaluation against the existing hazardous characteristics.”

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*Comments API-9 and API-10 (page 9)*

November 1999 Memo: Differences from 1998 Final Rule and Major Flaws in Rationale

The November 1999 Memo differs from, and is inconsistent with, the 1998 listing determination in several fundamental ways. The rationale for the decision contained in the Memo – as reiterated in the July 5 Federal Register notice – is also arbitrary and illogical and otherwise fundamentally flawed. Thus, the November 1999 Memo is in every way an unlawful attempt to revise the 1998 listing rule.

First, it should be noted that the very term “dual purpose,” as used in the Memo to describe units which perform both hydrotreating and hydrocracking functions, was never mentioned in the 1998 rulemaking, or used by the refining industry itself prior to November 1999, simply because there was

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<sup>47</sup>It does no good for EPA to claim that it has not yet made a final decision not to list spent hydrocracking catalysts. See n. 2, above. The 1998 decision that the K171/172 listings do not apply to hydrocracking catalyst has meaning of its own, whether or not EPA ever decides, after rulemaking, to list or “no list” hydrocracking catalyst per se.

no such term at the time of the final rule. In fact, that expression was coined by the reclaimers in their negotiations with EPA in 1999, and simply adopted by EPA in the November Memo.

*Comment API-15 (pages 12-13)*

Another variation on EPA's theme is that virtually all dual purpose catalysts are covered by the listing simply because that is what EPA now says it intended in the final rule. However, EPA provides no valid support for this purported intent. In fact, if it were true that EPA always intended this result, then why did EPA go to such pains to rely on the PSA definitions in an attempt to differentiate between non-listed hydrocracking catalysts and listed hydrotreatment catalysts, since EPA knew at that time that hydrocrackers can and often do perform some treatment? Similarly, why did EPA expressly allow reliance on prior EIA-820 classifications of hydrocrackers as a basis for determining what was not covered by the listing, if it had always intended that dual purpose catalysts (which may have been properly classified as hydrocrackers on those forms for many years) would nonetheless be subject to the listing? If that were actually EPA's intent, why did it not say so at the time and avoid the need for finding ways to distinguish between hydrotreating and hydrocracking?

EPA cannot claim that it was unaware in 1998 that many hydrocrackers could be considered "dual purpose" units, in that some treatment also occurs in the unit.<sup>48</sup> In fact, the PSA definition for *hydrocracking* clearly states that hydrocrackers have the capability of handling "high sulfur feedstocks without prior desulfurization" (63 FR 42155).<sup>49</sup> Thus, by PSA definition, hydrocrackers can and do remove sulfur, including high amounts of sulfur. Moreover, EPA expressly recognized, as early as 1996, that hydrocrackers and hydrocracking catalysts can remove both sulfur and nitrogen, in addition to molecular conversion. EPA "Study of Petroleum Refining Residuals: Industry Study," August 1996, at p. 35. Attachment H.<sup>50</sup> Since removing sulfur/nitrogen is considered treatment, and sulfur/nitrogen removal occurs in hydrocrackers, then logically such treatment is not a criterion that differentiates between hydrocracking and hydrotreating. Yet the 1998 rule did attempt to differentiate them, and EPA did not address the fact that both processes have treatment in common. Thus, since EPA evidently did not think at that time that treatment alone was sufficient to trigger the listing, it could not have "intended" all dual purpose catalysts to be covered by the hydrotreating listing.

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<sup>48</sup>The June 1, 2000 letter to Motiva (Attachment G) asserts that EPA was unaware of dual purpose processes in 1998, but that assertion is inconsistent with the facts described in the text, and with EPA's claim that it always "intended" catalysts from such units to be listed. EPA could not have an intent as to something of which it was unaware at the time.

<sup>49</sup>The Reclaimers themselves also asserted (Attachment D8, at p. 8) that EPA was informed of the dual function of hydrocracking catalyst by API's 1996 comments in the rulemaking.

<sup>50</sup>"Hydrocracking process are similar to hydrotreating and hydrotreating processes in that they remove ... sulfur and nitrogen from the process feeds, but differ in that they also serve to break heavier fractions into lighter fractions. ... catalysts employed in hydrocracking reactors have multiple functions. First, ... desulfurization/ denitrification reactions. In addition, ... cracking reactions." That study was performed concurrently with the 1998 rulemaking and by the same EPA office.

Further, EPA's claim in the Memo that applying the hydrotreating listing to "dual purpose" catalysts is consistent with the "intent of the listing to identify wastes containing the hazardous constituents that are removed by ... hydrotreating or hydrorefining, regardless of whether hydrocracking is also occurring," is also illogical and inaccurate. First, it again purports to render meaningless the 1998 decision that hydrocracking catalyst is not covered by the listing. Moreover, since EPA knew at the time of the rulemaking that hydrocracking catalysts could also remove sulfur, nitrogen and other contaminants from feed, and that spent catalysts from some types of hydrocrackers closely resemble hydrotreating catalyst (*see* n. 34, above, 63 FR 42155), and yet clearly stated that hydrocracking catalyst was not being listed, it follows that EPA did not intend at that time for all catalysts to be listed simply because they contain the same constituents. If that were true, then the 1998 attempt to differentiate between hydrocracking and hydrotreating catalysts would have been pointless and unnecessary. In any case, since the constituents at issue (arsenic and benzene), 63 FR 42154, do not appear to be sprung by the hydrotreatment process per se (*see* n. 41, below), that is not a logical basis for classifying "dual purpose" catalyst as hydrotreating instead of hydrocracking.

*Response API-9 and API-10 (page 9) and API-15 (pages 12-13):* EPA disagrees with the commenter. What this commenter appears to consistently overlook is that the listing is based on the actual treatment function of the catalyst within the unit, and not the name of the unit as identified by the general refinery process description. As discussed in the response to API-12 above, the "K" listings should be viewed from the process perspective. Dual purpose reactors have two activities occurring within the unit, both hydrotreating and hydrocracking. Therefore, the catalyst wastes should be considered listed hazardous wastes (K171 or K172). As a note of caution, it is important for petroleum refiners to consider their units beyond the initial EIA-820 determination and consider all reactions occurring within the unit. If a petroleum refiner is unclear about whether a unit is a "dual purpose" unit, EPA can respond to inquiries on a case-by-case basis.

Although EPA acknowledges that the rulemaking record contains information regarding dual purpose reactors, EPA did not have these units in mind when it wrote the portion of the preamble cited by the commenter. The preamble discussion was written with regard to the more traditional, single-purpose units. EPA notes that the administrative record for the petroleum rulemaking is voluminous and that the preamble was written under the considerable time pressure of a consent decree obligation. As a result, EPA acknowledges that the preamble is not clear on the status of dual-purpose units.

Regarding the basis for classifying dual purpose catalysts as listed hazardous waste, EPA disagrees with the commenter that just because the constituents at issue are not exclusively generated from hydrotreating (but are also generated from hydrocracking), dual purpose catalysts should not be classified as hydrotreating because they also perform a very significant hydrocracking function. Dual purpose reactors are designed to perform hydrocracking and simultaneous hydrotreating, thus the catalysts become contaminated with similar constituents. These spent catalysts from dual purpose reactors are expected to be contaminated with sulfur compounds, metals, and organic compounds, which served as bases for listing hydrotreating and hydrorefining catalysts. EPA chose not to perform a listing determination for hydrocracking catalyst not because it did not contain the contaminants of

concern, but because it was not obligated to do so under the terms of the Consent Decree; had a listing determination been made for hydrocracking catalyst, a different listing outcome may have resulted.

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*Comment API-16 (pages 13-14)*

Finally, it is specious for EPA to claim that the 1998 regulatory language supports the November 1999 Memo. 66 FR 35380. The regulatory language says *nothing* that defines hydrotreating or distinguishes it from hydrocracking, and therefore adds nothing to clarify EPA's original intent. The only explanation of what the terms hydrotreating and hydrorefining, as used in the listing regulatory language, mean is found in the preamble. EPA cannot now suggest that the word "hydrotreating" in the regulatory language has any meaning apart from the explanation in the preamble; without the preamble it has *no* meaning, and we have already shown that the preamble cannot have the meaning EPA now wants to give it.

In sum, the most that EPA can derive from the 1998 rulemaking is that some catalysts can legitimately be classified as either non-listed hydrocracking or listed hydrotreating catalysts by definition,<sup>51</sup> and that, the overlapping PSA definitions could cause some potential confusion, as EPA asserted in the July 5 notice. 66 FR 35380. API would disagree with that conclusion, since the refining industry had a clear grasp of what the PSA definitions meant and how the listing rules should apply. In any event, any potential confusion from the overlapping definitions does not necessarily make the 1998 rule wrong or hopelessly ambiguous. Regulations can and often do allow regulated parties to make some choices, any of which could be correct, as long as they abide by the criteria specified in the rule. In this case, the fact that some catalysts could fit either definition would explain why EPA expressly relied on past EIA-820 classifications as a further clarification. That is, if it was intended, as EPA now claims, that performance of some treatment automatically trumps the hydrocracking definition and makes a catalyst exclusively hydrotreating, then why did EPA rely on those forms at all? If there were no choices to be made, why didn't the final rule simply say that any treatment subjects the catalyst to the hydrotreating listing, without regard to the EIA-820 forms? Since EPA did rely on EIA-820's, that indicates the Agency meant to defer somewhat to refiners' good faith judgment in making choices that complied with either of the PSA definitions.<sup>52</sup>

*Response API-16 (pages 13-14):* The commenter takes issue with how to classify a unit between hydrotreating and hydrocracking. However, such classification does not determine how generated waste is regulated. The listings are dependent on the function performed by the unit. Also, contrary to the commenter's suggestion, this interpretation does not mean that the guidance provided in the preamble is pointless. EPA acknowledges that classification is not always free from doubt and that

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<sup>51</sup>Even the Reclaimers conceded as much in their initial discussions with EPA. See pp. 6-7, above.

<sup>52</sup>Of course, if any refiner improperly classified a unit as a "hydrocracker" on an EIA-820 Form that did not actually meet the PSA definition of "hydrocracker" in order to avoid a hazardous waste listing, that would be a potential subject for traditional enforcement.

determinations will at times need to be made on a case-by-case basis as to whether a waste is covered. EPA does not take the approach that every hydrocracking unit that performs any treatment is covered by the listing; for the two units that EPA has been asked about, EPA has identified one, the second stage reactor of Chevron's Isocracking unit, as a hydrocracker that generates waste catalyst not covered by the listing. In making this determination, it was relevant that the predominant function of the unit was hydrocracking within the PSA definition and that any treatment performed by the unit was minimal and incidental.

See the response to comment API-6 with regard to the use of EIA-820 forms in listing determinations.

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*Comment API-17 (page 14)*

In any event, even if EPA did not originally understand or intend that the definitions would overlap as to "dual purpose" catalyst, and inadvertently created some "ambiguity" or potential confusion, that does not justify attempting to resolve the problem retroactively by fiat instead of prospectively by rulemaking.<sup>53</sup> Even if imperfect as drafted, the rules say what they say. EPA has no legal authority to "clarify" an ambiguous or incorrect rule without rulemaking when the clarification changes the scope and increases burdens of the rule. *E.g., General Electric Co. v. EPA*, 236 F.3d 749 (D.C. Cir. 2001). Thus, if EPA decided in 1999 that it wanted to narrow the 1998 definition of hydrocracking and expand the scope of the hydrotreating listing, it should have proposed to amend the rules accordingly.

*Comment API-18 (page 14)*

Similarly, if EPA is concerned – as first the reclaimers and now EPA suggests -- that refiners would take advantage of the purported ambiguity of the 1998 definitions and listing to misclassify their residuals to avoid the listing, EPA should have first verified, through investigation and discussion with refiners, that was a real problem. If EPA found a basis for that concern, then it could have addressed it directly through appropriate enforcement or rulemaking procedures. However, the mere existence of such potential "ambiguity" in a rule does not give EPA authority to "correct" that problem retroactively through a *post hoc* "clarification" which substantively affects and imposes additional burdens on the regulated industry.

*Response API-17 (page 14) and API-18 (page 14):* EPA does not understand the basic thrust of this comment, nor the citations provided. EPA's point is that the interpretation presented in the preamble may have created some confusion, but that the memoranda in question represent a

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<sup>53</sup>Since the November 1999 Memo is a major departure from any reasonable understanding that the refiners had of the 1998 rule, under the "Fair Notice" doctrine, EPA cannot enforce its position on "dual purpose" catalysts against any refiner that relied on the 1998 rulemaking and properly classified its catalyst as hydrocracking under the PSA definition prior to that Memo. *E.g., General Electric Co. v. EPA*, 53 F.3d 1324 (D.C. Cir 1995).



permissible interpretation of the regulations. The principles and cases cited by the commenter are not relevant to this circumstance.

The General Electric case deals with a situation in which GE disputed EPA's interpretation of its regulations in the context of an enforcement proceeding against GE. The court found the Agency's interpretation to be permissible, but overturned the penalty because GE did not have fair warning of the Agency's interpretation before the enforcement proceeding and the agency itself struggled "to provide a definitive reading of the regulatory requirements, . . ." 53 F.3d at 1334. Here, no enforcement proceeding has been initiated against any persons represented by the commenter, the Agency is very clear about the types of units that are undoubtedly dual purpose reactors, and will provide case-by-case interpretations where it is not clear. Moreover, EPA has just completed this notice and comment proceeding on its interpretation. Consequently, if the Agency's interpretation is valid, no person who could be subject to the rule would have any argument that it has not received "fair notice."

In the Utility Solid Waste Activities Group (USWAG) case, EPA directly changed the language in a rule which the Agency determined was in error because of an erroneous use of the Wordperfect find/replace command in the drafting of the regulation. 236 F.3d at 752. EPA had claimed it could change the regulation, itself, by a "technical amendment." This was rejected by the court. Id. These issues are not relevant to the regulatory interpretation issues involved in this case.

The commenter also appears to object to EPA's long-standing and legally justified use of memoranda and letters to clarify previously published regulations. See more detailed response to comment API-4 above for a discussion of the use of letters and memoranda.

*Comment API-19 (pages 14-15)*

#### Additional Problems Created by November 1999 Memo

In addition to the legal, procedural and logical defects in the November 1999 Memo discussed above, that document has created major new concerns. In fact, by abandoning conversion as the primary distinguishing factor between *hydrocracking* and *hydrotreating*, and by relying entirely on the occurrence of "treatment" as the sole factor for determining the applicability of the K171 listing, the November 1999 Memo created more confusion and substantive problems than it solved. First, since it potentially expanded the scope of the listing to include substantial volumes of catalysts that previously had been considered hydrocracking catalysts and were not subject to Subtitle C,<sup>54</sup> the November 1999 Memo has resulted in increased costs and administrative burdens on the refiners.

Second, despite making "treatment" the paramount consideration, the November 1999 Memo did not define that concept in any quantitative way. This caused immediate confusion in the refining

<sup>54</sup>Of course, any spent hydrocracking catalyst that fails any characteristic for hazardous waste always has been and remains subject to Subtitle C. E.g., 63 FR 42155.

industry and created the possibility that even an infinitesimal amount of “treatment” could effectively eliminate the category of non-listed “hydrocracking catalyst,” since some degree of “treatment” occurs in virtually all types of hydrocracking. See, e.g., EPA 2001 Background Document (n. 43, below). EPA later attempted to clarify this issue somewhat in a Memo dated June 1, 2000 from E. Cotsworth to the Regional Offices, by declaring that “hydrocracking reactors that do only minimal and incidental hydrotreatment” are not covered by the K171 or K172 listings. Attachment A. However, EPA did not define in that memo, or any subsequent document, what “minimal and incidental” means in a quantitative or practical matter.<sup>55</sup>

*Response API-19 (pages 14-15):* Neither the 1999 memorandum, nor the 2000 memorandum, changes the manner in which catalyst must be classified with regard to a listing determination. The increased cost and burden with EPA’s decision to list spent hydrotreating and hydrorefining catalyst as hazardous wastes were identified in the 1998 final rule (63 *FR* 42176, August 6, 1998). The annualized compliance costs for the entire final rule actions (i.e., which included listing a total of four wastes as hazardous) were estimated to range from \$20 to \$40 million, with an expected value of \$30 million. The range in costs is due to “a high degree of uncertainty in costing and, particularly, in volumes to be processed” (63 *FR* 42176). Therefore, whether or not a particular waste from a particular refinery was accounted for in the economic analysis for the 1998 final rule is an uncertainty that is accounted for by EPA as providing its costs estimate as a range, rather than as a discrete number.

See more detailed response to comment API-14 above regarding “treatment.”

EPA has also provided, through its letters and memoranda cited in the July 5, 2001 *FR* Notice, guidance to the industry regarding the scope and meaning of ‘minimal and incidental’ hydrotreatment. Therefore the Agency disagrees with the commenter that it has not provided guidance on this term. As shown in the July 5, 2001 notice on the memoranda, EPA has provided interpretations of specific processes on a case-by-case basis. If the information available is unclear with respect to a specific unit or process at a refinery, EPA can provide case-by-case interpretations.

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*Comment API-20 (page 15)*

In any case, there appears to be no data or analysis performed to date that correlates potential health or environmental risks from “dual purpose” catalysts with the degree of “treatment” that occurs in a hydroprocessor. Thus, there is no logical reason to expect that the level of treatment, however

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<sup>55</sup>In letters also dated June 1 to Chevron and Motiva Enterprises, regarding “dual purpose” catalysts, EPA also failed to provide any prospective guidance to those refiners as to what “incidental and minimal” means.

ultimately defined, would correlate with the potential health or environmental risks that EPA identified in 1998 as its basis for listing of these spent catalysts.<sup>56</sup>

*Response API-20 (page 15):* Given that the catalysts in dual purpose reactors are used to promote a hydrotreating or hydrorefining function, the spent catalysts are expected to contain, at least in part, the same hazardous constituents as catalysts removed from other hydrotreating/ hydrorefining units. While it would be difficult to correlate the level of treatment in a hydroprocessing reactor with risks posed by the spent catalyst, we note that dual purpose units are used to simultaneously treat and crack heavy and sour feedstock containing higher levels of contaminants such as sulfur (resulting in reactive sulfides which cause pyrophoricity), polycyclic aromatic hydrocarbons (PAHs), and metals (Clarifying the Scope of Petroleum Hazardous Waste Listings: Supplemental Information Regarding Petroleum Hydroprocessing Units, US EPA, Office of Solid Waste, May 2002). Feedstocks to such dual purpose are expected to contain levels of these contaminants that are equal to or greater than the levels in other hydrotreating/ hydrorefining units.

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*Comment API-21 (pages 15-16)*

In addition, the November 1999 Memo has raised important new questions about what types of “treatment” EPA now believes trigger the listing, which EPA has so far failed to clarify adequately.<sup>57</sup> For example, in so-called “dual purpose” hydrocracking, there are many reactions that change the characteristics of a feedstock in order to meet exact product specifications. Arguably, any reaction that benefits the quality of the product could be considered treatment, including molecular size reduction. However, EPA has not defined which of the many beneficial reactions that occur in hydrocracking will now be considered “treatment.”

Traditionally, as used by the industry in connection with hydrotreating, the term “treatment” can describe two types of hydroprocessing applications:

1. Processes used to protect a catalyst from poisoning; and
2. Processes used to polish a product that has already undergone cracking and fractionation (separation based on the boiling range of the material).

Processes to protect a hydrocracking catalyst are designed to remove those compounds that poison the cracking catalyst. Thus, the choice of catalyst and operation of the process are optimized

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<sup>56</sup>The toxic constituents that gave rise to the decision to list (arsenic and benzene) do not appear to be related to whether sulfur or nitrogen were sprung from the hydrocarbon, or whether an olefin was reduced, processes defined as “hydrotreatment” by the PSA definition.

<sup>57</sup>This was not as crucial a concept under the scheme originally adopted in the 1998 rule, since it was clear then that of the three types of spent hydroprocessing catalyst, only *hydrocracking* catalyst was not covered by K171 or K172. See 63 FR 42155. Thus, the critical question under the original rule was whether a catalyst was from a unit or process defined as *hydrocracking*.



around this goal and dependent on the properties of the hydrocracking process being protected. The catalyst chosen for this purpose may also result in some cracking (conversion), but that is incidental and, in many cases, undesirable.<sup>58</sup>

Processes to polish a product to meet a specification are designed to remove specific compounds, such as sulfur, generally at trace levels. Cracking at this stage is very undesirable, as it will result in a loss of product. Thus, the catalysts used for this purpose are tailored specifically for the removal of the contaminant, and will also use a less active substrate. EPA has not yet attempted to clarify which of these processes and associated catalysts it believes are subject to the listing.

Given the absence of any quantitative or functional clarification of what type or level of "treatment" triggers the K171 listing, the potential scope of the K171 listing is now extremely vague and uncertain, and refiners are subject to potential liability if they are not sure whether a particular catalyst is covered by the listing or not. Therefore, if EPA insists on maintaining "treatment" as the sole or primary criterion for determining the applicability of the listing, it will need to define precisely what level of treatment is not considered "minimal and incidental," and what kinds and what purposes of treatment are covered by the listing. Moreover, in order to make those decisions rationally and in accordance with RCRA sec. 1004(5) and 3001(b), and 40 CFR sec. 261.11, we believe that EPA would need to gather more data and make the necessary risk determinations in a rulemaking to amend the 1998 listings. This would pose formidable technical challenges to EPA and require substantial time and resources from EPA and the industry.

#### *Comment Chevron-2*

EPA's current effort to define this listing based on the catalyst's "treating function" first requires that there be an understanding of what is meant by "treating" in the context of hydroprocessing. The term "treatment", as used by the industry in this context, describes two types of hydroprocessing applications:

1. Protect a hydrocracking catalyst from poisoning; and
2. Polish a product that has already undergone cracking and fractionation.

EPA now appears to want to define treatment based on specific reactions and the degree to which these reactions occur. Such reactions occur in all hydroprocessing reactors. Deciding which of these reactions justify listing the spent catalyst as hazardous is a daunting task. EPA would have to correlate these reactions with risks as the basis for the listing. We expect such an effort would take many years to perform. In addition, we do not expect any of these reactions to correlate with the benzene and arsenic content in the spent catalyst, which was the basis for the original listing.

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<sup>58</sup>For example, as the most recent EPA Background Document (*Clarifying the Scope of Petroleum Hazardous Waste Listings: Supplemental Information Regarding Petroleum Hydroprocessing Units*, June 2001, page 34) indicates, less active alumina substrates (rather than acidic silica-alumina) are generally used to perform this function to minimize the amount of cracking that might occur.

*Response API-21 (pages 15-16) and Chevron-2:* EPA disagrees that its interpretation provides insufficient clarity. EPA's approach focuses on the function a unit is designed to perform in light of the PSA definitions. The regulatory status of particular processes is not within the scope of the request for comments on the Federal Register notice. However, EPA responds to this comment to the extent that the commenter identifies two types of processes which may be perceived as treatment and effectively requests an interpretation from the Agency regarding those processes. The first is a process where the catalyst is used to protect a catalyst from poisoning. This type of process is generally considered treatment, and in some units, the treatment occurs in tandem with hydrocracking. For example, in the 1998 final rule, the Agency identified guard bed units that refiners were calling hydrocrackers, when the units were actually performing treatment as well. These units, also known as desulfurization pretreaters, are used to extend the life of the downstream catalytic bed (e.g., reformer, hydrocracker, isomerization reactor) by removing sulfur, oxygen, nitrogen, and/ or heavy metals.

The other process which may be perceived as treatment is polishing. The commenter's description of polishing is correct that not all polishing processes are included in the definition of hydrotreatment. The 1995 Listing Background Document for the proposed petroleum refinery waste rule provides some detail about polishing processes. The document shows that hydrotreatment does not actually occur unless organic sulfur and nitrogen are converted to hydrogen sulfide and ammonia. For example, refineries may perform a polishing step on distillate (diesel fuel and jet fuel) to reduce the sulfur content of the fuel.

As shown in the July 2001 notice on the memoranda, EPA has provided interpretations of specific processes on a case-by-case basis. If the information available is unclear with respect to a specific unit or process at a refinery, EPA can provide case-by-case interpretations.

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#### *Comment API-22 (pages 16-18)*

As an alternative, we suggest the following approach for distinguishing between catalysts from *hydrocracking* processes that are not listed, and *hydrotreating* processes that should be covered by the K171 listing. This approach is consistent with the original listing determination and would not require the level of effort that would be needed to make EPA's "treatment-only" approach practical and legal.

#### Suggested Decision Tool for Distinguishing Hydrocracking from Hydrotreating

The definitional problems described above began when, in the final rule, EPA decided to reject the use of specific conversion rates as a bright-line to differentiate between different types of hydroprocesses. See 63 FR 42155. API understands EPA's concern over the use of conversion rates as the *only* measure of whether a process is hydrotreating or hydrocracking. However, conversion is still a key factor in defining and distinguishing between these processes. The regulatory importance of these definitions requires that all relevant factors, including conversion, be considered, to be certain the

processes are properly identified and the listings remain rationale and legal under RCRA and EPA's hazardous waste listing rules.

The following suggested approach considers each of the factors that are important in distinguishing between these residuals, and is more consistent with the PSA definitions relied upon in the 1998 final listing rule than the "treatment-only" approach announced in the November 1999 Memo. In the attached decision flow chart (Attachment I), we do not draw a "bright line" around conversion. Rather, conversion is used to define the extreme ends of the spectrum. Other indicators are used to distinguish between units with conversion rates that lie between these extremes.

The following factors should be considered in distinguishing between hydroprocessing units:

1. The conversion rate:

- Units with greater than 50% conversion are hydrocrackers under any definition; units with less than 30% conversion generally contain the universe of hydrotreaters and hydrorefiners. The additional criteria following are applied to units with conversion rates between 50% and 30% to distinguish hydrocrackers from hydrotreaters. These ranges err on the side of classifying a unit as a hydrotreater.

2. Mid-distillate recovery:

- A unit with a conversion rate between 30 and 50% will be considered a hydrocracker if a fractionator is downstream that separates the feed into two or more liquid products, with one or more side cut streams (draws from trays located between the top and bottom of the column) being valuable mid-distillates consisting of at least 20% by weight of the feed to the hydrocracker. (Note that a stripper is not a fractionator and would not qualify the hydroprocessing unit as a hydrocracker. This is consistent with the flow diagram in Figure 2-1 included in the June 2001 EPA Background Document.)<sup>46</sup>

3. Catalyst design

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<sup>46</sup>The differences between a fractionator and a stripper are significant and relevant in considering whether the process is hydrocracking or hydrotreating. The purpose of a stripper is to remove volatile contaminants, while the purpose of a fractionator is to separate the feed into different products based on their boiling ranges. A stripper generates hydrocarbon gases, H<sub>2</sub>S, ammonia, a small amount of liquid condensate from the top of the column, and a stripped liquid product from the bottom of the column. The liquid product will have a boiling range similar to the feed to the stripper and contain 80% or more of the feed. A stripper does not have side cuts (draws from trays located between the top and bottom of the column) and does not attempt to separate mid-distillate products. A fractionator will separate the feed into two or more liquid products, with one or more side cut streams (valuable mid-distillates consisting of at least 20% by weight of the feed to the hydrocracker). The design differences between a stripper and fractionator are well established and are discussed in most unit operations text books.

- If the catalyst support is alumina only, then the catalyst was designed for treating and the unit is a hydrotreater. If the catalyst support is silica-alumina, then the catalyst was designed for cracking and should be considered a hydrocracker, assuming it also meets the criteria in 1 or 2 above.

API believes that the three criteria above would accurately classify units as hydrotreating/hydrorefining or hydrocracking in a way that is consistent with the unit-based (source specific) residual classifications and characterizations used throughout the spent catalyst listing rulemaking and in the final 1998 listing decision, all of which included conversion as a distinguishing characteristic. We also believe that this approach would address EPA's purported concern that reliance solely on conversion rates would make it easy for refiners to adjust operating conditions at a unit in order to increase the conversion rate and thus avoid the applicability of the K171/K172 listings. See n.29, above. See also 63 FR 42155; 66 FR 35382.

#### *Comment Chevron-3*

One of the key factors in differentiating these processes, particularly hydrocracking from the others, is conversion. EPA's most recent background document actually continues to make this point. We agree with EPA that conversion should not be the sole factor for differentiating hydrocracking units from other units. However, to suggest that conversion is not a consideration is in conflict with the definition for hydrocracking in DOE's Petroleum Supply Annual (PSA), which was used in the original listing. We support API's suggested alternative method for differentiating between these processes, which is summarized below:

#### D. Conversion:

If > 50% conversion, then it is a hydrocracker. If < 30% conversion, then it is a hydrotreater.

#### B. Catalyst type (for conversion between 30% and 50%):

If catalyst base is alumina only (no silica), then it is a hydrotreater.

#### C. Product recovery (for conversion between 30% and 50%; alumina-silica catalyst):

If a fractionator follows the unit, then it is a hydrocracker. Otherwise, it is a hydrotreater.

We believe that this series of considerations would result in an accurate identification of these units.

#### *Comment NPRA-3*

The decision to list hydrotreating and hydrorefining spent catalyst, and not hydrocracking spent catalyst, was made after multiple years of data gathering and analysis. Any change or clarification

should be accomplished by proposal and public comment. It is suggested that a better guidepost for distinguishing hydrocracking from hydrotreating would be the use of percent conversion.

*Response API-22 (pages 16-18), Chevron-3, and NPRA-3:* The Agency reviewed the options provided and determined that they do not meet the intent of the 1998 rulemaking and would not be an appropriate interpretation of the regulation. In the first place, EPA explicitly rejected percentage cutoffs for hydrocracking, hydrotreating and hydrotreating, as noted elsewhere in this Response to Comment document and the Federal Register notice. Furthermore, each of the criteria described in API's comment are oriented to making hydrotreatment and hydrocracking mutually exclusive. Mutual exclusivity is not a necessary element of the definition. In other words, EPA believes it is possible for a unit to have both a significant amount of treatment AND a significant amount of conversion. If spent catalyst is removed from such a dual-purpose unit, then catalyst from the unit should be a listed hazardous waste." In addition, the criteria suggested by API raise entirely new substantive technical issues and, if EPA were to decide that they were appropriate for inclusion in the regulation, the Agency would have to propose an amendment and request public comment.

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*Comment API-23 (page 18)*

#### Conclusions

As explained above, since the November 1999 memo substantially and unfairly expanded the scope of the spent catalyst listings, without giving refiners or the public any prior opportunity to comment, and since that expansion is arbitrary and inconsistent with the position announced in the 1998 listing rule preamble, API urges EPA to:

(A) Withdraw the November 1999 Memo and to return to the 1998 rulemaking as written for determining the scope of the spent hydrotreating and hydrotreating catalyst listings.

(B) Whether or not EPA withdraws the November 1999 Memo:

(1) if EPA believes that the 1998 rulemaking is not sufficiently clear as to the status of catalyst removed from units or processes that perform both hydrotreating and hydrocracking functions, then EPA should adopt the suggested decision tool suggested by API above, either through a clarifying memo, or through amendment of the 1998 listing rule;

(2) if EPA does not adopt the approach suggested by API, and intends to focus on "treatment" as the primary criterion for determining the scope of the K171/172 listings, then EPA should propose amendments to the 1998 listing rule to gather the necessary data, perform the required risk assessments and address all of the other issues related to "treatment" discussed above.

In addition, if EPA proposes to amend the spent catalyst listing determinations as suggested above, then EPA should also take the opportunity to propose making those listings “conditional,” so as to encourage more recycling and catalysts and conservation of resources, as discussed on p. 3 and in fn. 4, above, and in Attachment E.

*Comment Chevron-4*

Chevron urges EPA to withdraw the November 1999 memo and to return to the 1998 rulemaking for determining the scope of the spent hydrotreating and hydrorefining catalyst listings. Further, EPA should ultimately adopt the three-step test for defining these processes which considers the degree of conversion, the presence of a downstream fractionator for product recovery, and whether the catalyst is alumina-only base.

*Response API-23 (page 18) and Chevron-4:* EPA responded to the issues summarized here in response to the detailed comments.

EPA agrees with the commenter that recycling and reclamation of hazardous wastes, as well as the conservation of resources, should be encouraged. It is an important goal for the Agency to encourage the reclamation of hazardous wastes containing significant quantities of recoverable metals. As commenters pointed out in their comments to the July 5, 2001 *FR* notice, spent petroleum hydroprocessing catalyst can contain recoverable quantities of vanadium. Therefore, EPA encourages all parties to identify ways in which the recycling of spent catalysts may be encouraged.

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*Comment Chevron-5*

Finally, we support API's request for an exclusion from the listing for reclaiming metals since that would encourage recycling. Most of these catalysts were sent to metals recovery prior to the listing. Most of the remaining catalyst was disposed as hazardous waste due to state regulations or RCRA characteristics. The 1998 listing simply made it more expensive to ship these materials over longer distances to reclaimers due to haulers charging a higher \$/mile fee to cover higher insurance costs and etc. Disposal at nearby landfills became more attractive.

Thank you for the opportunity to share our thoughts and experience on this important matter. If you have any questions, please feel free to contact Judy Blanchard in my office at 202-408-5831, or for technical details contact Mark Luce at Chevron Research (510-242-5087).

*Response Chevron-5:* See response to comment API-3 regarding recycling costs. Although comment API-3 does not address shipping costs, EPA has not completely analyzed the costs of management alternatives of hazardous spent catalyst waste. As discussed in the 1998 final rule (and in comment API-3), EPA identified several risks beyond those necessarily associated with landfill disposal, including pyrophoric properties. If EPA were to change the listing to conditionally exclude



certain K171 and K172 wastes as suggested by the commenter, it would go through the rulemaking process (as discussed in response to comment API-22).

## Appendix A. Additional Comments

EPA did not prepare responses for the following portions of text supplied by the commenters. These portions of the comments do not require a response from EPA because they are background or do not address specific issues. They are included here for completeness.

### *Comment TFA-1 (page 1)*

#### Introduction

The Ferroalloys Association (“TFA”) submits these comments in response to EPA’s Notice of Opportunity to Comment – Spent Catalysts from Dual-Purpose Petroleum Hydroprocessing Reactors, 66 Fed. Reg. 35379 (July 5, 2001) (the “Notice”). This Notice asks for comments on two memoranda (dated November 29, 1999 and June 1, 2000) issued by EPA interpreting its rule listing as hazardous waste two types of spent hydroprocessing catalyst – hydrotreating and hydrotreating catalyst (the “Memoranda”). The underlying regulation is published at 63 Fed. Reg. 42110 (August 6, 1998) (hereafter referred to as the “Rule”).

Generally, the Notice asks for comments on EPA’s interpretation in the Memoranda that when hydroprocessing reactors in a refinery perform a hydrotreating or hydrotreating function, as well as a hydrocracking function, they should be classified as generating a spent hydrotreating or hydrotreating catalyst, subject to regulation as a listed hazardous waste (Waste Codes K171/K172).

#### The Ferroalloys Association

TFA was organized in 1971 as a non-profit organization of producers of vanadium, molybdenum, nickel, cobalt, and related basic alloys and metals. TFA represents 20 companies with facilities in over 25 states.

TFA includes as members companies which (i) recycle spent hydroprocessing catalyst to reclaim vanadium and other valuable metals and materials, (ii) have affiliates that supply metal catalysts to the refining and petrochemical industries, and (iii) produce vanadium compounds and alloys from vanadium recovered from spent catalyst. The members of TFA’s Spent Catalyst Recycling Group are Bear Metallurgical Company, CS Metals of Louisiana, Gulf Chemical & Metallurgical Corporation, Shieldalloy Metallurgical Corporation, and Strategic Minerals Corporation.

These companies have a crucial interest that EPA regulations regarding management of spent catalyst are technically correct, and consistent with RCRA and EPA policy. Because their businesses use spent catalyst as raw material and/or use vanadium recovered from spent catalyst, they need to make significant business decisions based (in part) on the effect of EPA regulations on catalyst management. Also, the recyclers process and generate hazardous wastes that are subject to the Rule. Accordingly, they have an interest in clear, consistent and predictable regulations governing their

operations. Finally, recyclers must cooperate closely with their customers – oil refiners – to understand and comply with the regulations which apply to the spent catalyst the refiners ship to them.

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*Comment API-1 (page 1)*

The American Petroleum Institute (API) is pleased to provide these comments in response to the notice seeking public comment on “Spent Catalysts from Dual-Purpose Petroleum Hydroprocessing Reactors.” 66 FR 35379 (July 5, 2001). API represents more than 400 member companies involved in all aspects of the oil and natural gas industry. These comments will address technical and legal issues concerning the 1998 listing of spent *hydrotreating* and *hydrorefining* catalysts as hazardous waste (63 FR 42110, August 6, 1998), and the subsequent attempted expansion of those listings to include so-called “dual purpose” catalysts via a memorandum dated November 29, 1999, from Elizabeth Cotsworth, Office of Solid Waste, to the EPA Regions (“November 1999 Memo”).<sup>1</sup>

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*Comment NPRA-1*

The National Petrochemical & Refiners Association (NPRA) represents almost 500 companies, including virtually all US refiners and petrochemical manufacturers. Our members supply consumers with a wide variety of products and services that are used daily in homes and businesses. These products include gasoline, diesel fuel, home heating oil, jet fuel, and the chemicals that serve as "building blocks" in making everything from plastics to clothing to medicine to computers, etc.

In making and delivering products essential to everyone, our members work diligently to protect human health and the environment. That is why NPRA is a member of the Responsible Care® initiative, which requires continuous improvement in the health, safety, and environmental performance of processing facilities and products.

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*Comment NPRA-5*

Finally, we support the comments provided separately by the American Petroleum Institute (API).

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<sup>1</sup>That Memorandum was modified in one respect by a second memorandum dated June 1, 2000, from E. Cotsworth, EPA, to the EPA Regional Offices (Attachment A). See pp. 10&n.24, 15, below. The July 5 notice seeks comments on both Memoranda, although these comments focus primarily on the November 1999 Memo.