



U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

### *Hotline Report: Air Quality*

## **No Intent to Underestimate Costs Was Found, but Supporting Documentation for EPA's Final Rule Limiting Sulfur in Gasoline Was Incomplete or Inaccurate in Several Instances**

Report No. 16-P-0122

March 29, 2016



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## Abbreviations

ABT	Averaging, Banking and Trading
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FCC	Fluid Catalytic Cracker Naphtha
ISI	Influential Scientific Information
LP	Linear Programming
LSR	Light Straight Run Naphtha
OAQPS	Office of Air Quality Planning and Standards
OAR	Office of Air and Radiation
OIG	Office of Inspector General
OMB	U.S. Office of Management and Budget
OTAQ	Office of Transportation and Air Quality
ppm	parts per million
RIA	Regulatory Impact Analysis

**Cover photo:** Gasoline pumps at a gas station. (EPA photo)

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# At a Glance

## Why We Did This Review

We conducted this review in response to a hotline complaint about how the U.S. Environmental Protection Agency (EPA) estimated costs to the petroleum refining industry to meet new sulfur content standards for gasoline under the 2014 Tier 3 Motor Vehicle Emission and Fuel Standards (i.e., Tier 3 rule). The Tier 3 rule requires new emission limits for motor vehicles, as well as reduced limits on the amount of sulfur in gasoline. The primary allegations were that the EPA purposefully underestimated the costs to refineries and misrepresented information in the public record about how the agency modeled these costs. Our objective was to determine whether the EPA adhered to relevant statutes, regulations, policies, procedures and guidance in estimating and reporting expected costs to refineries to comply with the Tier 3 sulfur standards.

**This report addresses the following EPA goal or cross-agency strategy:**

- *Addressing climate change and improving air quality.*

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Listing of [OIG reports](#).

## *No Intent to Underestimate Costs Was Found, but Supporting Documentation for EPA's Final Rule Limiting Sulfur in Gasoline Was Incomplete or Inaccurate in Several Instances*

### What We Found

We found no evidence to substantiate the hotline allegations that EPA staff or managers purposefully underestimated costs to refineries or intentionally misrepresented information about its modeling analyses in public rulemaking documents related to the Tier 3 rule.

However, during our review we identified several instances where descriptions of certain aspects of the EPA's modeling analyses were inaccurate or incomplete in the Tier 3 rule's final regulatory impact analysis (RIA). Based on our assessment, some of these instances occurred because EPA staff did not update information about their analyses in the final RIA from the earlier version that was developed for the proposed rule. In addition, staffing and time constraints hampered the quality assurance review of the final RIA. The inaccurate and incomplete documentation we identified did not impact the EPA's estimate of costs to the refining industry.

RIAs are intended to be comprehensive, detailed documents that describe to the public how the EPA conducted its analyses in support of rulemakings. They help promote accountability and transparency in government actions. Inaccurate and incomplete information in any final RIA could prevent a third party from obtaining a full and accurate understanding of how the EPA arrived at its overall cost estimate, and could undermine public trust in the integrity of the regulatory process. This is especially true when EPA's analyses are identified as influential scientific information and/or cannot be publicly released due to the inclusion of sensitive or proprietary information, as was the case with the EPA's Tier 3 cost model. In these instances, extra vigilance is needed by the agency to ensure that the information in the public rulemaking documents is accurate and complete.

**Inaccurate or incomplete documentation of the EPA's cost modeling could prevent a third party from obtaining a full and accurate understanding of how the EPA arrived at its cost estimate for the Tier 3 rule.**

### Recommendation and Planned Agency Corrective Actions

We recommend that the Assistant Administrator for Air and Radiation direct the Office of Transportation and Air Quality to develop a process to provide for an enhanced quality assurance review of future RIA documents when the analysis used to support the rulemaking is influential scientific information and/or cannot be made public. The agency agreed with our recommendation and proposed an acceptable corrective action.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

March 29, 2016

**MEMORANDUM**

**SUBJECT:** No Intent to Underestimate Costs Was Found, but Supporting Documentation for EPA's Final Rule Limiting Sulfur in Gasoline Was Incomplete or Inaccurate in Several Instances  
Report No. 16-P-0122

**FROM:** Arthur A. Elkins Jr.

A handwritten signature in black ink, appearing to read "Arthur A. Elkins Jr.", is written over the printed name.

**TO:** Janet McCabe, Acting Assistant Administrator  
Office of Air and Radiation

This is our report on the subject review conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

The office primarily responsible for the issues addressed in this report is the Office of Air and Radiation's Office of Transportation and Air Quality.

**Action Required**

In accordance with EPA Manual 2750, your office provided an acceptable corrective action and milestone date in response to the OIG's recommendation. Thus, the recommendation is resolved and no final response to this report is required.

We will post this report to our website at [www.epa.gov/oig](http://www.epa.gov/oig).

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## Purpose

On November 13, 2014, the U.S. Environmental Protection Agency (EPA), Office of Inspector General (OIG), received a hotline complaint containing numerous allegations regarding the EPA's estimation and reporting of costs to the refining industry to comply with new gasoline sulfur content requirements under the 2014 Tier 3 Motor Vehicle Emission and Fuel Standards (i.e., Tier 3 rule)<sup>1</sup>. The complainant alleged that the EPA took intentional, inappropriate steps in its modeling to underestimate the true costs to industry to comply with the gasoline requirements, and also purposefully misrepresented information in the public record about how the agency modeled these costs. Based on these allegations, our objective was to determine whether the EPA adhered to relevant statutes, regulations, policies, procedures and guidance in estimating and reporting expected costs to refineries to comply with the new gasoline sulfur content requirements under the Tier 3 rule.

## Background

On April 28, 2014, the EPA issued the final Tier 3 rule to reduce emissions of various pollutants from motor vehicles, including particulate matter, nitrogen dioxide, and air toxics. Because the effectiveness of pollution control devices on vehicles is negatively impacted by

Removing sulfur from gasoline allows a vehicle's emission control system to work more efficiently. Lower sulfur gasoline also facilitates the development of some lower-cost technologies to improve fuel economy and reduce greenhouse gas emissions.

sulfur in gasoline, the rule included standards for refineries to limit the content of sulfur in gasoline to 10 parts per million (ppm) on average. Refineries are required to comply with the new sulfur standards by January 1, 2017.<sup>2</sup>

EPA rulemaking follows a process that provides for public review and comment, as well as technical analyses to support the rulemaking. First, the EPA develops a proposed rule and conducts analyses to assess the impacts, such as costs, expected to result from the rule. If certain conditions are met, some of these analyses, including models developed by the EPA, are independently peer reviewed to help ensure their quality. When the EPA publicly issues the proposed rule, it also issues supporting documentation to help the public understand what information and analyses it used to develop the rule. This includes a regulatory impact analysis (RIA) that describes in detail the analyses, including modeling, that the EPA conducted to estimate costs and benefits expected from the rule. The EPA estimated that the monetized benefits of the Tier 3 rule would outweigh the costs of implementation by anywhere from a low (conservative) factor of 4.5 to a factor of almost 13. The range in the rule's estimated cost benefit is due to the range in uncertainty associated with the estimated monetized benefits of the rule.

<sup>1</sup> Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards; Final Rule, *Federal Register*, Vol. 79, No. 81, April 28, 2014.

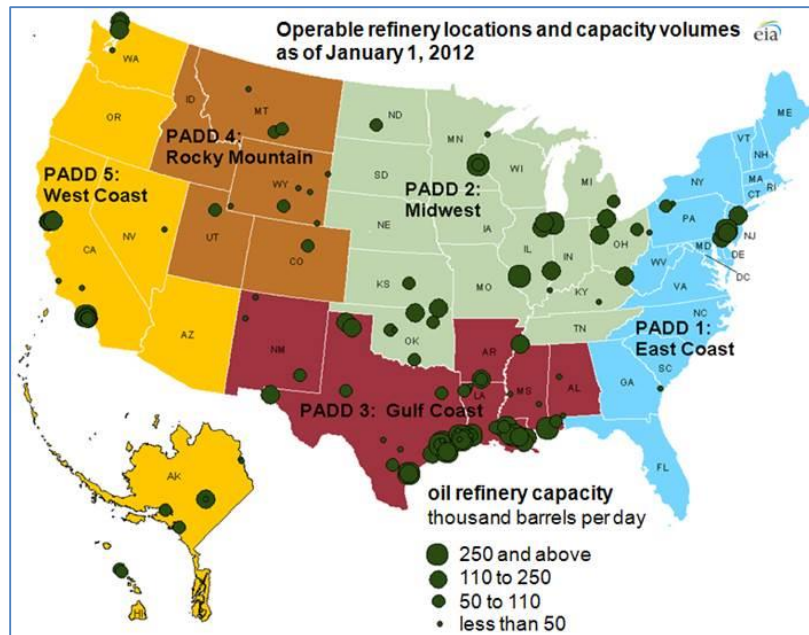
<sup>2</sup> Small refiners have an extended compliance date of January 1, 2020.

Members of the public have an opportunity to comment on the proposed rule. EPA staff then consider public comments when developing the final rule. EPA staff also consider comments from peer reviewers of models or other analyses used to support the rulemaking, if applicable. After considering these comments, along with any new information obtained since the proposed rulemaking, the EPA issues a final rule. At this time, it also issues a final RIA to describe the analyses conducted for the final rule.

### **Modeling Conducted to Estimate Costs**

To estimate costs to U.S. petroleum refineries to comply with the sulfur standards under the Tier 3 rulemaking, EPA staff in the Office of Air and Radiation's (OAR's) Office of Transportation and Air Quality (OTAQ) developed a refinery-by-refinery cost model. According to OTAQ staff, they used a refinery-by-refinery model because they believed it would most accurately estimate costs, especially when considering an averaging, banking and trading (ABT) program.<sup>3</sup> The EPA projected that 108 refineries would be subject to the standards. OTAQ staff used the refinery-by-refinery cost model to estimate what steps these individual refineries would take to comply with the standards, and what the overall costs and other impacts (such as increased energy demands) of these actions would be.

**Figure 1: Geographic location and capacity of U.S. refineries**



This map shows the geographic location and refining capacity of U.S. refineries as of January 1, 2012, grouped by geographic regions called Petroleum Administration for Defense Districts (PADDs).

Source: U.S. Energy Information Administration.

<sup>3</sup> The ABT program allows refineries to generate and trade credits to meet the Tier 3 10 ppm sulfur standard.



The refinery-by-refinery cost model was developed using data from the U.S. Department of Energy's (DOE's) Energy Information Administration, EPA's Office of Air Quality, Planning and Standards (OAQPS) within OAR, pollution control technology vendors, and individual refineries. Some of these data are considered protected proprietary information and, therefore, the model has not been made public. Further, the refinery-by-refinery cost model was identified by EPA as influential scientific information (ISI), a designation reserved for scientific information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions.

The EPA had the refinery-by-refinery cost model peer reviewed before the proposed rulemaking. Before the final rule was issued, the EPA had a second peer review of the model conducted to review changes made to the model since the proposed rulemaking.

The refinery-by-refinery cost model focused largely on estimating the costs of desulfurizing (i.e., treating to remove sulfur) two gasoline blendstocks:<sup>4</sup> fluid catalytic cracker (FCC) naphtha and light straight run (LSR) naphtha. The model also estimated costs to refineries to re-generate octane<sup>5</sup> that is lost when FCC naphtha is desulfurized.

**EPA's refinery-by-refinery cost model estimated:**

- **How each refinery blends its gasoline and the sulfur levels of the blendstocks.**
- **Sulfur reduction needed at each refinery to comply with Tier 3.**
- **The capital cost, loss of octane and hydrogen and utilities required by each refinery to comply with Tier 3.**
- **Cost of octane recovery and other operating costs at each refinery.**
- **Overall cost of required sulfur reduction at each refinery (10 ppm and 5 ppm).**

To help estimate costs and other impacts associated with re-generating lost octane, the EPA used an established industry linear programming (LP) model. Some of the results from the LP modeling were used to derive an octane cost estimate, which was then input into the refinery-by-refinery cost model to estimate the overall costs for the standards. Other results from the LP modeling were used to conduct analyses on energy demand, emissions and permitting impacts.

According to EPA staff, they made certain adjustments to the refinery-by-refinery cost model to account for various factors to improve the accuracy of the model. For example, to obtain the correct overall volume of gasoline, EPA staff subtracted volumes of gasoline that are exported and thus not subject to the standards. As another example, EPA staff applied an overdesign factor to naphtha hydrotreaters, which are pieces of equipment used to desulfurize LSR. An

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<sup>4</sup> Any material that is blended in an oil refinery to make a product, especially for making gasoline.

<sup>5</sup> The octane rating of gasoline is a measure of the fuel's tendency to knock or ping when it is mixed with air and burned in an engine. U.S. gasoline must meet a minimum octane rating of 87 for regular grade in most parts of the country.



overdesign factor (often expressed as a percentage) is applied to the capital costs for a piece of new equipment to account for the possibility that the equipment may operate at an increased capacity in the future. Use of this factor is based on the assumption that the equipment is designed and built for a larger operating capacity than is currently needed.

A diagram of the key modeling steps conducted by the EPA is included in Appendix A.

### ***Estimated Costs to Refineries***

For the proposed rulemaking, the EPA estimated total costs to the U.S. refining industry for the sulfur content standards would be 0.89 cents/gallon of gasoline. For the final rulemaking, the EPA reduced these expected costs to 0.65 cents/gallon. According to the EPA, the main reasons for this reduction in estimated costs were:

- 1) A projected decrease in gasoline production (particularly a decrease in production by the refinery units most responsible for most of the sulfur in gasoline) as demand for diesel grows.
- 2) A change to assume more widespread credit trading under the ABT program.

Under the ABT program, refineries faced with higher desulfurization costs can purchase credits from other refineries that over-comply with the standard (i.e., reduce gasoline sulfur to below 10 ppm), which reduces the overall expected costs of the Tier 3 program.

The majority of the total anticipated costs (over 95 percent) for the standards are expected to result from desulfurizing FCC naphtha.

## **Responsible Office**

The office primarily responsible for the Tier 3 rulemaking was OAR's OTAQ. Within OTAQ, the Assessment and Standards Division's Fuels Center Director and staff were responsible for developing the cost model and estimating overall costs to industry to comply with the Tier 3 sulfur standards.

## **Scope and Methodology**

We conducted our audit from April 2015 through December 2015. We conducted this audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our objectives.

We reviewed six main allegation areas identified in the hotline complaint:

1. Modeling expected desulfurization of LSR.
2. Modeling expected costs and increased energy demands to generate lost octane.
3. Selecting peer reviewers and scoping the peer review statement of work.
4. Using contingency and overdesign factors in the refinery-by-refinery cost model.
5. Assessing emissions and resulting permit requirements for refineries.
6. Adjusting the refinery-by-refinery cost model to account for exported gasoline.

To answer our objective, we evaluated the EPA's adherence to applicable criteria as the criteria pertained to the six topic areas above. We did not evaluate the complete cost modeling process or aspects of the Tier 3 rulemaking beyond those identified above. We make no conclusions regarding the overall adequacy of the refinery-by-refinery cost model; the appropriateness of the final cost estimate that the EPA developed; or the EPA's adherence to applicable statutes, policies, and guidance for the development of the rule in general, or for portions of the cost model not related to the allegations.

We identified and reviewed applicable statutes, policies and guidance pertaining to rulemaking, modeling and dissemination of information to the public. This included:

- The Clean Air Act.
- U.S. Office of Management and Budget (OMB) *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by Federal Agencies*.
- OMB Circular A-4.
- EPA Order CIO 2105.0.
- EPA Guidance for Quality Assurance Project Plans for Modeling.
- EPA's *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency*.
- EPA's Peer Review Handbook.

We reviewed the final refinery-by-refinery cost model used for the final Tier 3 rule; certain output reports from the LP model; and analyses EPA staff conducted to estimate energy demand, emissions and permitting impacts. We also reviewed public supporting documents for the rulemaking, including the draft and final RIAs, peer review comments, and the EPA's response to the peer reviewers' comments. In addition, we reviewed internal documents, including email exchanges among the modeling team and internal decision-making documents. We also reviewed information provided by DOE as part of the interagency review process for the rulemaking. Further, we reviewed other cost studies conducted by

DOE and the American Petroleum Institute that sought to estimate the costs of implementing sulfur standards similar to those finalized under Tier 3.

We reviewed selected programming in the refinery-by-refinery cost model and the permitting analysis for consistency with the EPA's methodology as stated in the final RIA and described by EPA staff in interviews and correspondence with the OIG. We verified certain LP model output data and re-created EPA's octane cost and utility demand analyses. We also analyzed EPA's permitting analysis to measure the effect of increased utility demand related to octane generation on the number of refineries requiring new permits.

We interviewed the complainant to understand the allegations and corresponded with the complainant throughout the assignment to seek additional information or clarification as needed. We interviewed staff and managers in OTAQ, the Office of Policy, and the Office of Environmental Information. We conducted numerous meetings and email exchanges with the main modeling staff in OTAQ. In addition, we interviewed one of the reviewers from the final round of peer review for the model. We also met with staff in the DOE's Office of Policy and International Affairs to discuss DOE's comments to EPA during the Tier 3 interagency review.

## **Results of Review**

We did not find evidence to substantiate the hotline allegations that the EPA took intentional, inappropriate steps in its modeling to underestimate costs to industry to comply with the gasoline requirements, or to purposefully misrepresent information in the public record about how the agency modeled these costs. Further, the EPA solicited external reviews of its cost-estimating methodology, as recommended by OMB and EPA policies and guidance. For example, the EPA obtained two independent external peer reviews of its cost model. Also, the EPA's approach for estimating costs was reviewed by DOE staff as part of the interagency review process for the Tier 3 rulemaking.

However, we identified several instances in public documents for the rulemaking where the EPA did not accurately or fully describe its cost estimation methodology in the RIA, and one instance where the EPA did not respond to a peer reviewer comment. These issues dealt primarily with documentation of the modeling work and did not directly impact the EPA's cost estimate.

Table 1 provides a summary of what we found for each allegation topic area.

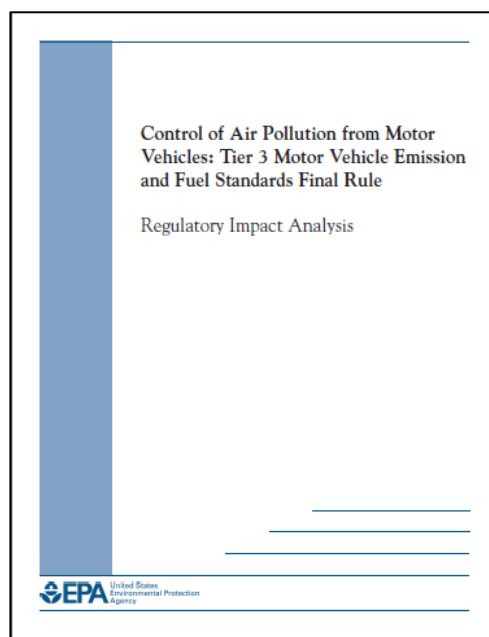
**Table 1: Findings by allegation topic area**

Allegation topic area	Allegation substantiated?	Instances of inaccurate or incomplete information?
LSR Treatment	No	Yes – one inaccuracy in the final RIA; lack of response to one peer review comment regarding an LSR-related assumption
Octane Re-generation	No	Yes – one inaccuracy in the final RIA
Peer Review	No	No
Use of Contingency and Overdesign Factors	No	Yes – inaccurate/incomplete information in the final RIA
Emissions and Permit Triggers	No	Yes – inaccurate/incomplete information in the final RIA
Accounting for Exports	No	No

Source: OIG.

***Errors and Inaccuracies in the Final RIA***

We identified several inaccuracies and instances of incomplete information in the final RIA. RIAs are required for major rulemakings and are intended to provide detailed descriptions of analyses the agency undertook to estimate impacts, including costs, from specific rules. Chapters 4 and 5 of the final Tier 3 RIA,<sup>6</sup> which span 166 pages, describe the analyses the EPA conducted to estimate costs from the fuel standards—including the EPA’s refinery-by-refinery cost modeling and LP modeling. In reviewing sections of the RIA pertaining to the six allegation topic areas, we identified several instances where the EPA did not accurately or completely describe what it had done in its final modeling analyses. These are described in detail below.



The Tier 3 RIA cover. (EPA website)

**Inaccurate information on model estimates concerning LSR treatment:**

- Table 5-30 in the final RIA reflected that the EPA’s modeling estimated 23 refineries would need additional treatment capacity for LSR. This is inaccurate, as the final model actually estimated 10 refineries would need additional treatment capacity for LSR. OTAQ staff told us this was an oversight due to their failure to update the numbers between the proposed and final rules. The figure of 23 represents what was estimated by the EPA’s proposed rule cost

<sup>6</sup> [Final Tier 3 RIA](#).

model, and was reflected in the draft RIA that was issued with the proposed rule. OTAQ staff failed to update this to the correct number (10) when the EPA issued the final RIA. Although the figures in this table are incorrect, the text in the RIA accurately describes changes in the assumptions EPA staff used between the proposed and final models to estimate additional needed treatment capacity for LSR.

#### Inaccurate information pertaining to octane analysis:

- Table 5-39 in the final RIA was incorrectly labeled as using FCC naphtha volumes from the LP refinery model *control case* in the calculations to estimate costs per octane-gallon, when the volumes were actually taken from the *reference case*. The reference case was created by the EPA to model refining industry operations and cost in 2018, without Tier 3. The control case was identical to the reference case except for the beginning octane level of the FCC naphtha pool. For the control case, the EPA lowered this octane value by 1 before running the model so it could estimate the cost to refineries of making up 1 octane number in 2018.

#### Inaccurate information pertaining to the EPA's emissions and permitting analysis:

- The EPA did not update the final RIA to accurately reflect all the changes in the emissions and permitting analysis conducted to estimate the number of new permits that refineries would need to meet the standards. The permitting process can affect how long it would take for refineries to be able to comply with Tier 3. For the proposed rule, the EPA's OAQPS conducted an analysis using refinery modeling results from OTAQ to estimate the effect on refinery emissions from the Tier 3 sulfur standards and how many refineries may need new air permits due to new increases in emissions. After the proposed rulemaking, OTAQ staff updated OAQPS' analysis, using updated refinery modeling results and a different base-year for production data. OTAQ did not describe this change in the final RIA. While the final RIA included a permitting summary containing the number of permits estimated for the final rule, it still provided a reference to the original permitting analysis that had been conducted by OAQPS for the proposed rulemaking, even though the results of the updated analysis were different. OAQPS' original analysis estimated that 14 to 19 refineries would need a new permit under Tier 3, while OTAQ's updated analysis for the final rule estimated that four to nine refineries would need a new permit.

Furthermore, the EPA did not update a section heading for the number of permit triggers to accurately depict that the permit triggers were

calculated assuming a nationwide ABT program. Also, the EPA did not update the final RIA to show it was no longer including reformer energy in the emissions/permitting analysis.

#### Incomplete and inaccurate information on use of overdesign factors:

- In the final RIA, the EPA did not mention that it used an overdesign factor to estimate capital costs associated with naphtha hydrotreaters (which are used to treat LSR). In actuality, the model included an overdesign factor of 15 percent to estimate capital costs associated with these hydrotreaters. In this instance the EPA provided incomplete information about how it conducted its final cost modeling analysis. The application of this overdesign factor had a minimal impact on the EPA's overall cost estimate (i.e., less than 0.001 cents/gallon).
- The final RIA also erroneously stated that a 15 percent overdesign factor for new FCC post-treaters (used to treat FCC) was used in the EPA's permitting analysis. This is inaccurate because the EPA did not use an overdesign factor for FCC post-treaters in the final model, although it did use a 7.5 percent overdesign factor in the model used for the proposed rule. In addition, OTAQ staff told us that overdesign factors are used for cost analyses, not permitting analyses.

According to OMB guidance, RIAs should provide sufficient information to outside parties to fully understand the analyses that a federal agency conducted, and reproduce them if desired. Specifically, OMB Circular A-4 requires that descriptions of analyses in RIAs be transparent and reproducible, with basic assumptions, methods and data underlying the analysis clearly laid out. OMB guidelines also require publicly disseminated information, such as RIAs, to be accurate, complete, reliable and unbiased. Inaccurate or incomplete information in the RIA could result in a third party being unable to obtain a full and accurate understanding of how the EPA arrived at its final cost estimate.

Accurate and complete information in RIAs takes on even more importance when the EPA's analyses include ISI or cannot be made public due to protected proprietary or sensitive data, as was the case with the Tier 3 refinery-by-refinery cost model. The EPA's information quality guidelines<sup>7</sup> state that ISI should be subject to a higher degree of quality than information not deemed to be ISI (for example, transparency about data and methods). The guidelines also state that information disseminated in support of top agency actions (such as the Tier 3 RIA) is considered influential information and should adhere to a rigorous standard of quality. Further, the guidelines state that the agency should apply especially rigorous checks when data and analyses cannot be released publicly due to trade secrets, intellectual property or other protections. This last point is particularly

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<sup>7</sup> *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency* (EPA 2002).



relevant to the refinery-by-refinery cost model, as the protected information in the model prevented the EPA from releasing it publicly. In these cases, the importance of the RIA's role in promoting accountability and transparency in government is enhanced given that the public has to rely on the EPA's description of its analyses, rather than being able to access the analyses themselves.

Based on our assessment of all documentation we obtained, we did not find any evidence that the instances of inaccuracies and incomplete information we identified were intentional. Rather, we believe these resulted primarily from staff and time constraints during the final rulemaking, which hampered the review process for assuring the accuracy of all information in the final RIA. Due to unforeseen staffing issues, more responsibilities fell on the primary modeler during the final stages of the rulemaking than was originally intended. Thus, while the primary modeler was writing the majority of the text for the final RIA, he was also conducting final re-runs of both the refinery-by-refinery cost model and LP model, as well as responding to peer review comments. This resulted in a workload that was too heavy for one person, as it had originally been intended to be shared by two staff in OTAQ. The primary modeler told us that some of the mistakes in the final RIA may have been avoided if he had had more time to conduct an additional review of the final RIA at the very end of the rulemaking period. In addition, OTAQ staff and managers told us that due to time and staffing constraints, they had to prioritize their review to focus more heavily on portions of the modeling that had the biggest cost impact (i.e., treating FCC naphtha) and on the feasibility of compliance by the compliance date.

### ***Lack of Response to Peer Reviewer Comment***

We reviewed the peer reviewer comments pertaining to the allegation topic areas and EPA responses to these comments for the peer review of EPA's final cost model. EPA provided a written response to all but one of these peer review comments.

The EPA did not provide a written response to one peer reviewer's comment questioning the validity of the EPA's modeling logic concerning isomerization units<sup>8</sup> and LSR treatment. The modeling logic was built on the assumption that refineries with isomerization units would not incur additional LSR desulfurization expenses under Tier 3.<sup>9</sup> The EPA did not respond to the peer reviewer's feedback on this issue and made no changes to its isomerization unit assumption or the associated modeling logic. The EPA has discretion over whether to accept a peer reviewer's comment, but the EPA's Peer Review Handbook requires that the peer review record include a written response from the EPA explaining its rationale and rebuttal for not accepting the comment. OTAQ staff did not do this for this specific comment, and acknowledged to us that they should have done so in their

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<sup>8</sup> The purpose of isomerization is to increase the refinery's production of high-octane, low-aromatic gasoline.

<sup>9</sup> This reasoning was based on OTAQ staff's assumption that refineries with isomerization units would already be desulfurizing their LSR stream before it reached the isomerization unit.

official response to the peer reviewers' comments. As noted in OMB's *Final Information Quality Bulletin for Peer Review*, the credibility of a final scientific report is likely to be enhanced if the public understands how the agency addressed the specific concerns raised by the peer reviewers.

## Conclusions

We did not find evidence to substantiate the hotline allegations that the EPA intentionally underestimated costs to industry or purposefully misrepresented information to the public. We did, however, identify instances in four of the six allegation topic areas where descriptions of certain aspects of the EPA's modeling analyses were inaccurate or incomplete. We also identified one instance where the EPA did not respond to a peer review comment as required by EPA guidance. While these were documentation errors that did not affect the cost estimate presented in the final rule, they indicate a need for more thorough review of public rulemaking documents to ensure their accuracy and completeness. Accurate and complete rulemaking documents help promote accountability and transparency in government actions. This is especially important when the EPA's analyses are identified as ISI and/or cannot be released publicly due to protected information, as was the case with the Tier 3 refinery-by-refinery cost model. In these instances, the EPA should take extra steps to ensure the supporting public documentation for the analyses is accurate and complete.

## Recommendation

We recommend that the Assistant Administrator for Air and Radiation:

1. Direct OTAQ to develop a process to provide for an enhanced quality assurance review of regulatory impact analysis documents, when the analysis used to support the rulemaking is influential scientific information and/or cannot be made public.

## Agency Comments and OIG Evaluation

In its February 5, 2016, response to the draft report, OAR agreed with our recommendation and provided an acceptable corrective action plan. OAR's corrective action includes documenting and disseminating best practices to improve quality assurance of regulatory impact analysis documents. OAR plans to implement these improved practices when updating language between proposed and final rules, citing modeling analyses, and ensuring a thorough and complete response to all peer review comments. We believe these planned actions meet the intent of our recommendation. Thus, the recommendation is resolved and open pending completion of the corrective action.

## **Status of Recommendations and Potential Monetary Benefits**

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status <sup>1</sup>	Action Official	Planned Completion Date	Claimed Amount	Agreed-To Amount
1	11	Direct OTAQ to develop a process to provide for an enhanced quality assurance review of regulatory impact analysis documents, when the analysis used to support the rulemaking is influential scientific information and/or cannot be made public.	O	Assistant Administrator for Air and Radiation	12/30/16		

<sup>1</sup> O = Recommendation is open with agreed-to corrective actions pending.  
 C = Recommendation is closed with all agreed-to actions completed.  
 U = Recommendation is unresolved with resolution efforts in progress.

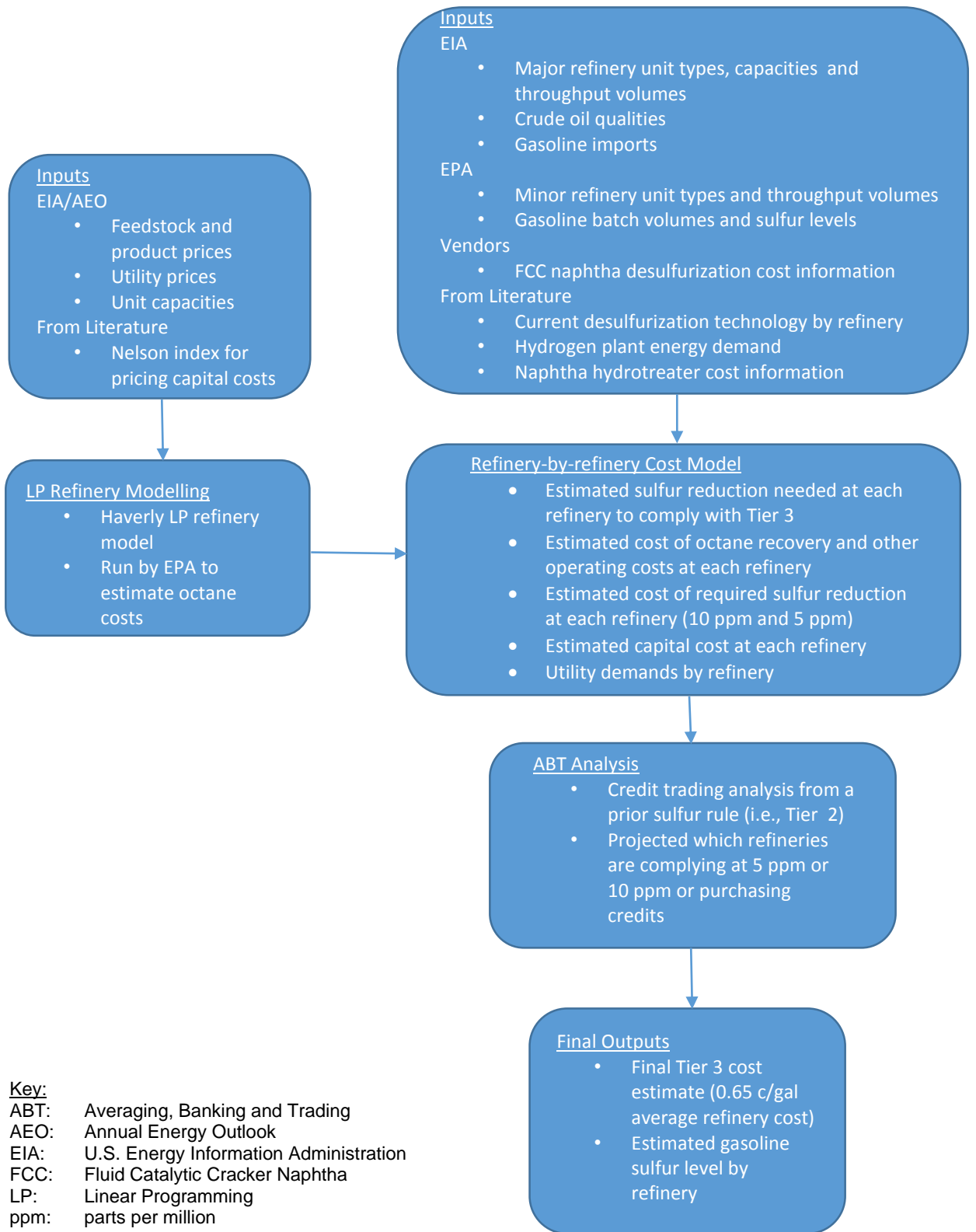
## ***OIG Depiction of Tier 3 Fuel Standards Cost Modeling Process***

The OIG diagram below shows a high-level summary of the EPA's cost modeling for the sulfur fuel standards portion of the Tier 3 rulemaking. The upper, right-hand box contains bulleted lists of inputs into the refinery-by-refinery cost model, as well as the sources of that information. The primary sources of information for the EPA's refinery-by-refinery cost model were the U.S. Energy Information Administration, the EPA, desulfurization technology vendors, and available literature on refinery units and processes.

The two boxes on the left-hand side show how LP modeling outputs were also key inputs into the refinery-by-refinery cost model. The EPA's LP modeling relied on information from the U.S. Energy Information Administration, including projections from the Annual Energy Outlook, and literature about capital equipment pricing.

The refinery-by-refinery cost model, as depicted by the second box from the top on the right-hand side, used the various inputs to project how each refinery would reduce the sulfur in its gasoline pool to 10 ppm or lower, and to estimate associated costs and other impacts (e.g., utility demands). This was dependent on the model's assessment of each refinery's capability to revamp existing or install new sulfur control technologies available to them. Refinery-specific cost estimates at 10 and 5 ppm from the refinery-by-refinery cost model were used to estimate the overall program costs, depending on how refiners complied under the ABT program.

The last box in the diagram shows the refinery-by-refinery model's final outputs, including the EPA's final Tier 3 cost estimate of 0.65 cents/gallon. This was the EPA's final estimate of average refinery costs attributable to Tier 3.



**Key:**  
 ABT: Averaging, Banking and Trading  
 AEO: Annual Energy Outlook  
 EIA: U.S. Energy Information Administration  
 FCC: Fluid Catalytic Cracker Naphtha  
 LP: Linear Programming  
 ppm: parts per million

## ***Agency Response to Draft Report***

[February 5, 2016]

### **MEMORANDUM**

**SUBJECT:** Response to Office of Inspector General (OIG) Draft Report No. OPE-FY15-0020 titled “Supporting Documentation for EPA’s Final Rule Limiting Sulfur in Gasoline was Incomplete or Inaccurate in Several Instances, But No Intent to Misrepresent Data was Found,” dated January 7, 2016

**FROM:** Janet G. McCabe  
Acting Assistant Administrator

**TO:** Carolyn Copper, Assistant Inspector General  
Office of Program Evaluation  
Office of Inspector General

The EPA’s Office of Air and Radiation (OAR) appreciates the opportunity to review and comment on the OIG’s draft report currently titled “Supporting Documentation for EPA’s Final Rule Limiting Sulfur in Gasoline was Incomplete or Inaccurate in Several Instances, But No Intent to Misrepresent Data was Found” (Project No. OPE-FY15-0020) (Draft report). We would first like to express our appreciation for the professionalism of the OIG staff as they investigated a very sophisticated and highly technical fuels cost analysis conducted for the Tier 3 rulemaking. Given the complexity of the analysis, we appreciate the willingness of the OIG team to reach out to Office of Transportation and Air Quality (OTAQ) staff during the review to ensure an accurate OIG review. Furthermore, we agree with the OIG that EPA rulemakings should be written to be transparent to the public, and be complete and accurate. We draft and review all rulemakings with those goals in mind. Given the inherent challenges of documenting and reviewing large and technically complex rulemakings, we strive for continuous improvement in the clarity and completeness of our regulatory impact analyses. The OIG has identified some errors in the documentation of the Tier 3 fuel cost analysis that highlight some opportunities for us to further improve our quality assurance process. Although the report correctly notes that these errors did not impact the cost estimates and were related to some staffing issues, it nevertheless provides some useful insights into ways that we can ensure that our regulatory analyses are complete and accurate. We describe the steps we intend to take further below in our response to the OIG’s recommendation.

We have several specific suggestions that would improve the OIG report’s communication to the public about the outcomes of the review. In particular, the title of the report does not address the primary allegations as described in the topic sentence and in “Why We Did This Review.” We suggest that the title be revised to read, “No Evidence Was Found to Support Allegations that EPA Staff Underestimated or Misrepresented Costs to Industry.” This revised title highlights the



most important conclusion and also addresses the alleged underestimation of costs, which has the most serious implications for EPA's regulatory process. It is also consistent with the topic sentence of the report. The secondary conclusions about incompleteness and inaccuracy could be highlighted in a subtitle or in the highlighted text box, such as: "Some inaccurate or incomplete documentation was identified but did not impact the EPA's estimate of costs." Similarly, the "Results of Review" section does not currently reflect the OIG's substantial effort to support the most important conclusion, that there was no evidence to substantiate the hotline allegations that EPA intentionally misrepresented costs to the industry. Currently there is only a single sentence with no supporting justification. We suggest this discussion be expanded to illustrate the basis for the OIG's conclusion.

In addition, there is a sentence in the "Results of Review" section that seems to overstate the OIG's actual findings and is not adequately explained. The draft report states that "EPA did not fully adhere to applicable policies and guidance on information quality and responding to peer review comments." The report identifies errors in the documentation but does not explain why imperfection constitutes failure to adhere to policy and guidance. Similarly, EPA's failure to respond to one of hundreds of peer review comments would seem to be an error rather than a failure to adhere to peer review guidance. We suggest that the sentence be deleted.

Below is OAR's response to the OIG's specific recommendation. In the attachment, we provide suggested additional detailed wording changes in the form of a markup.

**Recommendation 1: "Direct OTAQ to develop a process to provide for an enhanced quality assurance review of regulatory impact analysis documents, when the analysis used to support the rulemaking is ISI and/or cannot be made public."**

**Response 1:** OAR agrees with this recommendation. OTAQ will document and disseminate best practices to improve quality assurance of regulatory impact analysis documents, such as more specific checklists and review guidelines for authors and internal reviewers. The enhanced quality assurance process will reduce the risk of there being errors and inaccuracies in our final rulemaking documents. The improved practices will be implemented when updating language between proposed and final rules, citing modeling analyses, and ensuring a thorough and complete response to all peer review comments.

**Planned Completion Date:** December 31, 2016

OTAQ will document and communicate the enhanced process by the end of calendar year 2016. However, OTAQ is already applying some aspects of the process to regulations documents that are currently in development.

If you have any questions regarding this response, please contact William Charmley, Director, Assessment and Standards Division in the Office of Transportation and Air Quality at (734) 214-4466.

Attachment

cc: Betsy Shaw  
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