Economic and Supporting Analyses for the Final Aircraft Drinking Water Rule

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List of Acronyms

ADWR	Aircraft Drinking Water Rule
AIDS	Acquired Immune Deficiency Syndrome
ANSI	American National Standards Institute
AOC	Administrative Order on Consent
ATA	Air Transport Association
BAT	Best Available Technology
BEA	Bureau of Economic Analysis
BMP	Best Management Practice
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
CDC	U.S. Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CRMP	Comprehensive Representative Monitoring Plan
CWS	Community Water System
D&B	Dun & Bradstreet
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FAA	U.S. Federal Aviation Administration
FDA	U.S. Food and Drug Administration
GDP	Gross Domestic Product
GS	General Schedule
GWUDI	Ground Water Under the Direct Influence of Surface Water
HACCP	Hazard Analysis Critical Control Point
HPC	Heterotrophic Plate Count
ICC	Interstate Carrier Conveyance
ICR	Information Collection Request
ICWS	Interstate Carrier Water Supply
IESWTR	Interim Enhanced Surface Water Treatment Rule
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MRDL	Maximum Residual Disinfectant Level
NAICS	National American Industry Classification System
NCWS	Noncommunity Water System
NPDWR	National Primary Drinking Water Regulation
NSF	National Science Foundation
NTNCWS	Nontransient Noncommunity Water System
O&M	Operation and Maintenance
OMB	Office of Management and Budget
PN	Public Notification
PWS	Public Water System
QA/QC	Quality Assurance/Quality Control

QAPP	Quality Assurance Project Plan
RFA	Regulatory Flexibility Act
SAB	Science Advisory Board
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SOC	Standard Occupational Classification
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TMF	Technical, Managerial, and Financial
TNCWS	Transient Noncommunity Water System
UMRA	Unfunded Mandates Reform Act
USC	United States Code
WHO	World Health Organization
WSG	Water Supply Guidance

Executive Summary

The United States Environmental Protection Agency (EPA) finalized National Primary Drinking Water Regulations (NPDWRs) for aircraft in September 2009. The primary purpose of the Aircraft Drinking Water Rule (ADWR) is to ensure that safe and reliable drinking water is provided to aircraft passengers and crew, while enabling air carriers to comply with the Safe Drinking Water Act (SDWA) and the NPDWRs in a feasible manner. These provisions, once promulgated, are expected to enhance protection of public health against illnesses attributable to microbiological contamination.

Under the SDWA, interstate carrier conveyances (ICCs) that regularly serve drinking water to an average of at least 25 individuals daily, at least 60 days per year, are subject to the NPDWRs. An ICC is a carrier which conveys passengers in interstate commerce; this includes aircraft, trains, buses, and water vessels. As with other ICCs, aircraft obtain finished water from many different sources and have significant physical and operational differences from traditional public water systems (PWSs), making implementation of the NPDWRs difficult for this class of PWSs. EPA may decide to tailor existing requirements to other classes of ICCs in the future.

The ADWR applies to all aircraft satisfying the definition of a transient non-community water system (TNCWS) that fly within the United States. This includes approximately 7,300 aircraft serving routes in the United States, which together have approximately 744 million passengers and crew that may partake of the water at some time over the course of a year.[1] Aircraft in the following categories are not subject to the ADWR because they do not meet the definition of a PWS, are not under EPA's jurisdiction, or are excluded from regulatory requirements under SDWA section 1411[2]:

- Aircraft that do not serve 25 or more people for at least 60 days per year
- Aircraft without a qualifying lavatory[3] or galley
- Aircraft solely used for cargo purposes
- Aircraft that fly international routes serving only one U.S. city
- Aircraft owned and operated by the U.S. military if used solely for military purposes, not conveying passengers in interstate commerce, and meet all of the other exclusion criteria under SDWA section 1411

[1] Since a portion of passengers and crew make multiple trips each year, the actual number of passengers and crew exposed to aircraft drinking water is less than 744 million.
[2] Section 1411 excludes from regulation any public water system that receives all of its water from another regulated public water system, does not sell or treat the water, and is not a "carrier which conveys passengers in interstate commerce."
[3] A qualifying lavatory is defined as a private room with a flushing toilet and sink. Curtained-off toilet seats without lavatory sinks (as seen in some small, short-range aircraft) have not been included.

This Economic and Supporting Analyses document describes the estimated annual costs to the air carrier industry and EPA for the final provisions. These costs include coliform monitoring, routine water system disinfection and flushing, reporting and recordkeeping, self-inspections/compliance audits, and planning processes. EPA has also characterized some of the non-quantified costs and benefits associated with this final rule.

Summary of the Final ADWR Requirements

In developing the ADWR, EPA evaluated four options: the existing regulations, and three alternatives. The analysis of several alternatives provided information that enabled the Agency to consider the economic and health effects of different combinations of regulatory components to gauge the relative efficiency and effectiveness of the regulatory alternatives. The alternatives considered are described in Chapter 2 and include the following:

Alternative 1 – Existing Drinking Water Regulations
Alternative 2 – Regulatory Requirements Similar to the Administrative Orders on Consent (AOCs)
Alternative 3 – Regulatory Requirements Similar to Water Supply Guidance (WSG) 29
Alternative 4 – Hybrid Approach - ADWR

EPA published the proposed ADWR on April 9, 2008 (71 FR 19320). The proposed rule presented a hybrid approach that combined specific elements of the alternatives considered during rule development so as to achieve a balance between added health protection and the economic costs, while also providing administrative and operational flexibility for the air carriers in how they implement the regulatory requirements. The final rule was revised based on public comments received on the proposed rule. This final approach consists of regulatory components that are tailored to meet the unique circumstances of aircraft PWSs. Key components of the final rule include the following:

- Routine coliform monitoring using one of four monitoring frequency options determined by the frequency of disinfection and flushing of the aircraft water system.

- Two routine coliform samples are collected at the frequency chosen. If one or more of the routine samples are total coliform-positive but are *Escherichia coli (E. coli)*-negative the aircraft can choose to either perform repeat sampling (collecting three samples) or corrective action to include disinfection and flushing and follow-up monitoring. Special consideration is given for aircraft with a single water tank that is removable and is drained at least once-a-day, and there is one tap on the aircraft. Those aircraft may collect a single 100 mL routine sample at the frequency chosen.

- Disinfection and flushing as corrective action must occur in the event of an *E. coli*-positive sample or if any repeat samples are total coliform-positive. If disinfection and flushing as corrective action is required, public access to water must be restricted and public notice must be posted until the water system is disinfected and flushed and a complete set of follow-up samples are total

coliform-negative. The rule specifies a maximum amount of time that can elapse before corrective action disinfection and flushing occurs if the water cannot be physically shut off or the flow of water cannot be prevented through the taps to prevent use for human consumption.

- Disinfectant residual monitoring is not required by the final rule, but may be recommended in guidance as a means of promoting voluntary measures such as flushing and refilling with water containing a residual.
- Specific training requirements for all personnel involved with the aircraft water system operations and maintenance provisions of the ADWR must be included in the aircraft operations and maintenance (O&M) plan.
- Detailed disinfection and flushing procedures must be included in O&M plans.
- Reporting requirements for disinfection and flushing and monitoring results, and compliance status.
- Water system O&M plans would be incorporated into U.S. Federal Aviation Administration (FAA)-accepted O&M plans for aircraft.
- EPA may perform compliance audits as needed.
- Air carriers perform self-inspections of aircraft water systems at least every 5 years and self-certify completion of the inspections.

Summary of National Benefits and Costs of the Final ADWR

National Benefits Summary

This section summarizes the risk (and benefit) tradeoffs between compliance with existing NPDWRs and the regulatory alternatives considered during the rule development process. Evaluations include a qualitative analysis of the relative risks of the regulatory alternatives considered. Potential non-quantified benefits of compliance with the regulatory options are also discussed.

Relative Risks—Qualitative Analysis

The goal of the ADWR is to tailor existing NPDWRs to the unique characteristics of aircraft water systems. The requisite data on contaminant occurrence (both frequency and concentration), health effects, and water consumption are not available to support a quantitative analysis. Therefore, in consultation with the U.S. Food and Drug Administration (FDA) and FAA, EPA has used best professional judgment to qualitatively estimate the relative risk of each regulatory alternative compared to the baseline alternative of existing regulations for transient non-community PWSs using finished surface water. This assessment was made with contributions from a diverse group of drinking water and aircraft experts, ranging from scientists and engineers to administrators and regulatory experts.

The consensus opinions resulting from the qualitative assessment of risks for each alternative relative to the Alternative 1 baseline of existing NPDWRs concluded that Alternative 2, which is similar to the AOCs, has an overall lower health risk due to the dominant factor of periodic disinfection and flushing of the aircraft water system. The overall health risk posed by Alternative 3, which is similar to Water Supply Guidance 29, is also most likely less than the Alternative 1 baseline, though the magnitude of the difference is expected to be smaller compared to Alternative 2 due to the flexibility in choosing between monitoring and an O&M plan under Alternative 3. The regulatory components of the ADWR allow greater flexibility than Alternatives 2 and 3 with regard to disinfection and flushing frequencies. Thus, some aircraft may not perform disinfection and flushing as often as would be required under those alternatives. However, this is compensated for by requiring more routine monitoring in those situations. As a result, the expert consensus is that the overall health risk posed by the ADWR is most likely less than the Alternative 1 baseline, and about the same as Alternatives 2 and 3.

Qualitative Benefits Analysis

Increased routine disinfection and flushing required under the final ADWR is expected to inactivate pathogens and control biofilm which can harbor pathogens in the aircraft distribution system that can contribute to endemic disease. Likewise, disinfection and flushing associated with corrective action is also expected to inactivate or remove any pathogens that may have entered the distribution system, resulting in increased avoidance of illness and death. By reducing cases of illness contracted through exposure to aircraft PWSs, the final rule is also expected to reduce the occurrence of illness passed through secondary spread. EPA expects the addition of multiple barriers to pathogens through monitoring and disinfection and flushing to reduce the likelihood of outbreaks associated with aircraft PWSs.

EPA determined that it was not feasible to perform a quantitative risk analysis for the proposed rule during its development. EPA continued to assess the AOC data and evaluate whether additional quantitative analyses were possible for the final rule. EPA has used the AOCs' data to update estimates of the percentage of total coliform-positive and *E. coli*-positive samples for Alternatives 2 through 4 based on the inclusion of disinfection and flushing of the water systems on a routine basis – a requirement not included in the existing NPDWRs represented by Alternative 1. EPA determined the AOC data is still not sufficient to support a quantitative analysis.

National Cost Summary

Exhibit ES.1 presents the total annualized costs to air carriers and the Agency for implementing the final ADWR at 3 and 7 percent discount rates. Incremental costs of the final rule against the baseline (Alternative 1) are also presented. For the purposes of this analysis, one-time and yearly costs were projected over a 25-year time period to coincide with and allow comparison with other drinking water regulations. The present values of costs are calculated using discount rates of 3 and 7 percent based on EPA policy and Office of Information and Regulatory Affairs of the Office of Management and Budget (OMB) guidance.

Exhibit ES.1 Total Annualized Present Value Implementation Costs for the Final ADWR ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Sampling Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.003
O&M Plan	$ 0.01	$ 0.0001	$ 0.01	$ 0.02	$ 0.0001	$ 0.02
Coliform Monitoring	$ 4.89	$ 0.04	$ 4.93	$ 4.82	$ 0.04	$ 4.86
Routine Disinfection and Flushing	$ 2.08	$ -	$ 2.08	$ 2.05	$ -	$ 2.05
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Compliance Audit	$ 0.01	$ 0.01	$ 0.02	$ 0.01	$ 0.01	$ 0.02
Total	**$ 7.04**	**$ 0.30**	**$ 7.34**	**$ 6.95**	**$ 0.30**	**$ 7.25**

Exhibit ES.2 presents the total annualized present value cost for each of the regulatory alternatives considered for this rulemaking.

Exhibit ES.2 Comparison of Total Annualized Present Value Costs by Regulatory Alternative ($Millions, 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4 (Final Rule)	Alt 1	Alt 2	Alt 3	Alt 4 (Final Rule)
	3%				7%			
Implementation	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Annual Administration	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23
Monitoring Plan	0.002	0.002	0.001	0.002	0.004	0.004	0.002	0.003
O&M Plan	-	-	0.01	0.01	-	-	0.01	0.02
Coliform Monitoring	25.37	1.67	2.23	4.93	25.02	1.65	2.20	4.86
Disinfectant Residual Monitoring	3.17	0.67	-	-	3.13	0.66	-	-
Routine Disinfection and Flushing	-	4.52	2.97	2.08	-	4.46	2.93	2.05
Corrective Action Disinfection and Flushing	-	0.05	0.05	0.05	-	0.05	0.05	0.05
Sanitary Survey/Compliance Audit	0.70	-	-	0.02	0.69	-	-	0.02
Turbidity Monitoring	-	-	12.92	-	-	-	12.74	-
Total	**29.49**	**7.16**	**18.43**	**7.34**	**29.08**	**7.07**	**18.19**	**7.25**

As discussed in Chapter 5, the qualitative analyses suggest that benefits are greater under the final rule than under Alternative 1, the baseline requirements. Exhibit ES.3 presents the cost savings associated with the final rule. Although it is not the least costly alternative considered during rule development, the final rule will likely deliver a level of desired benefits at a cost that is acceptable to the air carrier industry, which increases the likelihood that real benefits will accrue. EPA is limited by the purpose, quality, and quantity of data available in developing meaningful benefits analyses. Any comparison of risk between the alternatives considered for the final rule requires robust data, which is not currently available (see Chapter 3 for a more detailed description of available data).

Exhibit ES.3 Total Annualized Incremental Cost: Existing NPDWRs and the ADWR ($Millions, 2008$)

	Alt 1 (Existing NPDWRs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4 - Alt 1)	Alt 1 (Existing NPDWRs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4 - Alt 1)
	3%			7%		
Implementation	0.01	0.01	0	0.02	0.02	0
Annual Administration	0.24	0.24	0	0.23	0.23	0
Monitoring Plan	0.002	0.002	0	0.004	0.003	(0.001)
O&M Plan	-	0.01	0.01	-	0.02	0.02
Coliform Monitoring	25.37	4.93	(20.44)	25.02	4.86	(20.16)
Disinfectant Residual Monitoring	3.17	-	(3.17)	3.13	-	(3.13)
Routine Disinfection and Flushing	-	2.08	2.08	-	2.05	2.05
Corrective Action Disinfection and Flushing	-	0.05	0.05	-	0.05	0.05
Sanitary Survey/Compliance Audit	0.7	0.02	(0.68)	0.69	0.02	(0.67)
Turbidity Monitoring	-	-	-	-	-	-
Total	$29.49	$7.34	$(22.15)	$29.08	$7.25	$(21.83)

1. Introduction

This document presents an analysis of the costs, benefits, and potential impacts of the final ADWR.

This chapter includes the need for the rule (Section 1.1); a regulatory history of the ADWR (Section 1.2); a summary of the final ADWR (Section 1.3); the economic rationale for regulating aircraft PWSs (Section 1.4); an outline of the document (Section 1.5); and information regarding supporting calculations and citations (Section 1.6).

1.1 Need for the Rule

The primary responsibility for regulating the quality of drinking water lies with EPA. The SDWA establishes this responsibility and defines the mechanisms at the Agency's disposal to protect public health. EPA sets standards by identifying which contaminants should be regulated and by establishing the maximum levels of the contaminants allowed in drinking water. Under the SDWA, primary enforcement authority for the NPDWRs may be delegated to states and Indian Tribes; however, due to the interstate nature of aircraft travel, EPA will be responsible for implementation, including enforcement, of the ADWR.

The primary purpose of the final ADWR is to ensure that safe and reliable drinking water is provided to aircraft passengers and crew. This entails providing air carriers with a feasible and effective way to comply with the SDWA and the NPDWRs. Under the SDWA, ICCs, including aircraft, that regularly serve drinking water to an average of at least 25 individuals daily, at least 60 days per year, are subject to the NPDWRs. An ICC is a carrier that conveys passengers in interstate commerce. The classes of ICCs include aircraft, trains, buses, and water vessels.

Aircraft obtain potable water from many different sources and have significant physical and operational differences from traditional, stationary PWSs, making implementation of the NPDWRs difficult for this class of PWSs. A significant characteristic is that they board water frequently from a variety of locations, and must use water transfer equipment and temporary connections. This rule tailors implementation of existing health-based drinking water standards to the unique characteristics of aircraft PWSs. EPA may address regulations for other ICCs subsequent to development of the ADWR.

Public Health Concerns Related to Aircraft Drinking Water

EPA assumes that only finished water obtained from another PWS is boarded on aircraft. This assumption is based on an FDA requirement that only potable water may be provided for drinking and culinary purposes on ICCs (21 Code of Federal Regulations (CFR) 1240.80). However, the opportunity exists for microbial contamination to be introduced during the act of

transferring the water from the supplier truck or cart to the aircraft water system, or to occur through a cross connection within the water system itself.

In 1990, EPA's Science Advisory Board (SAB), an independent panel of experts established by Congressional mandate, cited drinking water contamination as one of the most important environmental risks. The SAB indicated that disease-causing microbial contaminants (*i.e.*, bacteria, protozoa, and viruses) pose a particularly high health risk due to the large populations that are directly exposed to them (SAB and USEPA, 1990). Information on waterborne disease outbreaks from the U.S. Centers for Disease Control and Prevention (CDC) underscores this concern. Data collected by CDC indicate that between 1971 and 2002, 757 waterborne disease outbreaks, caused by various types of contamination, were reported (Craun and Calderon, 1996; Levy et al., 1998; Barwick et al., 2000; Lee et al., 2002; and Blackburn et al., 2004). Water contamination issues apply to all drinking water systems, and are not unique to aircraft water systems.

To date, EPA has reviewed four data sources to gain a better understanding of the drinking water quality on domestic aircraft as represented by total coliform, *Escherichia coli (E. coli)*/fecal coliform, and chlorine residual. These data sources included: 1) a voluntary monitoring study completed by Air Transport Association (ATA) in Fall 2003; 2) an EPA compliance activity completed in 2004; 3) an EPA compliance activity under the AOCs covering monitoring results from 2005-2008; 4) and the Canadian Inspection Program monitoring results completed in 2006. In comparing the routine sampling data, the highest total coliform-positive rate of detection was 15 percent, while the AOCs rate observed was 3.6 percent. The data are discussed further in Chapter 3 and details of the AOCs are provided in Chapter 2. EPA believes that the mandatory quarterly disinfection and flushing requirements under the AOCs may be a contributing factor to the reduced total coliform rates observed in the AOCs' data. The data results are reflected in Exhibit 1.1.

Exhibit 1.1 Aircraft Drinking Water Monitoring Data

	EPA AOCs (2005 - 2008 – Compliance Activity) [1]	ATA (Fall 2003 - Voluntary)	EPA Study (2004 - Compliance Activity)	Canadian Study (2006 - Inspection Program)
Samples	Routine samples only; galley & lavatory samples • 3,512 (~58%) aircraft tested • 16 (~35%) air carriers tested	Galley samples (327 aircraft tested)	Galley & lavatory samples (327 aircraft tested)	Galley & lavatory samples (431 aircraft tested)
Total Coliform-Positive	3.6% (463 out of 12,794 samples) [2] • 1.0% (47 out of 5,695 galley samples) • 4.4% (413 out of 7,027 lavatory samples)	2.7%	15%	15.1%
***E. coli*Fecal Coliform-Positive**	3.9% (18 out of 463 total coliform-positive samples) • 12.8% (6 out of 47 galley samples) • 2.9% (12 out of 413 lavatory samples)	0.0%	0.6% (2 out of 49 total coliform-positive samples) (1.3% in summer samples)	7.7% (5 out of 65 total coliform-positive samples)
Cl_2 Residual Non-Detects	14.4% (1,517 out of 10,557)	41%	21%	NA

1. Data collected under EPA-approved quality assurance project plans (QAPPs) and comprehensive representative monitoring plans (CRMPs).
2. One total coliform-positive sample out of seven was a composite sample (of lavatory and galley sources) and two total coliform-positive samples out of 65 did not have a sample location.

The effects of waterborne disease are usually acute, resulting from a single or small number of exposures. Most waterborne pathogens cause gastrointestinal illness with diarrhea, abdominal discomfort, nausea, vomiting, or other symptoms. Most such cases involve a sudden onset and generally are of short duration in healthy people. Some pathogens (e.g., *Giardia* and *Cryptosporidium*), however, may cause extended illness, lasting weeks or longer in otherwise healthy individuals. The infection can prove fatal for members of sensitive populations, such as the immuno-compromised. Other waterborne pathogens cause, or at least are associated with, more serious disorders such as hepatitis, particularly hepatitis A (Moore et al., 1993), peptic ulcers and gastric cancer (*Helicobacter pylori*) (Park et al., 2001, Sepulveda and Graham, 2002), myocarditis (group B coxsackievirus) (Kim et al., 2001), meningitis (group B coxsackievirus and echoviruses) (Lee and Kim, 2002, Amvrosieva et al., 2001), and other diseases.

The final ADWR seeks to protect against contamination that has an acute rather than cumulative effect because of the short term exposure of consumers to the water and the transient nature of passengers and the crew on board a particular aircraft. In particular, the final ADWR seeks to protect against disease-causing microbial contaminants. Although data do not exist on outbreaks of illness caused by drinking water on aircraft, EPA understands that the population on board disperses after a flight and that even if passengers develop gastrointestinal symptoms within hours of deplaning, they are unlikely to contact the air carrier or any government agency to report the illness.

1.2 Regulatory History

The SDWA, including the amendments of 1986 and 1996, requires EPA to promulgate the NPDWRs to protect human health from waterborne contamination. As TNCWSs, aircraft are subject to certain NPDWRs specific to this category of systems. The Agency published WSG 29 in October 1986 to assist air carriers in complying with these standards (USEPA, 1986). Under WSG 29, an ICC water system could use an approved operation and maintenance program in lieu of monitoring requirements. In 2004, EPA found all aircraft water systems to be out of compliance with the NPDWRs. Since then, the Agency has determined that a new rule specifically adapted to aircraft water systems would provide a regulatory environment more conducive to compliance and enforcement. EPA is no longer approving operation and maintenance programs in lieu of monitoring while the ICC program is being revised. EPA has signed Administrative Orders on Consent with many air carriers that specify what monitoring and other activities are required until a new rule is in effect.

Many drinking water rules for systems using surface water or ground water under the direct influence of surface water (GWUDI) relate to treatment of source water, but because aircraft must use finished water the responsibility for treating the water is borne by the water supplier from which aircraft obtain their water. This situation is comparable to the handling of traditional, stationary PWSs as consecutive systems. The ADWR adapts to aircraft water systems the applicable requirements from the Total Coliform Rule (TCR), the Surface Water Treatment Rule (SWTR), and the Public Notification Rule, the relevant sections of which are summarized in the subsections below.

Monitoring for nitrates/nitrites (under the Phase II Inorganic Contaminant Rule) would normally apply to TNCWSs. However, aircraft board finished water that the supplier is required to have monitored for nitrate/nitrites, and to have applied treatment if necessary to meet the maximum contaminant levels (MCLs) for the contaminants. Therefore, the nitrate rule is not applicable to aircraft under the final ADWR and is not included in the discussion below.

1.2.1 1989 Total Coliform Rule

TCR (54 FR 27544, June 1989) applies to all PWSs. Because monitoring PWSs for every possible pathogenic organism is not feasible, coliform organisms are used as indicators of possible source water and distribution system contamination. Coliforms are easily detected in water and are used to indicate a water system's source and distribution system vulnerability to pathogens. In the TCR, EPA sets a Maximum Contaminant Level Goal (MCLG) of zero for total coliforms. EPA also sets a monthly MCL for total coliforms and requires testing of total coliform-positive cultures for the presence of *E. coli* or fecal coliforms. *E. coli* and fecal coliforms indicate more immediate health risks from sewage or fecal contamination and are used as a trigger of an acute MCL violation. Under the TCR, a TNCWS using finished surface water and serving fewer than 1,000 persons daily would typically be required to collect one routine total coliform sample per month. Additional samples would be required in the event a routine sample is total coliform-positive.

1.2.2 Surface Water Treatment Regulations

EPA has promulgated a suite of regulations to address microbial contamination of surface water. These regulations include the SWTR, the Interim Enhanced Surface Water Treatment Rule (IESWTR), the Filter Backwash Recycling Rule, and the Long Term 1 and Long Term 2 Enhanced Surface Water Treatment Rules (LT1ESWTR and LT2ESWTR). These rules apply monitoring and treatment technique requirements, such as turbidity limits, among others, to protect the public from microbial pathogens in drinking water such as bacteria, viruses, *Giardia lamblia*, and *Cryptosporidium*. The monitoring and treatment technique requirements must be met prior to water entering the distribution system. Aircraft are not required to provide source water treatment or to perform monitoring of source water because these are responsibilities of the PWS from which the aircraft obtains finished water for boarding. However, the SWTR included provisions for maintaining a detectable distribution system disinfectant residual and for monitoring distribution system disinfectant residuals at the same time and location as used for total coliform monitoring. A TNCWS using surface water serving fewer than 1,000 persons daily would typically be required to take one disinfectant residual sample at the same time and location as each coliform sample. The IESWTR requires primacy states to conduct sanitary surveys for all surface water and GWUDI systems regardless of size at a frequency of every 3 years for community water systems and every 5 years for noncommunity water systems.

1.2.3 Public Notification Rule

Public water systems must give notice to persons served for all violations of NPDWRs and for other situations posing a risk to public health from drinking water. The term "NPDWR Violations" is used in the public notification regulations to include violations of the MCL, Maximum Residual Disinfectant Level (MRDL), treatment technique, monitoring, and testing procedure requirements. Public notice requirements are divided into three tiers to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. Due to the transient nature of the public served by TNCWSs, public notice is typically provided through posting of the notice at locations where the public may access drinking water from the water system.

1.3 Summary of the Final Aircraft Drinking Water Rule

The ADWR applies to all aircraft under EPA's jurisdiction. Aircraft water systems are TNCWSs that board finished water from PWSs using primarily surface water supplies or GWUDI. Although some aircraft board water from PWSs supplied by ground water sources, these aircraft are also very likely to use surface water supplies at some of their destinations and are therefore classified as mixed systems. Mixed systems are subject to the same requirements as surface water and GWUDI systems.

As described in detail in Chapter 2, the baseline of existing regulations for TNCWSs using finished surface water (i.e., Alternative 1), requirements similar to two previously implemented approaches to regulating aircraft PWSs, and the final ADWR are presented in this

document. These alternatives were considered for development of the ADWR in compliance with guidelines set out in both EPA's *Guidelines for Preparing Economic Analyses* (USEPA, 2000) and Office of Management and Budget *Circular A-4* (OMB, 2003). Analysis of several alternatives allows the Agency to consider different combinations of regulatory components in order to select the most efficient and cost-effective approach to regulation. The alternatives considered as part of the analysis include:

Alternative 1 – Existing Drinking Water Regulations

Alternative 2 – Regulatory Requirements Similar to the AOCs

Alternative 3 – Regulatory Requirements Similar to Water Supply Guidance 29

Alternative 4 – Hybrid Approach – ADWR

The following discussion briefly summarizes the final rule, while Chapter 2 provides a more complete description of each of the alternatives considered for the ADWR. Although aircraft PWSs are not technically considered consecutive water systems[4], for the purposes of each alternative, they are assumed to be boarding finished water obtained from another PWS. Because aircraft board only finished water, for the purposes of the analyses in this document, aircraft are treated as equivalent to consecutive water systems. Finished water is defined in 40 CFR 141.2 as water that is introduced into the distribution system of a PWS and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system. Prior to boarding the water, compliance with FDA and FAA requirements[5] is expected to ensure that water from the supplier meets NPDWR standards and that the equipment used in transferring this water to the aircraft is maintained and operated so as to preserve that level of water quality.

Final ADWR

The final rule is a hybrid approach that combines what EPA believes are the most practical elements of the other alternatives with flexibility for the air carriers in how they implement the regulatory requirements. This final approach allows compliance with regulatory components that are most tailored to the unique circumstances of aircraft PWSs. Development of this alternative was undertaken based on the input received from stakeholders during the Agency's outreach efforts, as well as public comments on the proposed rule. The final rule includes the following regulatory components:

- Aircraft must comply with one of the following combinations of water quality monitoring, and disinfection and flushing of the aircraft water system in accordance with the manufacturer's recommendations:

[4] A consecutive system is defined as a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

[5] Compliance with FAA and FDA regulations is required of both aircraft PWSs and water suppliers. Any FAA and FDA requirements are in addition to those imposed by the ADWR.

  - Annual total coliform monitoring (once every twelfth month) in combination with routine disinfection and flushing quarterly (at least once every third month; four times per year).

  - Semi-annual total coliform monitoring (at least once every sixth month; two times per year) in combination with routine disinfection and flushing three times per year (once every fourth month).

  - Quarterly total coliform monitoring (once every third month; four times per year) in combination with semi-annual (once every sixth month; two times per year) routine disinfection and flushing.

  - Monthly total coliform monitoring (once every month; 12 times per year) in combination with annual or less frequent routine disinfection and flushing (once every twelfth month or less; one time per year or less).

- If not specified by the manufacturer, aircraft select any of the four disinfection and flushing frequencies.

- Analysis of all total coliform-positive culture media for the presence of *E. coli*.

- An option of repeat monitoring or disinfection and flushing with follow-up total coliform sampling as corrective action after one or more total coliform-positive routine samples that are *E. coli*-negative. The time frame for the corrective action is specified unless public access to the water is prevented through shut off of the water system or preventing the flow of water through the taps.

- Disinfection and flushing with follow-up total coliform sampling as a corrective action after one or more total coliform-positive repeat samples or a single *E. coli*-positive sample.

- Aircraft water system operations and maintenance plans.

- Compliance audits at an interval determined by EPA.

- Self-inspections conducted by the air carrier.

- Public notification for an *E .coli*-positive sample, for more than one total coliform-positive sample if disinfection and flushing as corrective action does not occur within the prescribed time frame, for failure to collect required routine or repeat samples, or if water is boarded that is of unknown quality or does not meet the NPDWRs.

1.4 Economic Rationale for the Regulation

This section discusses the statutory authority of EPA to regulate aircraft drinking water systems and the economic rationale for choosing a regulatory approach.

EPA derives its statutory authority to regulate contaminants in drinking water through the SDWA. Section 1412(b)(1)(A) of the SDWA requires EPA to establish NPDWRs for contaminants that may have an adverse public health effect; that are known to occur or that present a substantial likelihood of occurring once in PWSs at a frequency and level of public concern; and that present a meaningful opportunity for health risk reduction for persons served by PWSs. As noted above, ICCs are considered PWSs under the SDWA.

Executive Order 12866, Regulatory Planning and Review, directs the Agency to provide an economic rationale for choosing a regulatory approach. OMB circular A-4 notes that the rationale for regulation is to correct market failure or other social purposes: "The major types of market failure include: externality, market power, and inadequate or asymmetric information. Correcting market failures is a reason for regulation, but it is not the only reason. Other possible justifications include improving the functioning of government, removing distributional unfairness, or promoting privacy and personal freedom."

The economic rationale for establishing a regulation specifically designed for aircraft PWSs is to correct inadequate or asymmetric information. Limited monitoring has led to a lack of information regarding potential risks associated with consuming water onboard aircraft. As a result, aircraft passengers do not receive sufficient information on drinking water quality to make informed decisions about drinking water on aircraft. Federal intervention can be used to close this gap[6].

1.5 Document Organization

The remainder of the document is organized into the following chapters:

- Chapter 2 reviews alternative approaches that EPA considered during rule development and presents the rationale for the selection of the final rule option.

- Chapter 3 characterizes baseline conditions that existed before systems made changes to meet the AOCs' requirements including aircraft inventory, watering points, average number of passengers carried, and water boarding practices. The chapter also includes a summary of the microbiological conditions documented by air carrier data submitted for compliance with the AOCs. These conditions reflect aircraft water quality following implementation of routine water system

[6] Federal intervention is not the only tool available to address information gaps. Other tools include state or local intervention and voluntary incentives. However, due to the number of aircraft and carriers covered under this rule, as well as the interstate nature of the business, federal intervention is deemed the most appropriate tool to use to address the issue.

disinfection and flushing practices and corrective actions prompted by coliform detection in water samples.

- Chapter 4 presents a discussion of the risk and benefit tradeoffs between compliance with existing NPDWRs and the alternatives considered during the regulatory development process.

- Chapter 5 presents an estimate of the incremental costs and thecosts of implementing the final rule to air carriers and EPA. The costs of the other regulatory alternatives as well as the proposed rule are also presented.

- Chapter 6 discusses distributional analyses performed to evaluate the effects of the rule on different segments of the population, and considers various executive orders and requirements, including the Regulatory Flexibility Act (RFA) and Unfunded Mandates Reform Act (UMRA).

- References.

1.6 Calculations and Citations

This Economic and Supporting Analyses document presents results from analyses not explained in detail in Chapters 1 through 6. To help the reader track the various calculations and analyses, the following are provided:

- A reference section.

- Appendices.

  – Appendix A – ADWR Aircraft and Population Baseline

  – Appendix B – Aircraft Drinking Water Sampling Data

  – Appendix C – Cost Model

  – Appendix D – Screening Analysis

- Exhibits. Most tabular exhibits include a row that provides the formulas used to compute the contents of each column.

- Sources for information that was used but not calculated within the exhibits.

2. Consideration of Regulatory Alternatives

2.1 Introduction

The NPDWRs may be promulgated as either MCLs or treatment technique requirements, and include monitoring and reporting components. The NPDWR promulgation process requires that each contaminant undergo occurrence, health risk, and cost and benefit analyses. These analyses describe the contaminants' effects on public health and are used to identify the most appropriate public health protection measures for each contaminant. Because the goal of the ADWR is to tailor existing NPDWRs to the unique characteristics of aircraft water systems, EPA determined that additional risk assessments were not necessary.

In the rule development process, the Water Safety Plan approach, which draws on the principles of the hazard analysis critical control point (HACCP), and the Multiple Barrier approach were used to ensure the rule adequately addresses potential contamination issues at each step in the aircraft water system supply and transfer chain (see Exhibit 2.1).

In addition to the requirements described under EPA regulations, there are also numerous FDA and FAA regulations pertaining to water onboard aircraft. The FDA and FAA regulations include requirements affecting design, construction, and maintenance of watering points and aircraft water systems. FAA regulations address portions of the maintenance plans for aircraft water systems and provide existing regulatory authority to ensure the plans are implemented. FDA, operating under 21 CFR 1240 and 21 CFR 1250, has authority and responsibility for the following:

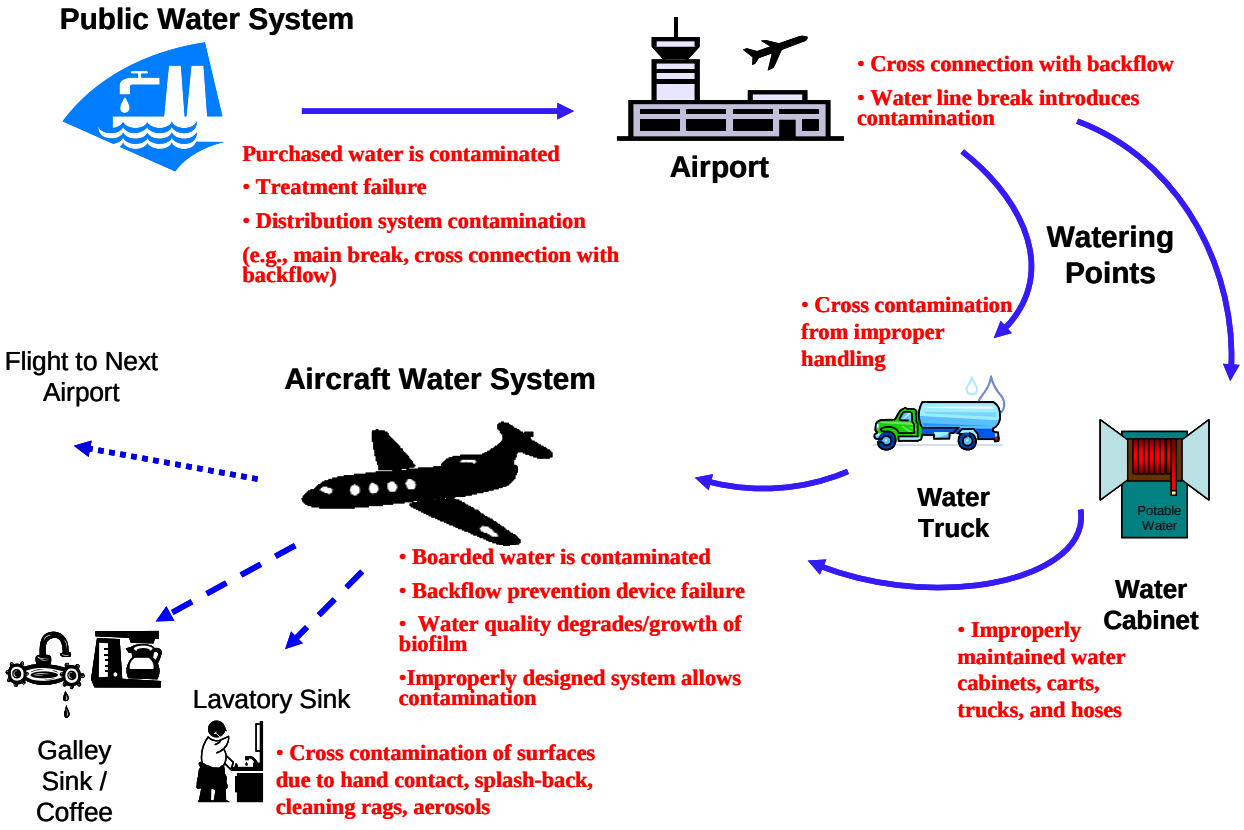
- Design approval for watering points and sanitation facilities at servicing areas
- Ensuring that watering points, water carts, trucks, and hoses are operated in such a manner as to prevent contamination of the water
- Review and approval of plans and specifications for design and construction of aircraft water systems

Although applicable to all regulatory alternatives discussed in this document, FDA and FAA regulatory requirements do not be change under the revised EPA regulations. FDA and FAA requirements also do not affect the comparison of the regulatory alternatives throughout this document (*i.e.*, they apply equally under all alternatives). Possible revisions to FDA or FAA regulations may be considered separately by each agency.

This chapter describes the process used to evaluate regulatory alternatives (Section 2.2), and the regulatory alternatives that were considered for the development of the ADWR (Section

2.3). Exhibit 2.1 provides an overview of the aircraft water system supply and transfer chain, and identifies potential causes of contamination of the onboard drinking water.

Exhibit 2.1 Aircraft Water System Supply and Transfer Chain



2.2 Process for Development of Regulatory Alternatives

In November 2004, EPA announced it had initiated a rule-making process to develop regulations for water onboard aircraft. The Agency committed to working collaboratively with other federal agencies overseeing the air carrier industry, industry representatives, and the interested public to identify appropriate requirements to ensure safe drinking water onboard aircraft. As a result, EPA established the ADWR Workgroup (the Workgroup), a multi-discipline, interagency team to participate in the regulatory development process. The team included representatives of the following EPA Offices: Water; Research and Development; General Counsel; Enforcement and Compliance Assurance; Policy, Economics, and Innovation; EPA Regions 1-7 and 9; as well as representatives of FDA and FAA. EPA also consulted with CDC on an as-needed basis. The Workgroup worked collaboratively with a broad range of industry experts and interested stakeholders including air carrier and airport owners and

operators, pilots, flight attendants, passengers, fixed base operators, and environmental/public health interests. Although the SDWA does not regulate aircraft water systems operating outside the U.S., EPA is supporting an international effort led by the World Health Organization (WHO) to develop international guidelines for aircraft drinking water.

Given the number and complexity of issues associated with a drinking water system onboard a mobile unit such as an aircraft, EPA undertook an assessment approach to identify rule alternatives by engaging the full range of stakeholders in the regulatory development process. In June 2005, EPA held a public information meeting to kick off the rulemaking process. EPA utilized a third-party facilitator for the meeting and for the development of a stakeholder assessment report. The stakeholder assessment report included recommendations for a series of joint education workshops to bring diverse stakeholders together to identify and understand the issues, and to provide input and comment on various areas of concern. A summary of the public information meeting can be reviewed at Docket ID No. EPA-HQ-OW-2005-0025. All documents in the docket are listed on the www.regulations.gov website.

The first stakeholder workshop was held January 18 and 19, 2006, and provided an opportunity for stakeholders to learn about aircraft water systems and watering points, current regulations, and other information relevant to the rulemaking. Stakeholders were encouraged to share their ideas about the issues that should be considered in developing the final rule. EPA also presented a conceptual approach for the rule framework that draws on the principles of HACCP, the Multiple Barrier approach used in managing traditional PWSs, and the Water Safety Plan approach developed and applied by the WHO in their drinking water guidelines. A detailed workshop summary is available in the docket.

In 2005, EPA began establishing AOCs with 45 air carriers potentially affected by the ADWR. The AOCs required monitoring of each aircraft and the reporting of information on existing treatment practices, data collected through previous monitoring, air carrier fleet information, and O&M procedures.

The second stakeholder workshop was conducted March 28 and 29, 2007. At this workshop, EPA presented a framework for the Water Safety Plan regulatory development approach. EPA also presented preliminary monitoring data collected as of mid-March 2007 under the air carrier AOCs. The majority of the workshop was spent soliciting stakeholder input on topics critical to the development of the ADWR including monitoring strategies, best management practices, notification to passengers and crew, reporting and recordkeeping, and program oversight and verification. A detailed workshop summary is available in the docket.

Based on stakeholder input, the information compiled in the framework for the Water Safety Plan approach, and the preliminary monitoring data provided by the air carriers, the Workgroup identified and developed four regulatory alternatives. The alternatives were developed with consideration of several key questions, such as:

- What health effects will the ADWR address?
- Which contaminants should be regulated?

- Should there be monitoring requirements?
- What, if any, onboard treatment options are feasible for air carriers?
- Which best management practices (BMPs) should be included in the rule?
- How can ADWR requirements be integrated with existing air carrier programs (*i.e.*, maintenance programs for other aircraft components)?

2.3 Regulatory Alternatives Considered

Based on input from the Workgroup and other stakeholders, EPA identified and developed four regulatory alternatives for consideration:

- Alternative 1 – Existing Drinking Water Regulations
- Alternative 2 – Regulatory Requirements Similar to the AOCs
- Alternative 3 – Regulatory Requirements Similar to WSG 29
- Alternative 4 – Hybrid Approach - ADWR

Each alternative is described below and summarized in the matrix that follows this chapter (Exhibit 2.2b). The first three alternatives represent key elements of the baseline scenario of existing NPDWRs and two previous approaches to regulating aircraft PWSs. Each was carefully considered as a possible option, including evaluation of their strengths and weaknesses. The proposed rule was developed by combining what were perceived to be strengths of the other alternatives with additional insight contributed by stakeholders. The first three alternatives were not proposed by the Agency as rule options.

The proposed rule was published in the *Federal Register* on April 9, 2008 (73 FR 19320). The public comment period closed on July 8, 2008, and public input was evaluated by the Agency during development of the final rule.

Although aircraft PWSs are not technically considered consecutive water systems, for the purpose of this rule and based on FDA requirements, it is assumed aircraft are boarding potable (finished) drinking water that meets NPDWR standards and that the equipment used in transferring this water to the aircraft is maintained and operated so as to preserve that level of water quality. Descriptions of FDA requirements are included in Exhibit 2.2a at the end of this chapter to provide a full picture of the regulatory landscape under which aircraft PWSs operate. Because the FDA requirements are existing regulations and apply in all cases regardless of the final ADWR, they are not re-stated in the discussion of each alternative. However, each alternative also assumes that it is possible for contamination to occur during the water transfer

process, for water to be boarded that is in violation of a NPDWR of significance to transient consumers, and that water quality onboard the aircraft may deteriorate over time unless management of water age is included in aircraft water system operations. In addition, in each alternative aircraft PWSs are categorized as TNCWSs using finished surface water or finished ground water under the direct influence of surface water, and serving 25 to 1,000 people per day. This categorization is also not re-stated in the discussion of each alternative.

2.3.1 Alternative 1 – Baseline Alternative: Existing NPDWRs

The baseline alternative includes the current requirements for aircraft PWSs under the applicable NPDWRs. Applicable regulations are those relevant to short-term rather than long-term exposure to the drinking water. Under the baseline alternative, aircraft would be required to comply with the regulations for coliforms, disinfectant residuals in the distribution system, and public notification. The subsections below describe each of these requirements.

Coliform Bacteria

Coliform testing of drinking water is required under the TCR and is intended to provide an indication of possible contamination of the water system by microbes. The existing TCR would apply the following requirements to aircraft PWSs:

- Water from taps in lavatories and galleys would be sampled and analyzed as follows:
  - Routine monitoring: One sample would be collected per month from each aircraft. The sample location would be adjusted each month according to a written sample siting plan. Samples would be tested for total coliforms, and total coliform-positive sample cultures would be analyzed for either fecal coliform or *E. coli*.
  - Repeat monitoring: Four repeat samples would be collected within 24 hours of notification of a total coliform-positive routine sample. The four sampling sites would include the original test site and three additional taps distributed throughout the aircraft water system. If fewer than four sampling sites exist onboard, then 400 mL of sample must be taken from available sample sites (*i.e.*, if there is only one tap, a 400 mL sample or four 100 mL samples would be drawn from that tap).
  - Additional routine samples: In the month following a positive routine sample, a minimum of five routine samples must be collected.
  - The aircraft PWS is in violation of the monthly MCL if it has more than one total coliform-positive sample per month. The aircraft triggers an acute MCL violation if it has a repeat sample that tests positive for fecal coliform or *E. coli*, or has a routine sample that tests positive for fecal

coliform or *E. coli* that is followed by a total coliform-positive repeat sample.

- Sanitary surveys would be conducted every 5 years.
- No corrective action, such as disinfection and/or flushing the water system, is specified in the regulation.
- Public notification requirements would apply which state the air carrier must notify the primacy agency within 24 hours of receiving notice of the fecal coliform or *E. coli*-positive result. In the case of a monthly MCL violation, the air carrier would be required to notify the public within 30 days. In the case of an acute violation, the air carrier would be required to notify the public within 24 hours as described below for a violation requiring Tier 1 public notice.

Distribution System Disinfectant Residual

The Surface Water Treatment Rule requires systems using surface water or GWUDI to monitor the disinfectant residual in the distribution system. The distribution system disinfectant residual is used as an indicator of whether the water is adequately disinfected. The disinfectant residual in the distribution system is not expected to inactivate disinfectant-resistant pathogens.

- Sampling frequency: Disinfectant residuals in the distribution system must be monitored at the same time and location as coliform samples are monitored. For aircraft, a single residual would be monitored each month when routine coliform samples are collected and additional residual measurements would be required for each repeat coliform sample.
- Alternative sampling: The aircraft may monitor for heterotrophic bacteria using heterotrophic plate counts (HPCs) instead of testing for disinfectant residual.
- Compliance: Disinfectant residual concentration must be detectable in the distribution system. If conducting a HPC instead of testing for disinfectant residual, a heterotrophic bacteria concentration of less than or equal to 500 cfu/mL is considered equivalent to a detectable residual. A violation is incurred if the system fails to have a detectable residual in the samples for two consecutive months.
- Public notification: Failure to meet the requirements for disinfectant residual or heterotrophic bacteria requires the aircraft to implement the measures of a Tier 2 public notice (see below).

Public Notification for Violations of NPDWRs

The baseline requirements for coliforms where an acute violation is incurred that are described above would require implementation of Tier 1 public notice measures. The air carrier

must attempt to notify the public served within 24 hours in the form of a Tier 1 notice, which for TNCWSs typically means posting notice in the area where people are served, hand delivery of a communication, and/or broadcasting the notice using a public address system. The air carrier must also initiate consultation with the primacy agency as soon as practical and at least within 24 hours after receiving notification of the test results to determine if further public notification steps are required. For non-acute coliform violations and for violations of the requirement for a disinfectant residual in the distribution system, the aircraft would provide Tier 2 public notice. This is also typically posted or hand delivered to users of the TNCWS, and the regulation allows 30 days for notice to be provided.

2.3.2 Alternative 2 – Regulatory Requirements Similar to the AOCs

An AOC regulatory alternative would require aircraft PWSs to implement monitoring for coliforms and disinfectant residuals, an operations and maintenance program that includes routine disinfection and flushing, disinfection and flushing as corrective action, and reporting procedures consistent with the requirements established under the AOCs. The requirements, or orders, of the AOCs were based on a finding that the air carriers were not meeting the existing NPDWR requirements as described in the baseline alternative.

Under the AOCs, air carriers are required to do the following:

- Supply fleet information to EPA in the EPA-specified format.
- Provide EPA with a copy of the current policies and practices for boarding domestic water and foreign-source water using the EPA-specified format.
- Provide EPA with a copy of current O&M practices.
- Provide EPA with data from current or previous drinking water monitoring programs.
- Continue with the pre-AOC monitoring program if coliform monitoring was occurring more than once per year.
- Submit a Comprehensive Representative Monitoring Plan (CRMP) to EPA within 30 days of the AOC's effective date.
- Submit a QAPP to EPA within 30 days of the AOC's effective date.
- Implement Period I monitoring within 15 days after written approval from EPA of the CRMP and QAPP.
- Under Period I monitoring, implement the following:
  - Disinfect the aircraft water system quarterly.

  - Disinfect the watering points owned by the air carrier monthly and in accordance with an O&M plan. If the pre-AOC O&M plan required more frequent disinfection than monthly, continue at that higher frequency.

  - If the aircraft fleet consists of less than or equal to 20 aircraft, sample all aircraft for total coliform quarterly; if the aircraft fleet consists of more than 20 aircraft, sample approximately 25 percent of the fleet of aircraft quarterly, so that all aircraft are sampled for total coliform at least annually. Any total coliform-positive sample culture would be tested for fecal coliform or *E. coli.*

  - Perform disinfection and flushing and follow-up sampling as corrective action where any routine or follow-up sample is total coliform-positive.

  - Report monitoring results quarterly.

  - Submit a self-certification each quarter that affirms that the aircraft water system and air carrier-owned watering points are disinfected as per the O&M plan.

- After 12 months of Period I monitoring, the air carrier was to consult with EPA and an agreement made, or a program prescribed by EPA in the absence of agreement, for a monitoring, disinfection, and reporting frequency and response procedure which would be implemented in months 12 through 24, or Period II, of the monitoring program.

- During the 24 months of Monitoring Periods I and II, the air carrier was to conduct a study of potential confounding or contributing sources of contamination that are external to the aircraft, *i.e.*, watering points. The air carrier was to submit the study results to EPA within 24 months of the effective date of the AOC.

Under this alternative, all qualifying aircraft would be required to establish a program of sampling, routine disinfection and flushing, reporting, and a response procedure that is consistent with the parameters established under Monitoring Period I of the AOCs:

- All personnel responsible for the O&M of aircraft water systems would receive training. The training would be implemented by the air carrier responsible for the aircraft.

- Aircraft O&M and monitoring plans must be updated to reflect new schedules, procedures, and activities.

- Aircraft must monitor for total coliforms and disinfectant residual.

- If a system tests positive for total coliforms, it must analyze the total coliform-positive culture medium for fecal coliform or *E. coli*.

- If a system tests positive for fecal coliform or *E. coli*, or if it tests positive for total coliform in any sample, it must notify the primacy agency within 24 hours and must conduct disinfection and flushing procedures, including follow-up sampling, and must implement public notification activities.

- Copies of O&M plans, monitoring plans, and monitoring data must be maintained.

- Approximately 25 percent of the aircraft fleet must be monitored for coliforms and disinfectant residual quarterly, so that all aircraft are sampled at least annually.

- Routine disinfection and flushing must be performed at least quarterly.

- A self-certification that affirms that the aircraft water system was disinfected and flushed according to the O&M plan must be submitted each quarter.

- Report monitoring results quarterly (within 10 business days of the end of a quarter of monitoring).

2.3.3 Alternative 3 – Requirements Similar to Water Supply Guidance 29

Upon promulgation of the SDWA in 1974, EPA's responsibilities for ensuring that safe drinking water was served on ICCs broadened from certifying the PWSs serving ICCs to include regulation of the water quality onboard the conveyances. WSG 29, signed in 1986, outlined EPA's role in implementing NPDWRs with respect to Interstate Carrier Water Supplies (ICWSs), watering points, and ICCs, and established the coordination of this role with the FDA's responsibilities in the Interstate Travel Sanitation Program. WSG 29 allowed aircraft to choose between monitoring for turbidity, total coliforms, and disinfectant residuals and the implementation of an operations and maintenance program that included disinfection and flushing the aircraft. It is notable that WSG 29 was written prior to promulgation of the TCR, the SWTR, or Phase II Chemical contaminant rule (which included revised requirements for nitrate). Therefore, for this alternative, the monitoring requirements have not been revised to reflect current requirements of the NPDWRS as described in the baseline alternative. The WSG 29 alternative was considered primarily because it recognized the importance of disinfection and flushing as a treatment technique/best management practice in the operation and maintenance of aircraft PWSs. It also offered flexibility through a choice between monitoring and implementing an EPA-approved operation and maintenance program.

Under the alternative based on WSG 29, the following would be included:

- Aircraft would comply either with the monitoring and reporting requirements or with their EPA-approved O&M plans.

- Monitoring requirements would include daily turbidity monitoring and quarterly coliform monitoring.
- Disinfection and flushing as corrective action would be required following a total coliform-positive sample.
- O&M requirements for quarterly disinfection and flushing of onboard systems.

2.3.4 Alternative 4 – Hybrid Approach - ADWR

EPA developed the proposed regulatory option based on input from the Workgroup, senior management, and stakeholders. It was developed following the March 2007 workshop where stakeholders and the Workgroup discussed limitations of the other alternatives and key provisions of a possible ADWR. EPA reviewed public comments received on the proposed rule and incorporated specific items during development of the final rule. The final rule addresses stakeholder and commenter concerns including: (1) the need for operational flexibility by providing several options for compliance, (2) the need to not conflict with manufacturers' recommendations, (3) the need to limit the grounding of aircraft based on water system issues to situations that present an acute public health risk and only when public access to the water cannot be prevented, and (4) the need to allow for future changes in technology.

EPA is presenting key components of the final rule:

- Routine coliform monitoring using one of four monitoring frequency options determined by the frequency of disinfection and flushing of the aircraft water system.
- Two routine coliform samples are collected at the frequency chosen. If one or more of the routine samples are total coliform-positive but are *E. coli*-negative, the aircraft can choose to either perform repeat sampling (collecting 3 samples) or corrective action to include disinfection and flushing and follow-up monitoring. Special consideration is given for aircraft with a single water tank and tap if the tank is removable and drained daily. Those aircraft may collect a single routine sample at the frequency chosen.
- Disinfection and flushing as corrective action must occur in the event of an *E. coli*-positive sample or if any repeat samples are total coliform-positive. If disinfection and flushing as corrective action is required, public access to water must be restricted and public notice must be posted until the water system is disinfected and flushed and a complete set of follow-up samples are taken. In cases of total coliform-positive results, aircraft may resume serving water for human consumption once follow-up samples have been taken. In cases of *E. coli*-positive results, the aircraft may not serve water for human consumption until all follow-up samples are total coliform-negative. The rule specifies a maximum amount of time that can elapse before corrective action disinfection and flushing

occurs if the water cannot be physically shut off or water flow through the taps cannot be prevented. Allowing more time for corrective action disinfection and flushing where public access can be prevented provides flexibility to air carriers for performing the procedure and minimizes the need for unscheduled events for which the aircraft must be taken out of service.

- Disinfectant residual monitoring is not required by the final rule, but may be recommended in guidance as a means of promoting voluntary measures such as flushing and refilling with water containing a residual.
- Specific training requirements for all personnel involved with the aircraft water system operations and maintenance provisions of the ADWR must be included in the aircraft O&M plan.
- Detailed disinfection and flushing procedures must be included in O&M plans.
- Reporting requirements for disinfection and flushing and monitoring results, and compliance status.
- Water system O&M plans must be incorporated into FAA-accepted O&M plans for aircraft.
- EPA may perform compliance audits as needed.
- Aircraft perform self-inspections of the water system at least every 5 years and self-certify completion of the inspections.

The regulatory requirements under the four alternatives are presented in summary form in the matrix in Exhibits 2.2a and 2.2b, below. Exhibit 2.2a includes those activities that are required by FDA regulations. These relate to watering points, or water transfer and delivery systems, which include the water source, trucks, carts, cabinets, containers, and hoses. These requirements are not affected by the final rule and will continue to be in effect under all regulatory alternatives. Exhibit 2.2b summarizes those activities related to onboard water system operation and maintenance.

Exhibit 2.2a Existing FDA Requirements for Watering Points[1] and Supplemental Treatment

Requirement	Existing FDA Regulations Applicable to Watering Points under all ADWR Alternatives
Design approval for watering points	FDA approval of watering points (21 CFR 1240.83) based on water supply meeting NPDWRs, and the methods/facilities for water delivery to conveyance are sanitary and satisfactory.
Design approval for sanitation facilities at servicing areas	Submit construction plans to FDA for review (21 CFR1250.62)
Disinfect and flush watering points	Operate and maintain servicing area pipes and appurtenances to prevent contamination of the water per FDA (21 CFR1250.67)
Disinfect and flush water carts and trucks	Operate and maintain servicing area pipes and appurtenances to prevent contamination of the water per FDA (21 CFR1250.67) *[Note: no frequency or minimum criteria specified]*
Inspection of servicing area	FDA may inspect servicing areas or may approve/disapprove based on inspections by state health department (21 CFR1250.61) *[Note: no inspection frequency specified]*
Supplemental Treatment Plan and Specifications Review and Approval of Design and Construction	Obtain FDA approval for treatment equipment onboard the aircraft (21 CFR1240.90)

[1] Watering points include transfer and delivery systems (including the water source, trucks, carts, cabinets, containers, and hoses)

Exhibit 2.2b Alternatives Considered for the ADWR – Aircraft Water System

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Rule Start-up – aircraft water systems	Assume air carrier personnel are familiar with requirements of existing regulations and have developed management systems to implement these requirements.	Read and understand regulatory requirements.	Read and understand regulatory requirements.	Read and understand regulatory requirements.
Rule Start-up– primacy agency	Assume primacy agency has developed necessary reporting and recordkeeping systems.	Establish new reporting and recordkeeping systems.	Establish new reporting and recordkeeping systems.	Establish new reporting and recordkeeping systems.
Qualified operators	PWSs using surface water or GWUDI must be operated by qualified personnel who meet the requirements specified by the state (40 CFR141.70).	Personnel to be trained and training content to be included in CRMP.	No new requirements.	Operator “need-to-know” items and personnel training requirements to be included in the aircraft O&M plan.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Develop and implement monitoring plan	Develop sample siting plan to include sample collection locations (40 CFR 141.21).	Update monitoring plans to reflect new schedules, procedures, and activities.	No monitoring required if O&M plan approved by EPA.	Monitoring frequency to be stated in sampling plan that is included in the aircraft O&M plan, and is based on disinfection and flushing frequency.
Routine monitoring – coliform bacteria	One total coliform sample monthly at individual aircraft, in accordance with sample siting plan (40 CFR141.21). Any total coliform-positive sample is analyzed for fecal coliform or *E. coli*.	Air carriers must sample approximately 25% of the aircraft fleet quarterly, so that all aircraft are sampled at least annually. Two samples must be collected from each individual aircraft – one galley and one lavatory tap sample. Any total coliform-positive sample is analyzed for fecal coliform or *E. coli*.	One sample quarterly if not implementing O&M plan.	Coliform monitoring frequency, requiring two samples, is selected by the air carrier from 1 of 4 options and is based on the disinfection and flushing frequency stated in O&M plan: (1) annual monitoring (once every twelfth month) if routine disinfection and flushing conducted at least quarterly (once every third month); (2) semi-annual monitoring (once every sixth month) if routine disinfection and flushing conducted once every 4 months (three times per year); (3) quarterly monitoring (once every third month) if routine disinfection and flushing conducted semi-annually (once every sixth month); (4) monthly monitoring (once every month) if routine disinfection and flushing conducted once per year or less (once every twelfth month or less). Aircraft with a single sample tap and a water tank that is removable and drained daily must collect only a single routine sample each monitoring period.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Repeat monitoring – coliform bacteria	Repeat sampling requires 4 samples (one upstream, one downstream, one at the same sampling point, and one at another point if 4 taps are available) within 24 hrs. Any total coliform-positive sample is analyzed for fecal coliform or *E. coli*.	Repeat sampling at 4 taps (tap with positive coliform sample, 1 other lavatory tap, 1 other galley tap, and 1 other tap; or total of 400 mL from available taps). If a sample tests positive for total coliforms in a routine sample, it must be analyzed for fecal coliform or *E. coli*.	Not specified.	If one or more routine samples are total coliform-positive but *E. coli* negative, the air carrier has the option of collecting a set of 3 repeat samples within 24 hours of notification. Any total coliform-positive sample is analyzed for *E. coli*.
Additional routine monitoring – coliform bacteria	If a routine total coliform sample is positive, systems taking less than 5 routine samples per month must collect 5 routine samples in the following month per the sample siting plan or obtain a waiver (40 CFR 141.21). Any total coliform- positive sample is analyzed for fecal coliform or *E. coli*.	Not required.	Not required.	Not required.
Post disinfection monitoring – coliform bacteria	Not required.	Collect 4 samples (1 galley tap, 1 lavatory tap, the tap positive for total coliform, and 1 other tap). Any total coliform-positive sample is analyzed for fecal coliform or *E. coli*.	Not required.	Two follow-up samples after corrective action disinfection and flushing, taken at the same locations as used for routine sample collection.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Routine monitoring – disinfectant residual	One disinfectant residual sample monthly at individual aircraft per SWTR, at same location and time as coliform sample (40 CFR 141.74(b)(6)(i) and/or (c)(3)(i)).	Annual at individual aircraft at same locations as routine coliform samples	Not required.	Not required.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Develop and implement O&M plan	Best Available Technology (BAT) for TCR MCLs: Implement proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks, and continual maintenance of positive water pressure in all parts of the distribution system (40 CFR 141.63D) FAA regulations require the use of manufacturers recommendations: - Develop and implement a maintenance and inspection program that guarantees airworthiness of aircraft (14 CFR 121.367). - Use BMPs prescribed by manufacturer's maintenance manual (14 CFR 43). - Use maintenance schedule in accordance with manufacturer (14 CFR 25.1529 Appendix H).	Update O&M plans to reflect new schedules, procedures, and activities.	O&M plan may be developed in lieu of required monitoring. Plan to be approved by EPA regional office with following elements: -Cover letter summarizing water handling procedures, maintenance schedule, and description of annual report data -Disinfection and flushing procedure as outlined in WSG 29, or equivalent procedure	O&M plans must address watering point selection criteria; disinfection and flushing procedures and frequency; procedures for follow-up sampling; staff training requirements; procedures for self-inspections; procedures for boarding water; the coliform sampling plan; and whether the aircraft water system can be shut off or water flow through the taps can be prevented.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Routine disinfect and flush aircraft water system	Inspect, disinfect, and sanitize water system as needed to prevent spread of disease per FDA (21 CFR 1240.30). Clean, disinfect and flush aircraft water system whenever FDA deems it necessary (21 CFR 1250.81).	Disinfect the aircraft water system quarterly in accordance with AOC O&M plan; if pre-AOC O&M plan required more frequent disinfection than monthly, continue at that higher frequency. Submit self-certification quarterly to EPA indicating that disinfection process followed proper procedures.	Quarterly per O&M plan and after any service or repairs; remove aircraft from service and disinfect holding tanks if aircraft served by use-prohibited watering points.	Aircraft follow 1 of 4 frequencies for routine disinfection and flushing: (1) quarterly (once every third month); (2) 3 times per year (one every fourth month); (3) 2 times per year (once every sixth month); (4) once per year or less (once every twelfth month or less). The air carrier must select a frequency that is in accordance with manufacturer recommendations. If there is no such manufacturer recommendation, then the air carrier selects any on of the four frequencies. The frequency determines the aircraft's required coliform monitoring schedule as described above.
Disinfect and flush aircraft water system as corrective action	Clean, disinfect and flush aircraft water system whenever FDA deems it necessary (21 CFR 1250.81).	Disinfection after total coliform-positive sample.	Required after any service or repairs or if the aircraft opts for monitoring and has a total coliform-positive sample; no monitoring to trigger corrective action if choose O&M option.	Required if any sample is *E. coli*-positive, or if one or more repeat samples or follow-up samples are total coliform-positive but *E. coli* –negative. Must be conducted prior to resumption of unrestricted public access to the aircraft water system or no later than 72 hours after notification of the positive result if the water cannot be physically shut off or flow through the taps prevented, or when able if the water is physically shut off or flow is prevented. Aircraft that fail to conduct disinfection and flushing within 72 hours and do not physically shut off the water or prevent flow through the taps must implement PN and restrict access to the water within 24 hours.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Supplemental Treatment	Not specified.	Not specified.	Not specified.	Not specified. (If onboard treatment units are used, they must be acceptable to FDA and FAA, meet National Science Foundation (NSF) International/American National Standards Institute (ANSI) Standards, and be installed, operated, and maintained in accordance with the manufacturer's specifications and FAA requirements).
Sanitary survey – primacy agency	Assume primacy agency has developed and implemented a program to conduct sanitary surveys (40 CFR 142.10(b)(2)). Primacy agency conducts sanitary surveys for all non-community systems served by surface water or GWUDI every 5 years per IESWTR (40 CFR 141.21(d)).	Not specified.	Not specified.	Compliance audits at the discretion of EPA.
Sanitary survey – water system	Water systems prepare for sanitary survey every 5 years per IESWTR (40 CFR 141.21(d)).	Not specified.	Not specified.	Self-inspection performed by aircraft at least every 5 years and self-certified to EPA.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Public Notification *[Note: This element not costed under this ruling but covered under the Information Collection Request (ICR) for the final ADWR and will be incorporated into the next revision of the ICR for the PN Rule]*	- Post FDA certificates on conveyances (21 CFR 1240.20). -Per 40 CFR 141.201 Subpart Q: Each owner or operator of a PWS must give notice of all NPDWR violations, operating status under variances and exemptions, failure to comply with schedules established by variance or an exemption, and occurrence of a waterborne disease outbreak.	PN required when aircraft cannot cease serving water to the public within 24 hours of receiving a total coliform-positive or fecal coliform/*E. coli*-positive result.	Post placards at all taps when MCL exceeded.	PN required whenever the restrict public access requirements are in place.

Potential Components	Baseline Alternative: Current NPDWRs[1] and applicable FDA and FAA regulations	Regulatory Requirements Similar to the AOCs	Regulatory Requirements Similar to Water Supply Guidance 29	Hybrid Approach- ADWR
Reporting and Recordkeeping	Per 40 CFR 141 Subpart D: -Report to State results of monitoring conducted by private labs (non-State labs); failure to comply with NPDWRs; certification of compliance with public notification requirements including copies of all public notices; copies of records maintained on premises. -Maintain following records related to NPDWR compliance on premises: bacteriological analyses (5 years), chemical analyses (10 years), records of actions taken to correct compliance issues (3 years), sanitary surveys and related reports and communications (10 years), records on any variance or exemption (5 years), and copies of public notices (3 years).	Report the monitoring results quarterly (within 10 business days of the end of a quarter of monitoring). Submit a self-certification each quarter that affirms that the aircraft water system(s) and watering points are disinfected as per the O&M plan. Air carriers must maintain copies of their O&M plan, monitoring plan, and monitoring data.	Maintain a maintenance log for each aircraft and submit an annual summary report of each aircraft's maintenance procedures to EPA. Maintain records of O&M procedures for 5 years. Air carriers that choose to conduct monitoring must keep a copy of their monitoring plan and monitoring results for at least 5 years, and report monitoring results to EPA on quarterly basis along with maintenance records for any aircraft with total coliform-positive samples.	Report disinfection and flushing events and monitoring results within 10 days of the end of the monitoring period. The air carrier must provide evidence of self-inspection within 90 days of completion and indicate all deficiencies from self-inspections have been corrected. The air carrier must report within 90 days that any deficiency identified during a compliance audit was addressed. If any deficiency identified during a compliance audit or self-inspection has not been addressed within 90 days of identification, the report must explain why and provide a schedule for addressing them. Report that a coliform sampling plan was developed, that an O&M plan was developed and report the coliform monitoring frequency within 18 months of final rule promulgation and within the first calendar quarter of adding additional aircraft to the air carrier fleet. Changes to the routine coliform sampling frequency must be reported within 10 days following the calendar month in which the change occurred. Report inventory within 18 months of the final rule and subsequent changes in inventory within 10 days of the end of the calendar month in which the change was made. Report all events requiring PN and all failures to comply with the disinfection and flushing or monitoring requirements. Maintain the following records: bacteriological analyses (5 years), disinfection and flushing (5 years), self inspections (10 years), notices to passengers and crew for compliance issues (3 years after issuance), and sampling and O&M plans.

[1] NPDWR requirements for TNCWSs using surface water (serving 1,000 or fewer people). Although aircraft PWSs are not considered to be consecutive systems, assume the aircraft is boarding water that meets FDA requirements for potable water in compliance with treatment technique requirements of EPA's regulations (source water treatment provided). Therefore, turbidity and nitrate/nitrite monitoring is not required.

[2] As used here, the use of supplemental treatment onboard aircraft such as booster chlorination, ultraviolet disinfection, and onboard filtration serves as an additional barrier to address water quality deterioration in the aircraft water system. It does not replace the FDA requirement that the watering point water supplies meet the requirements of the NPDWRs.

3. Baseline Analysis

3.1 Introduction

This chapter describes the baseline analysis that characterizes the number of aircraft public water systems and affected air carriers in existence as of January 2007 when the evaluation of potential regulatory options for aircraft water systems was initiated, as well as the quality of water onboard aircraft as of December 31, 2008. The baseline analysis consists of the following processes:

- **Creating an industry profile (Section 3.2)** - Identifying and collecting information on aircraft subject to the ADWR and estimating the potentially affected population.

- **Documenting data collection efforts (Section 3.3)** - Summarizing results of aircraft water quality data collection efforts and characterizing aircraft water quality.

This chapter presents a level of detail and precision appropriate to support subsequent analyses and regulatory decisions under the ADWR. Uncertainties in the ADWR baseline are discussed in Section 3.4.

3.2 Industry Profile

This section provides a characterization of aircraft water systems that is used to perform analyses of ADWR regulatory alternatives. Extensive effort was invested in January 2007 in establishing the baseline of aircraft water systems for development of the proposed rule. Although air carriers may have changes in their fleet and consolidations have occurred in the industry, there has likely not been a significant permanent change in the total number of aircraft or passengers, or the types of aircraft transporting the majority of passengers, particularly given the relatively short period of time between the proposal and final rule publications. The aircraft water system baseline is organized as follows:

- **Section 3.2.1** describes the data sources used to characterize the industry baseline.

- **Section 3.2.2** is a background section describing the various ways in which water systems can be classified and identifies distinctions that are important for this analysis.

- **Section 3.2.3** provides the baseline number of aircraft and the estimated population served by aircraft water systems per year.

3.1.1 Data Sources

Several data sources were used to characterize the ADWR baseline. Data from the AOCs, Bureau of Transportation Statistics (BTS), FAA, commercial air carrier web sites, and aircraft manufacturer web sites were used to create an aircraft water system and population baseline. BTS is the data collection and analysis arm of the U.S. Department of Transportation (DOT), and provides data for load factor, flights per year, and passengers per year for a number of large air carriers. FAA, which regulates all civil aviation in the U.S., requires that the number of onboard staff be based on the number of onboard passengers (14 CFR 91.533 and 14 CFR 125.269). A number of commercial air carrier web sites provide data on seating configurations, including carrying capacity and number of lavatories and galleys. Standard seating configurations provided by aircraft manufacturer web sites were used if the information was not available through air carrier Web sites. Commercial air carriers are required to make their annual reports to shareholders available to the public. These reports provide data on load factors, flights per year, and fleet size.

3.1.2 Water System Characterization

Categorization of water systems is important because system size, ownership, and consecutive/wholesale relationships affect the way in which regulatory analyses are performed. This section explains the classifications of water systems, as defined by EPA's NPDWRs, and describes further subdivisions according to water source, size (population served), and ownership for regulatory analysis purposes.

Public Water System Type

NPDWRs apply to all PWSs.[7] A PWS is defined as a system that provides water for human consumption through pipes or other constructed conveyances if such a system has at least 15 service connections or regularly serves an average of at least 25 individuals per day for at least 60 days per year. PWSs are categorized as follows:

- ***Community Water Systems*** (CWSs) are PWSs that have at least 15 service connections used by year-round residents or that regularly serve at least 25 year-round residents.

- ***Non-community Water Systems*** (NCWSs) are PWSs that are not classified as CWSs.

NCWSs are subdivided into two categories:

- ***Non-transient Non-community Water Systems*** (NTNCWSs) are NCWSs that regularly serve at least 25 of the same people more than 6 months per year.

[7] Some PWSs that meet specific criteria in 40 CFR 141.3 are exempt from NPDWRs. ICCs are specifically *not* exempt from NPDWRs.

- ***Transient Non-community Water Systems*** (TNCWSs) are NCWSs that do not regularly serve at least 25 of the same people more than 6 months per year.

Most commercial passenger aircraft serve at least 25 individuals per day for at least 60 days per year. However, it is unlikely that any single aircraft regularly serves the same 25 people for more than six months per year. Therefore, for the purposes of the ADWR, all aircraft public water systems are classified as TNCWSs.

Source Water Type

Systems are classified by the type of source from which they draw water. Systems that use either surface water or GWUDI are classified as surface water systems. Ground water systems are, by default, systems that draw from ground water sources that are not GWUDI. Some systems may obtain water from both ground water and surface water sources and are referred to as "mixed systems." In the Safe Drinking Water Information System (SDWIS) and the Baseline Handbook, a mixed system is categorized as a surface water system because it obtains some portion of its flow from surface water (*i.e.*, all mixed systems are considered surface water systems).

For the purposes of the ADWR baseline and subsequent analyses in this document, all aircraft are classified as surface water systems. Aircraft board water from a number of different locations across the U.S. and are likely to be served by many different public water systems, including surface water systems. Additionally, most large cities and municipalities where airports are located are served by surface water systems. For the purposes of this document, EPA is assuming that all aircraft board water from either mixed or surface water systems.

Population Served

The number of passengers per year for any aircraft is estimated by multiplying the carrying capacity of the aircraft, the loading factor (percentage of seats occupied) for the air carrier, and its yearly flight frequency. Passenger figures for all aircraft are summed to arrive at the yearly total number of passengers. The number of onboard staff is estimated based on FAA requirements (14 CFR 91.533 and 14 CFR 125.269), which provide a relationship between the number of required pilots and flight attendants and the number of onboard passengers. The total numbers of passengers and onboard staff represent all people potentially exposed to drinking water from an onboard water system (population served) at some time during the year. Although crew and some passengers take more than one flight per year, the total number of passengers and crew has not been adjusted to account for this difference. For purposes the ADWR, population figures are presented in the nine categories corresponding to the number of available sampling points onboard an aircraft (see Exhibit 3.1). Appendix A provides a detailed breakdown of aircraft data used to develop the population-served figures for onboard staff, passengers, and total population figures presented in Exhibit 3.1.

Ownership

Systems are categorized in SDWIS and in the Baseline Handbook according to three ownership types: "private," "public," and "other." Private systems are owned by private corporations or individuals. Public systems are owned by public entities such as municipalities, counties, or special districts. The "other" category contains systems where ownership is not reported in SDWIS. Ownership distinctions are important to the analysis because public systems may have access to capital and other means of financing that may not be available to private systems.

For the purposes of this document, all aircraft are classified as private ownership.

Consecutive and Wholesale System Types

Typical PWSs are normally categorized according to whether they produce finished water by monitoring and providing appropriate treatment to their source water, or obtain finished water from other PWS(s). Finished water is water introduced into the distribution system of a PWS and is intended for consumption without further treatment, except for treatment necessary to maintain water quality in the distribution system. Finished water is often referred to as potable water. A consecutive system is defined as a PWS that receives some or all of its finished water from one or more wholesale systems. A wholesale system is defined as a PWS that monitors and treats as appropriate, source water and then sells or otherwise delivers finished water to another PWS. Treatment applied to finished water by consecutive water systems may be in the form of booster disinfection or addition of corrosion control chemicals. Costs of treatment provided by wholesale systems are typically passed on to the consecutive systems in the form of water rates or fees.

FDA requirements mandate that aircraft provide only potable water that meets EPA standards for drinking water (21 CFR 1240.80). Because they board only finished water, for the purposes of ADWR analyses, all aircraft are treated as equivalent to consecutive water systems.

3.1.3 Baseline Number of Aircraft and Population Served by Aircraft per Year

Number of Aircraft

EPA estimated in January 2007 that 7,327 aircraft are subject to the final ADWR. The aircraft inventory presented in Exhibit 3.1 represents the baseline for rule activities that are applicable on an individual aircraft level (*e.g.*, monitoring, disinfection and flushing, self-inspections, and compliance audits). Annual implementation and administration activities, as well as development of sampling plans and O&M plans, will occur on an individual air carrier basis.

Aircraft in the following categories are not subject to the final ADWR because they do not meet the definition of a PWS, or are excluded from regulatory requirements under SDWA section 1411[8]:

- Aircraft that do not serve 25 or more people for at least 60 days per year
- Aircraft without a qualifying lavatory[9] or galley
- Aircraft solely used for cargo purposes
- Aircraft that fly international routes serving only one U.S. city
- Aircraft owned and operated by the U.S. military if used solely for military purposes, not conveying passengers in interstate commerce, and meet all of the other exclusion criteria under SDWA section 1411

Exhibit 3.1 is stratified according to the number of available sampling points per aircraft. For the purpose of the analysis, each qualifying lavatory and galley on an aircraft is assumed to have only one sampling tap. The number of available sampling taps is used to characterize some of the information gathered in developing the baseline. It appears in several of the exhibits in this document for information display purposes only. The number of available taps is not used as a parameter in the cost model for the economic analysis for the ADWR.

Exhibit 3.1 ADWR Aircraft and Population Baseline

# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	# of Onboard Staff/year	# of Passengers/year	Total # of Potentially Affected Persons/year
A	B	C=B*A	D	E	F=D+E
1	381	381	1,978,974	24,980,980	26,959,953
2	2,080	4,160	8,639,938	104,430,089	113,070,026
3	756	2,268	2,332,151	22,935,259	25,267,410
4	421	1,684	2,510,833	51,846,929	54,357,762
5	956	4,780	6,641,598	158,813,021	165,454,619
6	871	5,226	3,879,569	91,360,628	95,240,197
7	298	2,086	1,414,970	34,239,869	35,654,839
8	809	6,472	3,765,459	93,648,921	97,414,380
≥ 9	755	9,354	3,998,054	126,176,568	130,174,622
Total	**7,327**	**36,411**	**35,161,545**	**708,432,263**	**743,593,809**

Notes:
(A) Each qualifying lavatory and galley on an aircraft is assumed to have only one sampling point. Therefore, the number of available sampling points is representative of the number of lavatories and galleys on an aircraft.
(B), (D), (E) Derived from Appendix B.
(C) Average number of sampling points used for ≥ 9 sampling points size category.

[8] Section 1411 excludes from regulation any public water system that receives all its water from another regulated public water system, does not sell or treat the water, and is not a "carrier which conveys passengers in interstate commerce."
[9] A qualifying lavatory is defined as a private room with a flushing toilet and sink. Curtained-off toilet seats without lavatory sinks (as seen in some small, short-range aircraft) have not been included.

Population Served by Aircraft PWSs

All onboard passengers and crew can potentially be exposed to lavatory and galley water on aircraft. Exposure to finished water onboard aircraft can occur via consumption of coffee, tea, or other beverages made with galley water;[10] distributing drinking water that is from galley or lavatory water taps when bottled water is not available; passengers consuming water from lavatory taps to take medication, mix infant formula, brush teeth, wash face or hands, or through any subsequent hand-to-mouth contact. Columns D and E in Exhibit 3.1 present estimates of the population potentially exposed to drinking water onboard aircraft. These numbers are based on the number of flights each aircraft takes per year and the estimated number of passengers onboard each aircraft. These numbers have not been adjusted for passengers and crew who take more than one flight per year.

3.3 Water Quality Baseline

This section describes data collection efforts reported or processed as of December 31, 2008. In 2003 and 2004, the ATA and EPA randomly sampled aircraft water systems to determine whether current regulatory efforts were adequately protecting public health. In addition, data processed under the AOCs from 2005 to 2008 for air carriers with an approved QAPP and CRMP have been compiled. Collectively, the 2003, 2004, and AOCs' data represent the Agency's understanding of existing aircraft water quality.

3.3.1 2003 Data Collection Effort

In October and November of 2003, ATA randomly sampled drinking water in 265 passenger aircraft, 89 of which originated from an international airport on the last route flown prior to sampling. The aircraft were operated by eight U.S. air carriers, and the sampling was performed under a voluntary program coordinated with EPA. EPA had reviewed the final sample collection procedures for the study and all samples collected were, therefore, assumed to be valid samples.

A summary of the ATA sampling data is presented in Exhibit 3.2. All samples met regulatory requirements for nitrate, nitrite, and turbidity. Of the 265 samples collected, 2.6 percent tested positive for total coliform, but all tested negative for *E. coli*. A disinfectant residual was non-detectable in 41 percent of samples. Of the 176 aircraft originating from domestic locations, four (2.3 percent) samples tested positive for total coliform and 57 (32 percent) had a non-detectable disinfectant residual.[11]

[10] It has not been determined that water heated in a galley coffee maker reaches temperatures high enough to kill all harmful microorganisms.

[11] Sampling downstream of in-line filters may affect sample results. The protocols for the 2003 data collection effort specified that effort should be made to avoid sampling galley taps with installed filtration devices. However, sufficient data is not available to determine if all samples were sampled upstream of any filtration device(s).

Exhibit 3.2 Summary of 2003 ATA Sampling Data

	All Samples N = 265 aircraft		Samples from Aircraft Originating from Domestic Location N = 176	
	# of Aircraft	% Positive	# of Aircraft	% Positive
	A	B	C	D
Total Coliform-positive	7	2.6%	4	2.3%
***E. coli*-positive**	0	0%	0	0%
Non-detectable Chlorine Residual	108	41%	57	32%

3.3.2 2004 Data Collection Effort

In 2004, EPA performed two rounds of coliform and disinfectant residual sampling of aircraft. A total of 327 U.S. and foreign flag passenger aircraft were sampled. Exhibit 3.3 presents a summary of the data from these two rounds of sampling. This section provides further discussion of these two data collection efforts.

Exhibit 3.3 Summary of 2004 EPA Sampling Data

	Round 1 (August/September 2004) N = 158 aircraft		Round 2 (November/December 2004) N = 169 aircraft	
	# of Aircraft	% Positive	# of Aircraft	% Positive
	A	B	C	D
Total Coliform positive	20	12.7%	29	17.2%
***E. coli* positive**	2	1.3%	0	0.0%
Non-detectable Chlorine Residual	39	24.7%	30	17.8%

Notes:

1) A chlorine residual sample was not taken at one aircraft with total coliform-positive sample results. The number of aircraft reported with non-detectable chlorine residuals does not include this aircraft.
2) Samples collected in Rounds 1 and 2 were collected in the U.S. from U.S. aircraft traveling both domestically and internationally.

First Round of 2004 Data Collection Effort

EPA conducted a first-round of aircraft water quality sampling in August and September 2004. EPA sampled water quality at one or more galley water taps, water fountains, and lavatory faucets on 158 U.S. and foreign flag passenger aircraft at seven U.S. airports.

All samples in the first round data collection effort met regulatory requirements for nitrate and nitrite. As shown in Exhibit 3.3, 12.7 percent of aircraft (20 aircraft) tested positive for total coliform, and 1.3 percent (two aircraft) tested positive for *E. coli*. Additionally, 24.7 percent of the total number of aircraft sampled had non-detectable disinfectant residuals.[12]

Second Round of 2004 Data Collection Effort

EPA conducted a second round of aircraft water quality sampling during November and December 2004. EPA sampled at one or more galley water taps, water fountains, and lavatory faucets on 169 U.S. and foreign flag passenger aircraft at 12 U.S. airports.

As shown in Exhibit 3.3, in the second round data collection effort, EPA found that 17.2 percent of aircraft (29 aircraft) tested positive for total coliform. No *E. coli* was detected in the second round, and 17.8 percent of the total number of aircraft sampled had non-detectable disinfectant residuals.

3.3.3 Administrative Orders on Consent

Under the AOCs, air carriers have adopted and implemented monitoring and routine water system disinfection and flushing procedures specified by EPA. Air carriers under AOCs must implement regular monitoring and disinfection practices for all aircraft in their fleet for two twelve month monitoring periods from the effective date of the AOC. A detailed discussion of the requirements of the AOCs is provided in Chapter 2, Section 2.3.2. A summary of the practices required by the AOCs is provided below:

- Perform coliform and disinfectant residual monitoring of aircraft water systems.
- Perform quarterly disinfection of aircraft water systems and water transfer equipment owned by the air carrier.
- Perform repeat sampling, disinfection and flushing, and follow-up sampling as corrective action in the event that a routine sample is total coliform-positive.
- Provide public notification or turn off the aircraft's water in response to a total coliform-positive sample.
- Analyze all total coliform-positive sample culture media for the presence of fecal coliforms or *E. coli*.
- Conduct a study of possible sources of contamination that exist outside the aircraft, and supply information to EPA regarding various aspects of water boarding practices.

[12] Sampling downstream of in-line filters may affect sample results and sampling protocols would discourage sampling downstream of such filters. However, sufficient data is not available to determine if all samples were sampled upstream of or after the removal of any filtration device(s).

Data Collected Under AOCs

Each air carrier that is under an AOC is required to submit a CRMP and a QAPP. The CRMP describes the air carrier's sampling and disinfection processes and protocols and is designed to ensure samples are collected properly and within a 12-month period. Air carriers that have a fleet of fewer than 20 aircraft were directed to sample all aircraft quarterly; air carriers with a fleet of 20 or more aircraft were directed to sample each aircraft once per year. The QAPP describes the air carrier's quality assurance and quality control (QA/QC) processes and describes the methods used to collect and assess data.

Under the AOCs, air carriers collected total coliform and disinfectant residual samples from at least one galley and lavatory on each aircraft in the first year. Air carriers continued collecting monitoring data during subsequent years based on the monitoring and reporting frequency established in their AOCs. As of December 31, 2008, EPA had processed data from 20,156 total coliform samples and 17,267 disinfectant residual samples from 25 air carriers representing 78 percent of the estimated aircraft fleet under AOCs. These data may be indicative of the effectiveness of rule requirements as of the date of this document, but data for air carriers with an approved QAPP and CRMP are only available from two air carriers in 2005, five air carriers in 2006, eight air carriers in 2007, and 12 air carriers in 2008. Therefore, insufficient data is currently available to support statistical evaluation of the data. However, the data is used to provide an observational indication of trends.

Appendix B summarizes the available sampling results from 2005 to 2008 for all air carriers, and presents the routine and repeat data collected under EPA-approved QAPPs and CRMPs. Of the QAPP and CRMP-approved data: during 2005, 137 (3.6 percent) of 3,819 samples tested positive for total coliform, and only one of the 137 samples also tested positive for *E. coli*; in 2006, 143 (2.6 percent) of 5,570 samples tested positive for total coliform, and seven of the 143 samples also tested positive for *E. coli*; in 2007, 266 (4.2 percent) of 6,351 samples tested positive for total coliform, and seven of the 266 samples also tested positive for *E. coli*; and in 2008, 255 (8.5 percent) of 2,984 samples tested positive for total coliform, and seven of the 255 samples also tested positive for *E. coli*. See Section 3.3.5 and Appendix B for additional details.

Historical Data Collected

In addition to ATA's and EPA's sampling efforts, a number of air carriers collected monitoring data for various contaminants prior to their AOC. Several air carriers submitted data collected within five years of their AOC to EPA. However, EPA did not analyze these data for the ADWR since most air carriers did not specify their procedures, analytical methods, or provide a QAPP.

3.3.4 Disinfectant and Treatment Characterization for the Baseline

Of the 17,267 disinfectant residual sample events reported under the AOCs, 16,109 disinfectant residual sample results were collected under EPA-approved QAPPs and CRMPs and comprise the disinfectant residual baseline for the ADWR. Under the AOCs, disinfectant residual results were reported as either "detect" with the residual value recorded, or "non-detect." Disinfectant residual data was not provided for 2,615 coliform sample events. Disinfectant residual baseline data are presented for routine and repeat coliform sample collection events because repeat samples have no higher or lower probability of having a detectable residual than routine samples. Exhibit 3.4 presents processed data for disinfectant residual samples collected under EPA-approved QAPPs and CRMPs during routine and repeat total coliform sampling events for years 2005-2008.

Exhibit 3.4 AOCs Occurrence Baseline Data – Disinfectant Residual Samples (Years 2005-2008)

	Percent Disinfectant Residual Non-detect	Total # of Disinfectant Residual Non-detect	Total # of Disinfectant Residual Detect	Total # of Disinfectant Residual Samples
	Disinfectant Residual Data by Calendar Quarter			
Unknown Calendar Qtr	0%	0	0	0
Calendar Qtr 1	22.8%	864	2,933	3,797
Calendar Qtr 2	9.3%	632	6,128	6,760
Calendar Qtr 3	30.2%	813	1,879	2,692
Calendar Qtr 4	21.6%	618	2,242	2,860
Total	**18.2%**	**2,927**	**13,182**	**16,109**
	Disinfectant Residual Data by Sample Location			
Galley	17.3%	1,336	6,386	7,722
Lavatory	18.9%	1,518	6,530	8,048
Composite*	22.4%	73	253	326
Unknown Sample Site	0.0%	0	13	13
Total	**18.2%**	**2,927**	**13,182**	**16,109**

For air carriers with approved QAPPs and CRMPs, 18.2 percent of the 16,109 disinfectant residual results processed from 2005 to 2008 reported a non-detectable disinfectant residual. Non-detectable levels were similar in galleys (17.3%) and lavatories (18.9%), while 22.5 percent of the composite samples were non-detects. A sample location was not identified for 13 samples with a detectable residual. In addition, the occurrence of non-detectable disinfectant residuals increased in months with warmer weather. Quarter 3 (i.e., July to September) had the highest percentage of samples with a non-detectable disinfectant residual (30.2%).

Additional disinfectant residual information is found in Appendix B. Data in Appendix B indicates that a non-detectable disinfectant residual appears to not be associated with an increase in total coliform-positive samples. Of the 801 routine and repeat samples that were total

coliform-positive, 24 did not include any data on a disinfectant residual. Of the remaining 777 total coliform-positive routine and repeat samples, 584 samples (75%) had a detectable disinfectant residual and 193 samples (25%) did not have a detectable disinfectant residual. Twenty-one (3.6%) of the 584 total coliform-positive routine and repeat samples with a detectable residual (the lowest measuring 0.05 mg/L) also tested positive for *E. coli*. Only one (0.5%) of the 193 total coliform-positive samples that did not have a detectable residual tested positive for *E. coli*.

Regarding existing onboard water treatment units, seventy three samples had non-detectable disinfectant residual and were reported to have carbon filters installed on the water lines to the sample tap; two of those samples were total coliform-positive. For comparison, 364 samples with detectable disinfectant residual were reported to use carbon filters; three of those samples were total coliform-positive. Aside from charcoal/activated carbon and particle removal filters in some galleys and lavatories, the majority of aircraft do not provide additional treatment for boarded water.

3.3.5 Contaminant Occurrence for the Baseline

AOCs' sampling data under EPA-approved QAPPs and CRMPs from 2005 to 2008 analyzed by EPA as of December 31, 2008 show that 801 (4.3 percent) of 18,724 routine and repeat samples tested positive for total coliform, and 22 (2.7 percent) of the 801 total coliform positive samples tested positive for *E. coli*. (An additional *E. coli* positive sample tested negative for total coliform and was omitted from the analysis.) Of the 22 samples that tested positive for both *E. coli*, 18 were routine samples and four were repeat samples. Also, nine of the 22 samples that were *E. coli*-positive were collected from galleys and 13 were collected from lavatories. One of the 22 samples was collected in 2005 and seven were collected in 2006, 2007, and 2008, respectively. The 22 *E. coli*-positive samples were collected from 17 different aircraft; three of the repeat samples were collected from the same aircraft. A disinfectant residual was detected in 21 of the *E. coli*-positive samples; one routine sample did not detect a disinfectant residual. Finally, last departure cities were provided for 21 of the 22 samples. Information on whether water was boarded at the last departure city was not reported.

The occurrence of total coliform-positive and *E. coli*-positive samples have varied from year to year. The percent of samples that tested positive for total coliform from 2005 to 2008 were 3.6 percent, 2.6 percent, 4.2 percent, and 8.5 percent, respectively. Of these samples, the percent that also tested positive for *E. coli* from 2005 to 2008 were 0.7 percent, 4.9 percent, 2.6 percent, and 2.7 percent, respectively. However, data in 2005 were only available for 745 aircraft from two air carriers (4.4 percent of all air carriers under AOCs), data in 2006 were available for 1,246 aircraft from five air carriers (11.1 percent of all air carriers under AOCs), data in 2007 were available for 1,255 aircraft from 8 air carriers (17.8 percent of all air carriers under AOCs), and data in 2008 were available for 1,026 aircraft from 12 air carriers (26.6 percent of all air carriers under AOCs). All of the air carriers in these analyses were considered large carriers under the criteria described in the screening analysis presented in Appendix D.

Exhibit 3.5 presents AOC data processed under EPA-approved QAPPs and CRMPs as of December 31, 2008, for routine samples collected in years 2005-2008. These data comprise the coliform occurrence baseline for the ADWR. As presented above, not all 25 air carriers provided data collected under an approved QAPP and CRMP for all four years. Repeat total coliform samples by nature have a higher probability of being positive since repeat samples are taken after a routine sample is total coliform-positive. Consequently, the occurrence baseline for total coliform and *E. coli*/fecal coliform occurrence was based on routine samples only. Exhibit 3.5 presents data processed for routine total coliform samples collected under EPA- approved QAPPs and CRMPs for years 2005-2008.

Exhibit 3.5 AOCs Occurrence Baseline Data – Routine Total Coliform Samples (Years 2005-2008)

	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # of TC+ samples that are EC+ or FC+	Total # of TC Samples
	Total Coliform Data by Calendar Quarter				
Unknown Calendar Qtr	0.0%	0.0%	0	0	0
Calendar Qtr 1	3.2%	4.0%	100	4	3,145
Calendar Qtr 2	3.5%	3.5%	198	7	5,641
Calendar Qtr 3	4.1%	0.0%	79	0	1,930
Calendar Qtr 4	4.1%	8.1%	86	7	2,078
Total	**3.6%**	**3.9%**	**463**	**18**	**12,794**
	Total Coliform Data by Sample Location				
Galley	0.8%	12.8%	47	6	5,695
Lavatory	5.9%	2.9%	413	12	7,027
Composite*	14.3%	0%	1	0	7
Unknown Sample Site	3.1%	0%	2	0	65
Total	**3.6%**	**3.9%**	**463**	**18**	**12,794**

*Composite sample of Galley and Lavatory sources
Note: "TC+" means total coliform-positive; "EC+ or FC+" means *E. coli*-positive or fecal coliform-positive

Of the 20,156 total coliform samples processed, 93 percent or 18,724 samples (12,794 routine and 5,930 repeat samples) were from air carriers with an EPA-approved QAPP and CRMP. Of the 12,794 routine samples, 3.6 percent (463 samples) were positive for total coliform and 3.9 percent (18 samples) of the total coliform-positive samples were *E. coli*/fecal coliform-positive. Of the 463 total coliform-positive routine samples, 413 were collected in the lavatory, 47 were collected in the galley, and one was a composite sample of galley and lavatory sources; the location of the remaining two positive results are unknown. However, although the lavatory samples had a higher total coliform-positive occurrence rate (5.9%, or 413 of 7,027 lavatory samples) than the galley samples (0.8%, or 47 of 5,695 galley samples), the galley samples have a higher *E. coli*/fecal coliform occurrence of 12.8 percent (6 of 47 total coliform-positive samples), compared to 2.9 percent (12 of 413 total coliform-positive samples) in the lavatories.

3.4 Uncertainties in the ADWR Baseline

Uncertainties in this baseline analysis are due to the limitation of available information. These uncertainties contribute to uncertainties in the cost estimates presented in Chapter 5. The most significant uncertainties in the ADWR baseline are related to the number of aircraft per air carrier that are subject to the ADWR, each aircraft's passenger capacity, and the flight frequencies of charter aircraft. Where aircraft information was not provided by the air carrier on their Web site or annual report, or by the aircraft's manufacturer, aircraft capacity was based on other similar aircraft models. This assumption may under- or over-estimate the number of passengers per aircraft, as it does not factor in aircraft that are ordered to fit air carriers' specific requirements. Similarly, when the number of lavatories and galleys was not specified, the number of lavatories and galleys used was based on similar capacity aircraft. A carrying capacity of 25 was assumed when aircraft type was not specified and the capacity could not be obtained from a similar aircraft model. When two different models of an aircraft were used by an air carrier and the passenger carrying capacity was not differentiated between the two, an average carrying capacity was used.

Aircraft that clearly did not carry at least 25 passengers, 60 days per year were not included in the baseline; however, there were some charter aircraft included in the baseline. Those charter aircraft that exhibited a strong possibility of fitting the definition of a TNCWS were included in the baseline. A weighted average flight frequency was calculated for the charter flights included in the baseline based on known flight frequencies of other chartered aircraft. Lastly, when only a weekly or yearly flight frequency was provided, 365 days per year and 52 weeks per year were assumed.

4. Benefits Analysis

4.1 Introduction

Three of the alternatives considered during the ADWR development process were designed to provide more efficient methods for aircraft to comply with the NPDWRs than are allowed by the baseline regulations, without compromising public health. The baseline regulations were considered as the fourth alternative. The regulatory scenarios (i.e., the baseline and alternatives) that were considered for aircraft to achieve compliance with NPDWRs were designed to minimize the risk of potential adverse health outcomes from drinking water boarded on aircraft.

This chapter examines the risk (and benefit) tradeoffs between compliance with existing NPDWRs and the other alternatives considered during the regulatory development process. This comparative analysis was presented in the Economic and Supporting Analysis document developed for the proposed rule; however, EPA has updated this discussion and included the final rule elements for the reader's convenience. Evaluations include a qualitative analysis that compares the risks for each regulatory alternative as compared to baseline conditions. The qualitative analysis uses EPA's best professional judgment, not quantitative data, to establish a relative risk rating for each regulatory component. Potential additional benefits analyses as well as non-quantified benefits of compliance with the regulatory alternatives are also discussed.

4.2 Relative Risks – Qualitative Analysis

From a public health perspective, full compliance with current regulations by typical stationary TNCWS will result in minimal risk to public health. The existing NPDWRs have all been vetted through separate evaluation processes that determined that the estimated public health risks following implementation meet or exceed EPA criteria. As part of the evaluation process for most NPDWRs, a quantified risk assessment is performed and quantified benefits calculated using traditional risk assessment analyses.

Because aircraft water systems are mobile systems that may board water from multiple sources over the course of a single day, the opportunity exists for contamination of the water to occur during the water transfer and boarding process and for water quality in the aircraft water system to deteriorate due to water age (see Chapter 1 for a discussion of the public health risks addressed by the ADWR). As a result, some regulatory requirements appropriate for typical systems (such as monthly monitoring for coliforms and repeat coliform sampling) are not as useful for aircraft systems, and some voluntary activities (such as routine disinfection and flushing of a water system) warrant a regulatory requirement for aircraft.

To perform quantified risk and benefits analyses for a regulatory alternative, a large amount of data are needed for parameters such as contaminant occurrence (both frequency and

concentration), health effects, and water consumption. Because of their unique characteristics, the requisite data are not available for aircraft PWSs and the populations they serve: thus EPA determined that a quantitative risk assessment (and associated benefits analysis) was not feasible. Furthermore, since the goal of the ADWR is to tailor existing NPDWRs to the unique characteristics of aircraft water systems, EPA determined that additional quantitative risk assessments (and thus benefits analyses) were not necessary. Therefore, the discussion and analysis in this chapter focus on the *relative* risks between the regulatory alternatives considered for the ADWR and the baseline conditions.

4.2.1 Rule Implementation Activities

Rule implementation activities are expected to be similar under all regulatory alternatives. These activities are primarily administrative in nature and include items such as reading and understanding the rule, training, and development of reporting and recordkeeping protocols. Because of the similarities in expected implementation activities under all regulatory alternatives, they are not expected to have an observably different effect on overall risk relative to current regulations.

4.2.2 Operator Certification Requirements

Because of potential impacts on airworthiness, all aircraft maintenance is required to be performed by highly trained individuals under FAA oversight. These requirements are the same for all regulatory alternatives considered, even in the absence of specific operator certification requirements. Thus, there is no expected difference in risk between the alternatives for this regulatory component.

4.2.3 Routine Monitoring – Coliform Bacteria

Current regulations require monthly monitoring for coliform bacteria in accordance with the TCR. Since monitoring PWSs for every possible pathogenic organism is not feasible, coliform organisms are used as indicators of possible source water and distribution system contamination. All else being equal, any reduction in the frequency of routine monitoring performed represents a potential increase in risk for water consumers. Relative to the monthly coliform sampling in the current regulations, Alternative 2 (requirements similar to the AOCs) proposes a decrease in routine monitoring frequency to annually, while Alternative 3 (requirements similar to WSG 29) proposes quarterly sampling or no sampling if the air carrier is operating under an approved O&M plan. Thus, selection of Alternatives 2 or 3 represents a potential increase in health risk to consumers of water onboard aircraft. For the final rule, aircraft have four possible monitoring frequencies depending on the manufacturers' recommended schedule for disinfection and flushing. One option requires monthly monitoring if disinfection and flushing frequency is once per year or less. The other three options require quarterly, twice annual, or annual monitoring combined with more frequent disinfection and flushing frequencies. Under the final rule, those aircraft that monitor monthly will not see any change in risk relative to current regulations. However, all other aircraft under this alternative

will see a potential increase in health risk due to reduced monitoring, leading to an overall potential increase in health risk for the routine monitoring component of the final rule.

When considering the relative risks posed by differences in sampling frequency for aircraft PWSs, it is important to also consider the efficacy of sampling for these types of systems. Because of the numerous fill and drain operations across a wide geographic area that are common for aircraft water systems, the effectiveness of any sampling in identifying and correcting problems is limited. In many cases, due to the lag times from sampling to getting results, a positive coliform sample may be representative of water that has already been replaced (possibly several times) by clean water from a different watering point or the cause of the positive sample (e.g., biofilm sloughing) has already been cleared from the system. In cases such as these, identification of the positive sample may result in little to no impact on public health. On the other hand, sampling more frequently than monthly may be beneficial for identifying trends for a particular aircraft, airport, or water source that could lead to health risk reductions for that given entity. However, aircraft rely on the required use of watering points that meet FDA regulations to board potable (finished) water that meets all of the NPDWRs. Therefore, monitoring and treatment applied by the PWS supplying the watering point should address all but aircraft water boarding and system-related health risks.

4.2.4 Repeat Monitoring – Coliform Bacteria

When a PWS receives notification of a total coliform-positive routine sample, it is required to take repeat coliform samples. Alternatives 1 and 2 require four repeat samples to be collected, Alternative 3 does not specify any repeat sampling, and the final rule gives aircraft the option of taking three repeat samples or disinfecting and flushing the system as corrective action.

Unlike routine sampling where more frequent sampling can point to statistical trends, repeat samples are more specific to identifying the extent of a particular contamination event. In the absence of repeat monitoring, in the final rule the aircraft would proceed directly to a corrective action. Within this context, repeat samples help to better define the problem and can lead to more cost-efficient situational response (e.g., avoiding a potentially expensive corrective action if repeat samples do not identify an ongoing problem). Because aircraft will either determine that there is no ongoing problem (all repeat samples are negative) or take corrective action, no change in risk relative to current regulations is expected for any of the regulatory alternatives under consideration.

4.2.5 Additional Routine Monitoring – Coliform Bacteria

Because of the small size of the population served by aircraft PWSs, they are included among other TNCWSs that are only required to take one monthly sample to comply with current TCR requirements. For any system that has a total coliform-positive sample under the TCR, that system must collect a minimum of five routine samples in the following month. The TCR allows for the primacy agency to waive the requirement to collect five routine samples the next month the system provides water to the public if the primacy agency has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will

correct the problem before the end of the next month the system serves water to the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system had taken and/or will take to correct the problem.

For aircraft systems, the additional routine monitoring requirement equates to collection of four additional samples in any month following a positive coliform sample under current regulations (Alternative 1). Alternatives 2, 3, and the ADWR do not specify any requirements for this additional routine monitoring. Alternatives 2 and 3 require disinfection and flushing of the water system immediately following any total coliform-positive sample, thus presumably meeting the criteria that the system has corrected the problem before the end of the next month water is served to the public. The final rule gives aircraft the option of disinfecting and flushing the system with follow-up monitoring, or performing repeat monitoring if one or more routine sample is total coliform-positive. If any repeat sample is total coliform-positive, the aircraft must disinfect and flush the system. If all repeat samples are coliform-negative, no corrective action is required. For Alternatives 2, 3, and the ADWR, EPA is assuming the cause of the positive coliform sample is either unknowingly boarding contaminated water, contamination during the water boarding process, or water quality deterioration due to water age. In each case, the practice of disinfection and flushing as corrective action, combined with frequently boarding water from different locations minimizes the value of additional routine samples to indicate the existence of an ongoing problem. This assumption may not capture all contamination problems coming from the aircraft tap, tank, or distribution system. However, because the final rule requires aircraft to either disinfect and flush, or collect repeat samples in response to a total coliform-positive result, any potential increase in public health risk is anticipated to be small. Thus, EPA assumes the lack of a requirement for additional routine monitoring under Alternatives 2 and 3 results in minimal change in public health risk, and no more than a potential slight increase in public health risk for the final rule (depending on whether the system opts to disinfect and flush the system or collect repeat samples) relative to the current regulations. The reasoning for and associated limitations on considering the magnitude of this increased risk are similar to those discussed under routine monitoring in section 4.2.3 above.

4.2.6 Post Disinfection Monitoring – Coliform Bacteria

Under Alternative 1, the existing regulations, aircraft water systems do not have any requirements for post disinfection coliform monitoring. Alternative 3 also does not require post disinfection monitoring, thus there is no change in risk relative to Alternative 1. Alternatives 2 and the final rule do require post disinfection monitoring to verify the effectiveness of disinfection procedures triggered by a total coliform-positive sample result. To the extent that this verification prevents inadequate disinfection (and subsequent return of a contaminated water system to service) risks will be reduced under these two alternatives. The reduction of risk realized by post disinfection monitoring is expected to be valuable where the cause of the contaminated sample was not mitigated by the disinfection process, such as when certain taps required replacement, as reported by some air carriers at stakeholder meetings held during the development of the proposed rule. The reduction of risk realized by post disinfection coliform monitoring is expected to be minimal for aircraft overall.

4.2.7 Routine Monitoring – Disinfectant Residual

Under Alternative 1, aircraft water systems are required to take monthly disinfectant residual samples at the same time and place as routine and repeat coliform samples. Alternative 2 proposes reducing this sampling to annually to correspond with the annual routine coliform monitoring requirements. Alternative 3 does not require disinfectant residual monitoring if the system opts for the operations and maintenance program or if it performs coliform monitoring. The final rule does not include a requirement for routine residual disinfectant monitoring.

As with coliform monitoring, any reduction in sampling frequency for a disinfectant residual may result in an increased public health risk. Although some pathogens are resistant to disinfection (e.g., *Cryptosporidium*), maintenance of a disinfectant residual still provides important health protection within the water system. By monitoring more frequently for a disinfectant residual, a typical water system operator can better ensure continuity of this protection in the system. It is important to note, however, that while monitoring for a disinfectant residual is not required under the ADWR, all aircraft are required to board finished water that meets all NPDWRs, including disinfectant residual where applicable. Also, some aircraft may board water from PWSs that use ground water that may not be required to have a disinfectant residual. Thus, although there may be an increase in risk under the ADWR in relation to Alternative 1 since disinfectant residual sampling is not required, the differential in this risk is expected to be small.

4.2.8 Development and Implementation of an O&M Plan

All alternatives considered require basic O&M in compliance with FAA regulations to ensure airworthiness of the aircraft. FAA requires O&M practices to follow manufacturers' guidelines. Any FAA requirements regarding O&M are not changed under any of the alternatives and will not impact relative risks. Additional O&M requirements imposed under EPA jurisdiction are related to the proper maintenance and upkeep of equipment and are consistent for Alternatives 1 and 2. For Alternative 3, aircraft have the option of following a more prescriptive O&M plan in lieu of monitoring. The final rule requires development of specific O&M plans. To the degree that more prescriptive O&M plans will better focus maintenance activities on issues specific to aircraft water systems and help prevent more problems from arising, Alternatives 3 and the final rule could result in a decrease in risk relative to the existing regulations captured in Alternative 1. It is expected, however, that this decrease would be minimal due to the O&M requirements already in place under FAA regulations.

4.2.9 Routine Disinfection and Flushing

The existing regulations composing Alternative 1 address routine disinfection and flushing of distribution systems as one of several best available technologies (BATs) identified in the TCR to protect the system from coliform bacteria contamination. As BATs, these are optional procedures a PWS may or may not implement. Because of the unique nature and operation of aircraft water systems, it is estimated that next to boarding only finished water that meets all of the NPDWRs, periodic disinfection and flushing of the water system has the biggest

effect on maintaining water quality and ensuring public health is protected. Disinfection and flushing overcomes, to a large extent, the cumulative risks from boarding water from multiple locations by effectively resetting the system on a regular basis. To the extent that the regulatory alternatives increase the frequency of disinfection and flushing events, there is expected to be a decrease in public health risk. Because information reported by air carriers suggests pre-AOCs' disinfection and flushing frequencies varied greatly from monthly to every few years, a requirement specifying the frequency for disinfection and flushing, and the preventive nature of the activity, is expected to have the biggest effect in terms of the magnitude of change in risk.

4.2.10 Disinfection and Flushing as Corrective Action

Alternative 1 does not require specific corrective actions (*i.e.*, disinfection and flushing) following total coliform-positive samples. However, typical water system operations practices suggest that aircraft would take some kind of action in response to more than one total coliform-positive routine sample, or if any sample is *E. coli*-positive under Alternative 1, even if the actions are not specified in the regulations. For Alternatives 2, 3, and the ADWR, aircraft that experience confirmed positive total coliform samples (one sample for Alternatives 2 and 3) or one *E. coli* sample must[13] perform corrective action which includes, at a minimum, disinfection and flushing of the water system. Because disinfection and flushing corrective actions are mandatory and/or occur at frequencies greater than those typical under Alternative 1, they result in an overall decrease in risk for this regulatory component relative to Alternative 1.

4.2.11 Optional Supplemental Treatment

All three alternatives and the final rule allow for the use of appropriate supplemental treatment onboard aircraft. In cases where such treatment is added to an aircraft, an additional barrier against contamination will be provided and risks will decrease. However, because this is an existing option that also applies to baseline conditions, there is no change in risk for any of the alternatives relative to the baseline.

4.2.12 Sanitary Surveys/Self-Inspections

Alternative 1 requires sanitary surveys at least every 5 years. The final rule requires air carriers to conduct self-inspections every 5 years and certify that they were completed. These inspections will function in a manner similar to sanitary surveys and are expected to yield comparable risk reduction. EPA may conduct compliance audits to ensure proper implementation of rule requirements. Alternatives 2 and 3, however, do not have specific requirements for sanitary surveys and, to the extent that problems that would normally be uncovered during a sanitary survey are not found, may result in an increased risk.

[13] Corrective action is not mandated under Alternative 3. However, for analysis purposes it is assumed that aircraft would correct deficiencies in the same manner as under Alternatives 2 and the final ADWR.

4.2.13 Public Notification

Public notification requirements are similar for all regulatory alternatives considered. Any differences between the alternatives are minimal and not expected to have a measurable impact on risk relative to the baseline alternative.

4.2.14 Overall Relative Risk

The discussions above describe relative risks in terms of individual components of the regulatory alternatives and the ADWR. The overall change in risks from each alternative relative to the Alternative 1 baseline are a result of the complex interaction of all regulatory components. Based on the discussions presented above, EPA has used best professional judgment to qualitatively estimate the relative risk of each regulatory alternative considered. This assessment was made through collaboration with a wide range of drinking water and aircraft experts, including public health scientists, engineers, administrators, and regulatory experts. The consensus opinions resulting from the assessments are presented below for each alternative.

Alternative 2: Requirements Similar to the AOCs

Alternative 2 mirrors the requirements set forth in the AOCs. In consideration of the regulatory components, the expert consensus is that the dominant factor affecting risk is the periodic disinfection and flushing of aircraft water systems. This type of periodic maintenance is important in an operating environment that is as variable as that of aircraft water systems. Though there is currently no data on how large the marginal effect of increasing disinfection and flushing frequency is, any increase in periodicity for this activity is expected to yield larger health risk reductions compared to other regulatory components such as periodic monitoring.

Based on all the considerations discussed above, the expert consensus is that the overall health risk remaining after Alternative 2 is most likely less than the baseline.

Alternative 3: Requirements Similar to Water Supply Guidance 29

The components of Alternative 3 are generally not as comprehensive as Alternative 2, yet are similar for those components that are included in both. In particular, the disinfection and flushing requirements are the same for a subset of aircraft in Alternative 3 (*i.e.*, those that choose to comply with an O&M plan in lieu of monitoring). Based on the similarities between Alternatives 2 and 3, the same process and rationale were used to evaluate the two alternatives. Thus, the expert consensus is similar: the overall health risk posed by Alternative 3 is most likely less than the Alternative 1 baseline, though the magnitude of the difference is expected to be smaller compared to Alternative 2 due to the flexibility in choosing between monitoring and an O&M plan.

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The regulatory components of the final rule allow greater flexibility than Alternatives 2 and 3 with regard to disinfection and flushing. Thus, some aircraft will not perform disinfection

and flushing as often as would be required under those alternatives. However, this is compensated for by requiring more routine coliform monitoring in those situations. As a result, the expert consensus is that the overall health risk posed by the final rule is most likely less than the Alternative 1 baseline, and about the same as Alternatives 2 and 3.

4.3 Assessment of Potential Quantitative Relative Risk Analyses

In addition to the qualitative relative risk analysis presented above, EPA has considered analyses for incorporating quantitative data into a relative risk analysis. However, EPA is limited by the purpose, quality, and quantity of data available in developing meaningful analyses. Any comparison of risk between the alternatives considered for the final rule requires robust data that would support: 1) direct comparisons of the overall baseline conditions with the overall conditions under each of the alternatives, or 2) comparisons of specific regulatory components (*i.e.*, disinfection and flushing frequencies) that could be used to compare the baseline and all alternatives. See Chapter 3 for a more detailed description of available data.

The most recent data available that may represent baseline conditions are those from EPA's 2004 data collection effort. These data suggest a cumulative total coliform-positive rate of 15 percent for the aircraft sampled. Additional data that may inform the baseline are from the 2003 ATA data collection effort. These data suggest a 2.3 percent rate of total coliform-positive samples for aircraft originating from domestic locations. Sufficient accompanying information is not available for either of these studies to form the basis of more complex modeling and analysis that could inform a quantitative relative risk estimate. In particular, information on items such as maintenance histories, especially disinfection and flushing histories, of the sampled aircraft are not available to inform an analysis. Because disinfection and flushing is a key component to maintaining water quality, such information is vital for assessing differences in monitoring results seen between these two data collection efforts as well as differences within each data set. In addition, each of these data collection efforts represents a small fraction of the total aircraft inventory, calling into question the representativeness of the data.

The data collected under the AOCs represent all aircraft in each air carrier fleet that submitted data and are therefore more comprehensive than those collected under the efforts mentioned above. However, these data are also subject to limitations that currently prevent their use for a robust quantitative analysis. First, the AOCs' data collection was not developed with the intent to inform risk analyses. The AOCs' data were intended to be used for assessing compliance with the AOCs, and as such, the data elements collected may not provide the parameters necessary for relative risk analyses. However, preliminary analysis of the data indicates that they are more comprehensive and potentially useful for such purposes than the 2003 and 2004 data. Related to the intent of the AOCs' data collection, and more significant to the ability to use the data in a meaningful analysis, is the ongoing nature of the data collection. As of December 31, 2008, data have been received and analyzed for only 16 of the 45 air carriers currently under AOCs. In addition, as described in Chapter 3, only some of those data were collected under EPA-approved QAPPs and CRMPs. This small fraction of data processed to date

under the AOCs, while more representative than the smaller data sets collected under the 2003 and 2004 efforts, is still not sufficient to ensure a representative analysis.

In the absence of rigorous statistical analyses, only general observations of the data can be made, and only with adequate qualifiers. Because of the differences in conditions under which AOCs' data were collected compared to the 2003 and 2004 data (*i.e.*, quarterly disinfection and flushing is being conducted under the AOCs), comparisons of these data sets may inform the effectiveness of disinfection and flushing as a risk reduction strategy. Comparison of the total coliform-positive rate of 15 percent from the 2004 EPA data with the AOCs' rate of 3.6 percent for QAPP and CRMP-approved data may indicate some effectiveness of the actions, specifically disinfection and flushing, required under the AOCs. However, consideration of the 2003 ATA data tends to argue against this assumption since the differences between these data results and those for the AOCs appear to be insignificant. There are many other factors that could explain differences in the results that need to be considered. In addition to the obvious uncertainties associated with the small sample sizes for each of the data sets, influences of items such as water handling procedures, sampling procedures, water retention times, and overall attentiveness to the water quality issues need to be considered.

Considering all of the issues discussed above, EPA has determined that it is not feasible to perform a quantitative relative risk analysis at this time.

4.4 Non-quantified Benefits

In addition to the benefits associated with individual components of the ADWR, there may be other benefits of the final rule that cannot be quantified with the information available. These potential benefits are described below.

Because EPA has no information on illnesses and subsequent deaths that may have been caused by drinking water onboard aircraft, it cannot determine the number of illnesses and deaths that would be avoided. However, increased routine disinfection and flushing required under the final option is expected to remove pathogens in the aircraft distribution system contributing to endemic disease. Disinfection and flushing associated with corrective action is also expected to inactivate or remove pathogens that may have entered the distribution system, resulting in decreased illness and greater avoidance of death. By reducing cases of illness contracted through exposure to aircraft water, the final option is also expected to reduce the occurrence of illness passed through secondary spread. EPA expects that the addition of multiple barriers to pathogens through monitoring and disinfection and flushing may reduce the likelihood of waterborne disease outbreaks associated with aircraft PWSs.

5. Cost Analysis

5.1 Introduction

This chapter presents an estimate of the national implementation and incremental costs of the final ADWR as well as a brief qualitative discussion comparing costs to the potential expected benefits of the final rule. The cost estimate, prepared by EPA, is a summation of air carrier costs for complying with the ADWR components and EPA costs for implementing the rule. Although existing air carrier industry practice may involve some activities required under the ADWR, all costs incurred to comply with the final ADWR are considered additional or incremental costs. Rule components include developing and implementing monitoring and O&M plans; performing routine monitoring; disinfecting and flushing the aircraft water system; self-inspections by air carriers with self-certification of their completion; compliance audits by EPA; and reporting and recordkeeping requirements.

Public notification requirements are included in the ADWR; however, compliance with those requirements is not included in these cost estimates as it is addressed under the Information Collection Request for the Public Notification Rule. Because an update to the public notification information collection request (ICR) was published before the ADWR was final, an estimate of the burden associated with those costs has been included in the ICR for the final ADWR.

The detailed descriptions and analyses presented in this chapter focus on the final rule. Overall implementation costs for the final rule are compared to summary costs of the other alternatives considered during the regulatory development process. A comparison of the final ADWR and the proposed rule (updated to 2008$) is also provided. Detailed costs for the alternatives to the ADWR are presented in Appendix C.

Air carrier costs are estimated for different aircraft categories. The aircraft categories are based on the number of available sampling points on the aircraft, but the number of sampling points is used for information display purposes only and does not affect the cost estimates. For purposes of this analysis it is assumed that, on average, all air carriers spend equal time performing rule activities regardless of aircraft type or category.

EPA implementation costs include staff training on ADWR requirements, providing technical assistance to air carriers, conducting compliance audits, reviewing monitoring reports, and recordkeeping. EPA estimated unit costs for these various components using a cost model, equipment price lists and quotes, wage rates from government sources (Bureau of Labor Statistics (BLS)), stakeholder input, and other relevant assumptions used in economic analyses performed for existing drinking water rules (e.g., the recently finalized Ground Water Rule).

The national costs are estimated using a model specifically developed for the ADWR. The model uses Microsoft Excel software. The main advantage to this modeling approach is that it effectively captures point estimates of all cost information and presents it in a transparent

manner. This information forms the basis for examining impacts to air carriers and aircraft PWSs.

The remainder of this chapter is organized as follows:

- **Section 5.2** describes the general costing and compliance assumptions used to estimate national implementation costs for the final ADWR.
- **Section 5.3** describes the methodology of projecting costs over a 25-year period according to the ADWR compliance schedule, estimating the present value of each cost, and annualizing each cost over a 25-year period.
- **Section 5.4** describes the methodology for developing costs for all rule activities.
- **Section 5.5** presents passenger cost estimates.
- **Section 5.6** presents a discussion of non-quantified costs and uncertainties in cost estimates.
- **Section 5.7** presents the total annualized implementation cost for the final ADWR as well as the annualized incremental cost for the final rule.
- **Section 5.8** presents a comparison of cost estimates for the final ADWR to estimates for other rule alternatives considered and the proposed rule.
- **Section 5.9** qualitatively compares the estimated costs for the final ADWR to the potential expected benefits.
- **Section 5.10** discusses other economic measures.

5.2 General Cost Assumptions and Methodology

The ADWR Cost Model incorporates several baseline data elements, including the numbers, models, and seating capacity of aircraft; number of available sampling points per aircraft; and the number of flights per aircraft per year. Because many of the assumptions apply not to air carriers but to aircraft, where appropriate, exhibits in this chapter use aircraft estimates. Derivations of these baseline assumptions are discussed in Chapter 3. In addition, this section discusses several additional baseline costing assumptions used as inputs to the ADWR Cost Model including labor rates (Section 5.2.1) and laboratory fees (Section 5.2.2).

The ADWR cost model uses the air carrier baseline water quality data submitted by air carriers to EPA for compliance with AOCs as described in Chapter 3, and assumptions regarding labor hours, laboratory costs, and labor rates to generate point estimates for air carrier costs for components of the final rule and each alternative. The model also includes Agency costs by rule

component, which are costs incurred by EPA Headquarters and Regional offices to implement the rule. Detailed breakouts of costs for the final rule generated by the cost model are presented in this chapter. See Appendix C for detailed breakouts of costs for the other alternatives that were considered during rule development.

5.2.1 Labor Rates

For costing purposes, EPA estimates the labor needs and hourly labor rates of air carrier employees for three labor categories: managerial, clerical, and technical (see Exhibit 5.1). EPA recognizes that there may be significant variation in labor rates across all air carriers. However, for purposes of this analysis, EPA used national-level estimates from two resources: 1) the *Bureau of Labor Statistics Occupational Employment Survey (Air Transportation, May 2007)* and, 2) *Occupational Employment Wages for Flight Attendants (May 2005)*. The 2005 document for flight attendant wages was used because flight attendant wage data for 2006 and 2007 were not available. To be consistent with other costs used in the cost model, all estimates were converted to 2008 dollars for the analysis. The costs reflect a load factor of 1.5 to account for benefits paid to air carrier workers based on the *BLS Employer Costs for Employee Compensation Report, June 2008 (BLS, 2008)*[14].

Exhibit 5.1 Loaded Labor Rates by Standard Occupational Classification (SOC) Code (2008$)

SOC Code	Occupation	Mean Hourly Wage
Managerial		
SOC 11-3071	Transportation, Storage, and Distribution Managers	$65.42
Clerical		
SOC 43-6014	Secretaries, Except Legal, Medical, and Executive	$22.50
Technical		
SOC 39-6031	Flight Attendants	$41.72
SOC 53-7061	Cleaners of Vehicles and Equipment	$20.19
SOC 53-6051	Transportation Inspectors	$42.86
SOC 51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	$34.27
SOC 53-6099	Transportation Workers	$28.41

Source: Bureau of Labor Statistics (BLS) Occupational Employment Survey, May 2007, Air Transportation 481000, http://www.bls.gov/data/.
Flight Attendants - Occupational Employment and Wages, May 2005. Flight attendants' wage data for 2006 and 2007 not available.

To estimate costs for many of the rule components, EPA used the transportation inspector category because it was the highest-paid technical labor category. Various other technical and managerial rates are also included in the model based on the rule component and related activities. It should be noted the BLS labor rate for this labor category decreased from that obtained from BLS and used for cost estimates for the proposed rule.

[14] BLS Employer Costs for Employee Compensation Report, Table 9, June 2008. All workers in private industry. Production, transportation, and material moving. Transportation and material moving subsector. http://www.bls.gov/ncs/ect/home.htm

In developing Agency labor costs, EPA estimates the average hourly labor rate for salary, overhead, and benefits for Agency staff to be $50.14. To derive this figure, EPA multiplied the hourly compensation at General Schedule (GS)-12, Step 5 on the 2008 GS pay scale ($31.34) by a benefits multiplication factor of 1.6 to account for overhead and benefits as specified in the ICR Handbook (USEPA, 2005).

5.2.2 Laboratory Fees

A laboratory fee, or cost per sample, is associated with total coliform, disinfectant residual, and turbidity monitoring. EPA estimated the cost of monitoring based on the use of a commercial laboratory, as shown in Exhibit 5.2. EPA's estimate of the cost per total coliform sample includes sampling burden, the analysis cost charged by the laboratory, and shipping and handling. Disinfectant residual sampling and turbidity monitoring are not required under the final rule but would be required under one or more of the alternatives evaluated. Disinfectant residual samples and turbidity samples would be analyzed on-site; therefore, the cost per disinfectant residual sample and turbidity sample includes only the sampling kit purchased by the air carrier and the sampling and in-house analysis burden. It is estimated that all samples requiring commercial laboratory analysis for each sampling event (e.g., two routine samples or three repeat samples) will be shipped together to a laboratory between 20-30 miles from the airport. The estimated burden required to collect samples reflects a national average. Individual air carriers may realize collection burden that is either less than or greater than this average depending on locations of the airports with respect to EPA-or State-certified laboratories, aircraft schedules, and accessibility of sampling points in a particular aircraft. No additional costs are assumed for installation of new sampling taps, since EPA assumes all aircraft are equipped with existing taps for sampling.

Rates may vary due to regional variations in laboratory fees, the number of samples processed (quantity discounts), and laboratory capacity. Although laboratory costs are often lower for multiple samples, there are no estimates of the number of air carriers that may be able to take advantage of this savings. Therefore, the rate used in this analysis may over estimate the actual cost incurred by aircraft water systems.

Exhibit 5.2 Laboratory Costs (2008$)

Item	Cost
TC Coliform Sample	$22.16
Disinfectant Residual Sampling Kit	$2.96
Shipping	$107.48
Annual Equipment Replacement	$219.00
One-time Equipment Purchase (3 refrigerators)	$597.00
Portable 2100P turbidimeter and accessories	$858.00
Turbidimeter calibration kit	$97.69
Turbidimeter secondary standards	$124.00

Notes:

1) Estimated chlorine residual sampling kit costs from www.hach.com ($74 for 25 tests).

2) Assume shipping and annual equipment replacement costs are incurred by coliform monitoring. Disinfectant residual samples will be analyzed immediately and will not require shipping or refrigeration.

3) Assume 3 coolers ($33/cooler), 9 gel packs ($4/gel pack), and 2 calibrated thermometers ($42/thermometer) purchased per air carrier. Cost of cooler and gel pack from www.coleman.com. Cost of thermometer from https://www1.fishersci.com.

4) Assume 3 refrigerators ($199/refrigerator) purchased per air carrier twice in the 25-year evaluation period. Cost of refrigerator from www.homedepot.com.

5) Sample analysis costs based on average costs from various EPA certified labs across the U.S.

6) Cost of 2100P turbidimeter, calibration kit, and secondary standards from www.hach.com

5.3 Projecting and Discounting National Costs

Costs must be expressed in common units so they can be added together to calculate total annual costs. For the ADWR, some activities occur once, such as preparing monitoring plans and O&M plans. Other activities such as self-inspections are assumed to happen once every five years. Because these activities do not occur instantly or simultaneously, and to make such values comparable, the year or years in which all costs are expended must be determined and the costs must be brought back to their present value. For the purposes of this analysis, one-time and yearly costs were projected over a 25-year time period to coincide with and allow comparison with other drinking water regulations. The present values of costs are calculated using discount rates of 3 and 7 percent based on EPA policy and OMB guidance.[15]

Several adjustments are made to the cost estimates when costs are being used as part of the national cost estimate. A summary of these adjustments is as follows:

- Project all undiscounted costs over a 25-year time horizon based on the rule implementation schedule.
- Calculate total present value costs using 3 and 7 percent discount rates.
- Annualize the costs over 25 years using the same discount rates.

Appendix C contains results from each step above for the final rule. Exhibits C.12 through C.14 show the nominal costs projected over the rule schedule and the present value of

[15] The choice of an appropriate discount rate is a complex and controversial issue among economists and policy makers. Therefore, the Agency compares streams of future national level costs and benefits using two alternative discount rates, 3 and 7 percent. The underlying logic for each discount rate can be found in *Guidelines for Preparing Economic Analyses* (USEPA, 2000).

each cost calculated to the expected year of rule implementation for the final rule as well as the results for Alternatives 1, 2, and 3.

5.4 Derivation of Costs for Air Carriers and the Agency

This section presents the methodology and unit costs used to derive national costs for air carriers and the Agency to perform the final ADWR-related activities, and a brief summary of each rule component. Chapter 2 contains a detailed summary of the ADWR requirements. This section is organized by rule component as follows:

5.4.1 Rule Implementation/Annual Administration

5.4.2 Sampling Plan

5.4.3 O&M Plan

5.4.4 Coliform Monitoring

5.4.5 Routine Disinfection and Flushing

5.4.6 Disinfection and Flushing as Corrective Action

5.4.7 Compliance Audit and Self-Inspection

This chapter uses baseline information presented in Chapter 3 as a starting point for analysis of air carriers/aircraft subject to each rule component. Exhibit 5.3 presents key baseline information on the number of persons served per year and the number of aircraft that is referenced throughout this section. These aircraft are assumed to be TNCWSs that board finished surface water. The aircraft inventory presented in Exhibit 5.3 represents the baseline for rule activities that are applicable onboard the aircraft (monitoring, and disinfection and flushing). Implementation and annual administration activities, development of monitoring and O&M plans, and compliance audits will occur on an air carrier-wide basis. Exhibit 5.3 is stratified according to the number of available sampling points per aircraft for data display purposes only. For the purposes of analyses, each qualifying lavatory and galley on an aircraft is assumed to have only one sampling tap.

Exhibit 5.3 ADWR Aircraft and Population Baseline

# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	# of Onboard Staff/year	# of Passengers/year	Total # of Potentially Affected Persons/year
A	B	C=B*A	D	E	F=D+E
1	381	381	1,978,974	24,980,980	26,959,953
2	2,080	4,160	8,639,938	104,430,089	113,070,026
3	756	2,268	2,332,151	22,935,259	25,267,410
4	421	1,684	2,510,833	51,846,929	54,357,762
5	956	4,780	6,641,598	158,813,021	165,454,619
6	871	5,226	3,879,569	91,360,628	95,240,197
7	298	2,086	1,414,970	34,239,869	35,654,839
8	809	6,472	3,765,459	93,648,921	97,414,380
≥ 9	755	9,354	3,998,054	126,176,568	130,174,622
Total	**7,327**	**36,411**	**35,161,545**	**708,432,263**	**743,593,809**

Notes:

(A) Each qualifying lavatory and galley on an aircraft is assumed to have only one sampling point. Therefore, the number of available sampling points is representative of the number of lavatories and galleys on an aircraft.

(B), (D), (E) Derived from Appendix B.

(C) Average number of sampling points used for ≥ 9 sampling points size category.

5.4.1 Rule Implementation and Annual Administration

5.4.1.1 Air Carriers

All air carriers subject to the ADWR will incur one-time costs that include time for staff to read the rule and become familiar with its provisions and to train employees on rule requirements. All 63 air carriers subject to the ADWR will perform implementation activities. The technical labor rate presented in section 5.2.1 is used along with estimates of labor hours to generate implementation costs for all air carriers. Based on previous experience with rule implementation, EPA estimates that each air carrier would require 4 staff persons to spend 2 hours each for a total of 8 hours to read and understand the rule, and a total of 8 hours to train personnel. These unit costs are presented in Exhibit 5.4.

Exhibit 5.4 Air Carrier Burden and Cost Estimates for Implementation

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Read and Understand Rule	$42.86	8	$ 343	504	$ 21,600
Train Personnel	$42.86	8	$ 343	504	$ 21,600
Total		**16**	**$ 686**	**1,008**	**$ 43,201**

Notes:

(1) Detail may not add due to independent rounding.

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for start-up activities reflect EPA estimate.

(D), (E) National totals for all 63 U.S. air carriers subject to ADWR to perform implementation activities. Assumes all air carriers spend equal time performing implementation activities, regardless of fleet size or aircraft type.

5.4.1.2 Agency

The Agency will incur administrative costs while implementing the ADWR. These implementation costs are not directly required by specific provisions of ADWR alternatives, but would be necessary for the Agency to ensure that the provisions of the ADWR are properly carried out. The Agency will need to allocate time for their staff to establish and then maintain

the programs necessary to comply with the ADWR, including developing and/or modifying data management systems to track new required air carrier reports. Agency burden estimates include time for rule-implementation staff to read and understand the rule. The Agency will need to develop a program to oversee inventory and sampling data submitted by air carriers. To manage data received by air carriers, the Agency will also need to modify or develop data management systems. In addition to training Regional staff who will be reviewing data and overseeing the program, the Agency will need to sponsor administrative training for air carriers, similar to a train-the-trainer session, to help air carriers understand their responsibilities under the rule. Finally, the Agency will need to provide technical assistance when air carriers request help implementing the rule. Time requirements for Agency activities are presented in Exhibit 5.5a which lists the one-time activities required to start the program following promulgation of the ADWR along with their respective costs and burden. Agency burden and cost estimates are presented as distributed evenly between the 10 EPA Regional offices. However, some of these tasks will be the responsibility of the EPA Headquarters office in Washington, D.C., and some Regions will incur more costs than others due to the number of air carriers and aircraft based in each Region.

Exhibit 5.5a Agency Burden and Cost Estimates for Implementation

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/Region)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*10	E=C*10
Read and Understand Rule	$50.14	8	$ 401	80	$ 4,012
Program Development	$50.14	40	$ 2,006	400	$ 20,058
Modify/Develop Data Management Systems	$50.14	115	$ 5,767	1,150	$ 57,666
Air Carrier Training and Technical Assistance	$50.14	80	$ 4,012	800	$ 40,115
Staff Training	$50.14	40	$ 2,006	400	$ 20,058
Total		**283**	**$ 14,191**	**2,830**	**$ 141,908**

Notes:
(1) Detail may not add due to independent rounding.
Sources:
(A) Agency labor costs from Section 5.2.1
(B) Labor hours for start-up activities reflect EPA estimate.
(D), (E) National totals for Agency (EPA Regions) to implement ADWR for 63 U.S. air carriers subject to ADWR. Assumes each region spends equal time performing implementation activities, regardless of number of air carriers headquartered in their region, air carrier fleet size or aircraft type.

In addition to these one-time costs, the Agency will need to expend resources on continuing administrative activities. On an annual basis, the Agency will have to provide ongoing technical assistance to air carriers and to their own staff. The Agency already oversees laboratory certification programs for the TCR, and it is not anticipated additional costs will be necessary for this activity. Exhibit 5.5b lists these annual activities with their respective costs and burden.

Exhibit 5.5b Agency Burden and Cost Estimates for Annual Administration

Compliance Activity	Labor Cost ($/hour) A	Labor (hours/Region/year) B	Cost ($/year) C=A*B	Total Labor Burden (hours/year) D=B*10	Total Cost ($/year) E=C*10
Lab Certification	$50.14	-	$ -	-	$ -
Ongoing Technical Assistance	$50.14	500	$ 25,072	5,000	$ 250,720
Staff Training	$50.14	16	$ 802	160	$ 8,023
Total		**516**	**$ 25,874**	**5,160**	**$ 258,743**

Notes:
(1) Detail may not add due to independent rounding.
(2) No costs are associated with lab certification under the ADWR because it is not anticipated that the Agency will need to oversee lab certification programs in addition to what is being done for the Total Coliform Rule.
Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for start-up activities reflect EPA estimate.
(D), (E) National totals for Agency (EPA Regions) to implement ADWR for 63 U.S. air carriers subject to ADWR. Assumes each region spends equal time performing implementation activities, regardless of number of air carriers headquartered in their region, air carrier fleet size or aircraft type.

5.4.1.3 Annualized Costs for Rule Implementation/Annual Administration

Annualized costs estimates for air carriers and the Agency to perform implementation activities for the final rule are presented in Exhibit 5.6.

Exhibit 5.6 Air Carrier and Agency Cost Estimates for Implementation and Annual Administration ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Total	**$ 0.002**	**$ 0.25**	**$ 0.25**	**$ 0.004**	**$ 0.25**	**$ 0.25**

5.4.2 Sampling Plan

5.4.2.1 Air Carriers

Under the final rule, all air carriers subject to the ADWR will develop sampling plans to satisfy rule requirements. The sampling plan will include the air carrier's monitoring frequency and their disinfection and flushing frequency, and is assumed to include one plan to address the entire aircraft fleet. EPA has estimated that each air carrier will require a total of 10 hours to develop sampling plans for all qualifying aircraft in their fleet, regardless of fleet size or aircraft type. This one-time labor burden also includes the initial submission of air carrier inventory information. Sampling plans will be developed in years 1 and 2 of the 25-year compliance period. Exhibit 5.7 presents air carrier burden and costs for sampling plan requirements.

Exhibit 5.7 Air Carrier Burden and Cost Estimates for Sampling Plan

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Develop Sampling Plan per ADWR requirements and Report Sampling Frequency	$42.86	10	$ 429	630	$ 27,001
Total		**10**	**$ 429**	**630**	**$ 27,001**

Notes:
One-time labor burden for sampling plan includes initial submission of air carrier inventory information.
Sources:
(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.
(B) Labor hours for developing sampling plans and reporting sampling frequency reflect EPA estimate. Assumes both disinfection and flushing frequency and monitoring frequency will be reported in plan.
(D), (E) Assume all of the 63 U.S. air carriers subject to ADWR will develop sampling plans. Assumes all air carriers spend equal time developing sampling plans, regardless of fleet size or aircraft type.

5.4.2.2 Agency

Agency costs for the final ADWR sampling plan requirements are assumed to be solely administrative. The Agency will incur costs to review air carrier sampling frequencies. EPA assumes the Agency will require a total of 5 hours to review each air carrier sampling frequency, regardless of fleet size or aircraft type. This one-time labor burden also includes reviewing the initial submission of air carrier inventory information. The Agency will review the sampling frequency in years 1 and 2 of the 25-year compliance period, as they are received from air carriers. Exhibit 5.8 presents Agency burden and costs for sampling plan requirements.

Exhibit 5.8 Agency Burden and Cost Estimates for Sampling Plan

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Review Air Carrier Sampling Plan and Frequency	$50.14	4.5	$ 226	284	$ 14,216
Total		**4.5**	**$ 226**	**284**	**$ 14,216**

Notes:
One-time labor burden for sampling plan includes reviewing initial submission of air carrier inventory information.
Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for reviewing sampling plans and frequency reflect EPA estimate.
(D), (E) Assume all of the 63 U.S. air carriers subject to ADWR will develop sampling plans. Assumes Agency spends equal time reviewing air carrier sampling plans, regardless of fleet size or aircraft type.

5.4.2.3 Annualized Costs for Sampling Plan

Annualized costs for air carriers and the Agency to develop and review sampling frequencies for the final rule are presented in Exhibit 5.9.

Exhibit 5.9 Air Carrier and Agency Cost Estimates for Sampling Plan ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Sampling Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.003
Total	**$ 0.002**	**$ 0.001**	**$ 0.002**	**$ 0.002**	**$ 0.001**	**$ 0.003**

5.4.3 O&M Plan

5.4.3.1 Air Carriers

Under the final rule, all air carriers subject to the ADWR will need to develop water system O&M plans and practices with ADWR-specific requirements or update existing plans. EPA assumes that each air carrier will require a total of 80 hours to develop water system O&M plans and practices for all qualifying aircraft in their fleet, regardless of fleet size or aircraft type, and to submit a statement to the Agency indicating that their O&M plan has been completed. O&M plans and practices will be developed in years 1 and 2 of the 25-year compliance period. Exhibit 5.10 presents air carrier burden and costs for O&M plan requirements.

Exhibit 5.10 Air Carrier Burden and Cost Estimates for O&M Plan

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Update existing O&M manual and practices with ADWR specific requirements and submit statement to Agency indicating that O&M manual has been updated	$42.86	80	$ 3,429	5,040	$ 216,005
Total		**80**	**$ 3,429**	**5,040**	**$ 216,005**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing and implementing O&M plan and submitting verification statement to Agency reflect EPA estimate.

(D), (E) 63 U.S. air carriers subject to ADWR will develop O&M plans. Assumes all air carriers spend equal time developing and implementing O&M plan, regardless of fleet size or aircraft type.

5.4.3.2 Agency

O&M plans will be reviewed by the Agency as part of compliance audits and will not require a separate Agency review. Therefore, EPA assumes there will be no additional cost associated with reviewing O&M plans. However, the Agency will require 0.5 hour per air carrier to review the statement submitted by the system indicating that the air carriers' O&M manual has been completed. Exhibit 5.11 presents Agency burden and costs for O&M plan requirements.

Exhibit 5.11 Agency Burden and Cost Estimates for O&M Plan

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Review system submitted statement indicating that O&M manual has been updated	$50.14	0.5	$ 25	32	$ 1,580
Total		**0.5**	**$ 25**	**32**	**$ 1,580**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for reviewing verification statement reflect EPA estimate. Assumes O&M plan review will be completed as part of compliance audits.
(D), (E) 63 U.S. air carriers subject to ADWR will develop O&M plans. Assumes all Regional Agency offices spend equal time reviewing and approving O&M plan, regardless of fleet size or aircraft type.

5.4.3.3 Annualized Costs for O&M Plan

Annualized costs estimates for air carriers and the Agency to comply with O&M plan requirements for the final rule are presented in Exhibit 5.12.

Exhibit 5.12 Air Carrier and Agency Cost Estimates for O&M Plan ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
O&M Plan	$ 0.01	$ 0.0001	$ 0.01	$ 0.02	$ 0.0001	$ 0.02
Total	**$ 0.01**	**$ 0.0001**	**$ 0.01**	**$ 0.02**	**$ 0.0001**	**$ 0.02**

5.4.4 Coliform Monitoring

5.4.4.1 Air Carriers

Under the final rule, all air carriers subject to the ADWR are required to perform coliform monitoring for their aircraft. Coliform monitoring begins in year 3 and continues throughout the 25-year evaluation period. An air carrier's coliform monitoring schedule is determined by its disinfection and flushing frequency, which should be based on manufacturer's recommendations. EPA is providing significant flexibility by allowing air carriers to choose their monitoring frequency if there is no manufacturer's recommended frequency. See Section 5.4.5 for a detailed discussion on routine disinfection and flushing. For modeling purposes, EPA assumes 30 percent of air carriers will monitor annually, 30 percent twice annually, 30 percent quarterly, and 10 percent monthly, as shown in column D of Exhibit 5.13. Based on monitoring data collected under the AOCs for air carriers with approved QAPPs and CRMPs, EPA assumes that 3.6 percent of samples will be total coliform-positive (column E, Exhibit 5.13). EPA may be over- or under-estimating the total number of total coliform-positive samples. Appendix B provides a detailed breakdown of the air carrier monitoring data collected under the AOCs.

Air carriers are assumed to collect routine coliform samples immediately prior to routine disinfection and flushing procedures whenever possible. This scheduling option allows any subsequent corrective action disinfection and flushing procedures to be performed when the aircraft is already out of service for the scheduled routine maintenance. The option also allows

the disinfection and flushing procedure to count toward both the corrective action and routine efforts as long as two follow-up coliform samples are collected after the disinfection and flushing procedure to meet the corrective action requirements. EPA evaluated the opportunities aircraft would have to apply this practice by comparing the frequency of routine coliform sampling to the associated frequency of routine disinfection and flushing for the same option. Based on this analysis, EPA assumes that 0 percent of aircraft monitoring annually and twice annually, 50 percent of aircraft monitoring quarterly, and 46 percent of aircraft monitoring monthly with a total coliform-positive sample will collect three repeat samples within 24 hours of notification of a total coliform-positive routine sample as an option to immediate corrective action (column G, Exhibit 5.13); all other aircraft would perform immediate corrective action. Of those aircraft collecting repeat samples, 5.7 percent are assumed to detect an additional total coliform-positive (column F, Exhibit 5.13). The two follow-up samples required per aircraft that performs disinfection and flushing as corrective action is included in the coliform monitoring cost estimate (column I, Exhibit 5.13).

EPA assumes 0.5 hour for each coliform sample collection, processing, storage, and shipping (column J, Exhibit 5.13). Therefore, the burden is assumed to be 1 hour for the two samples collected for routine sampling, 1.5 hours for the three samples collected for repeat sampling, and 1 hour for the two corrective action disinfection and flushing follow-up samples. Although the ADWR allows aircraft with a single storage tank that is removed and drained daily to collect only one routine sample, EPA has no data to determine the number of aircraft addressed by this provision, and therefore, for this analysis assumed all aircraft will collect two routine samples. No sample analysis burden is incurred by air carriers, since EPA assumes that all coliform analysis will be conducted by an outside laboratory (column M, Exhibit 5.13). EPA assumes each air carrier will purchase three refrigerators to store samples. Refrigerator costs are assumed to occur twice during the 25-year evaluation period, in years 3 and 13. Additionally, EPA assumes that each air carrier will purchase three coolers, nine gel packs, and two thermometers every year to store, transport, and measure samples. Costs for the refrigerator and shipping (and storage materials purchased for shipping) are solely attributed to coliform monitoring. Shipping costs are estimated to be approximately $107 per sample set, which consists of two routine samples, three repeat samples, and two follow-up samples.

Reporting and Recordkeeping for Coliform Monitoring

Under the final rule, air carriers are required to maintain maintenance logs and report monitoring results to the Agency. The maintenance logs contain information on sampling locations and results. EPA assumes air carriers will require 15 minutes for each of these recordkeeping activities per sample set. Air carriers are also required to report their water system inventory within 18 months of promulgation of the final rule and update that inventory annually. The initial submission of inventory information is assumed to be submitted as part of the sampling plan. EPA assumes air carriers will require 1 hour each year for annual inventory updates.

Exhibit 5.13 Air Carrier Burden and Cost Estimates for Coliform Monitoring

			TC Samples						TC Sampling		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Coliform Monitoring (samples/year)	Routine Coliform Monitoring TC+ (samples/year)	Additional TC+ (samples/year)	Repeat (samples/year)	Additional Routine Coliform Monitoring (samples/year)	Corrective Action Coliform Follow-up Sample (post-disinfection sample) (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)
A	B	C=B*A	D	E=D*0.036	F	G	H	I	J	K=J(D+G+H+I)	L=K*AA
1	381	381	2,515	91	5	95	0	129	0.5	1,369	$ 46,922
2	2,080	4,160	13,728	494	30	518	0	702	0.5	7,474	$ 256,164
3	756	2,268	4,990	180	11	188	0	255	0.5	2,717	$ 93,106
4	421	1,684	2,779	100	6	105	0	142	0.5	1,513	$ 51,849
5	956	4,780	6,310	227	14	238	0	323	0.5	3,435	$ 117,737
6	871	5,226	5,749	207	12	217	0	294	0.5	3,130	$ 107,269
7	298	2,086	1,967	71	4	74	0	101	0.5	1,071	$ 36,700
8	809	6,472	5,339	192	11	201	0	273	0.5	2,907	$ 99,633
≥ 9	755	9,354	4,983	179	11	188	0	255	0.5	2,713	$ 92,983
Total	7,327	36,411	48,358	1,741	104	1,823	0	2,474		26,328	902,363

			Analysis									
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample set)	Total Shipping Cost ($/year)	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)
A	B	C=B*A	M	N=M(D+G+H+I)	O	P=O(D/2+G/3+H+I/2)	Q	R=Q(D+G+H+I)	S	T	U	V
1	381	381	0	-	$107	$ 145,446	$22.16	$ 60,682	$ 219	$ 717	$ 597	$ 1,956
2	2,080	4,160	0	-	$107	$ 794,034	$22.16	$ 331,283	$ 219	$ 3,917	$ 597	$ 10,677
3	756	2,268	0	-	$107	$ 288,601	$22.16	$ 120,409	$ 219	$ 1,424	$ 597	$ 3,881
4	421	1,684	0	-	$107	$ 160,716	$22.16	$ 67,053	$ 219	$ 793	$ 597	$ 2,161
5	956	4,780	0	-	$107	$ 364,950	$22.16	$ 152,263	$ 219	$ 1,800	$ 597	$ 4,907
6	871	5,226	0	-	$107	$ 332,502	$22.16	$ 138,725	$ 219	$ 1,640	$ 597	$ 4,471
7	298	2,086	0	-	$107	$ 113,761	$22.16	$ 47,463	$ 219	$ 561	$ 597	$ 1,530
8	809	6,472	0	-	$107	$ 308,833	$22.16	$ 128,850	$ 219	$ 1,523	$ 597	$ 4,153
≥ 9	755	9,354	0	-	$107	$ 288,219	$22.16	$ 120,249	$ 219	$ 1,422	$ 597	$ 3,876
Total	7,327	36,411		0		$ 2,797,061		$ 1,166,977		$ 13,797		$ 37,611

			Recordkeeping							Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Maintain Maintenance Log (hours/sample set)	Report Monitoring Results (hours/sample set)	Report Water System Inventory/Changes (hours/air carrier)	Report Water System Inventory/Changes Burden (hours/year)	Labor Cost ($/hour)	Recordkeeping and Reporting Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	W	X	Y	Z	AA	AB=((W+X)*(D/2+G/3+H+I/2))+Z	AC=AB*AA	AD=K+M+AB	AE=L+P+R+T+AC	AF=V
1	381	381	0.25	0.25	1.00	3.28	$34.27	680	$ 23,303	2,049	$ 277,070	$ 1,956
2	2,080	4,160	0.25	0.25	1.00	17.88	$34.27	3,712	$ 127,217	11,186	$ 1,512,615	$ 10,677
3	756	2,268	0.25	0.25	1.00	6.50	$34.27	1,349	$ 46,238	4,066	$ 549,777	$ 3,881
4	421	1,684	0.25	0.25	1.00	3.62	$34.27	751	$ 25,749	2,264	$ 306,159	$ 2,161
5	956	4,780	0.25	0.25	1.00	8.22	$34.27	1,706	$ 58,471	5,141	$ 695,221	$ 4,907
6	871	5,226	0.25	0.25	1.00	7.49	$34.27	1,554	$ 53,272	4,684	$ 633,407	$ 4,471
7	298	2,086	0.25	0.25	1.00	2.56	$34.27	532	$ 18,226	1,603	$ 216,711	$ 1,530
8	809	6,472	0.25	0.25	1.00	6.96	$34.27	1,444	$ 49,480	4,351	$ 588,320	$ 4,153
≥ 9	755	9,354	0.25	0.25	1.00	6.49	$34.27	1,347	$ 46,177	4,060	$ 549,050	$ 3,876
Total	7,327	36,411				63			$ 448,133	39,403	$ 5,328,330	$ 37,611

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) One galley and one lavatory TC sample collected per aircraft. Assume 30% of aircraft will sample annually, 30% of aircraft will sample twice annually, 30% of aircraft will sample quarterly, and 10% of aircraft will sample monthly.

(E) Assume 3.6% of coliform samples will be TC+ based on AOC data.

(F) Assume 0% of aircraft performing annual routine coliform monitoring, 0% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 46% of aircraft performing monthly routine coliform monitoring with initial TC+ sample will perform repeat sampling. Assume 5.7% of aircraft performing repeat sampling will have at least one additional TC+ sample (based on AOC data).

(G) Assume 0% of aircraft performing annual routine coliform monitoring, 0% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 46% of aircraft performing monthly routine coliform monitoring with TC+ will collect three repeat samples within 24 hours of notification of TC+ as an option to immediate corrective action. Assume aircraft with less than three sampling points collect a total of 300mL of samples from all available sampling points.

(H) Additional routine coliform monitoring not specified, assumed no additional routine coliform monitoring samples collected.

(I) Assume 100% of aircraft performing annual routine coliform monitoring, 100% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 54% of aircraft performing monthly routine coliform monitoring will collect 2 follow-up samples per aircraft that undergoes corrective action flushing and disinfecting.

(J) Assume 0.5 hour for sample collection and for process, storage, and shipping of sample. (Sample set burden is 1 hour for (2) routine samples, 1.5 hours for (3) repeat samples, and 1 hour for (2) corrective action follow-up samples.)

(M) Assume all analysis conducted by outside lab.

(O) Estimated courier fees based on costs from various courier services in major cities. Assumed courier services required for each sample set. (Sample set consists of 2 routine samples, 3 repeat samples, and 2 corrective action follow-up samples.) Assumed airport distance of 20-30 miles from lab. Assumed courier would return cooler to air carrier. 100% of shipping costs incurred by TC monitoring.

(Q) Average coliform analysis costs based on costs from various labs across the country. Assume all analysis conducted by outside lab.

(S) Assume air carriers will replace coolers, gel packs, and thermometers once a year. 100% of the unit equipment cost is incurred by total coliform monitoring.

(T) Coolers, gel packs, and thermometers are purchased by air carriers. The costs for this equipment are assumed to be distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(U) Assume each aircraft will purchase three new refrigerators. 100% of the refrigerator cost is incurred by total coliform monitoring.

(V) Refrigerators are purchased by air carriers. Assume costs for 63 airlines are distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(W), (X), (Y) Based on EPA estimate.

(Y) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule and update that inventory annually. The initial submission of inventory information is assumed to be submitted as part of the sampling plan. This burden reflects only the annual inventory updates.

(Z) Assume burden for 63 airlines is distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(AA) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(AB) Columns W and X applied on a sample set basis. Assume a sample set consists of (2) routine samples, (3) repeat samples, and (2) corrective action follow-up samples.

5.4.4.2 Agency

Agency costs for the final ADWR coliform monitoring requirements are assumed to be solely administrative. The Agency would incur costs to review aircraft monitoring results. EPA assumes the Agency will require 0.5 hours to review each aircraft's coliform-positive monitoring results. The Agency will review aircraft coliform monitoring results beginning in year 3 of the 25-year compliance period, as they are received electronically from air carriers.

The Agency will need to review all fleet inventory information submitted by air carriers, which will include new inventory data and changes to the fleets. Air carriers must report their water system inventory within 18 months of promulgation of the final rule and update that inventory annually. The initial submission of inventory information is assumed to be reviewed as part of the sampling plan. EPA assumes the Agency will require 0.5 hours to review each air carrier's annual inventory updates. Exhibit 5.14 presents Agency burden and costs for coliform monitoring.

Exhibit 5.14 Agency Burden and Cost Estimates for Coliform Monitoring

	TC Samples				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/TC+ sample or air carrier)	Unit Cost ($/TC+ sample or air carrier)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	870	$ 43,648
Review Aircraft Water System Inventory Changes	$50.14	0.5	$ 25	32	$ 790
Total		**1.0**	**$ 50**	**902**	**$ 44,437**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden for reviewing monitoring results = unit labor burden * total number of TC+ samples (Exhibit 5.13). Total labor burden for reviewing inventory = unit labor burden * 63 air carriers.

(E) Total cost for reviewing monitoring results = unit cost * total number of TC+ samples (Exhibit 5.13). Total cost for reviewing inventory = unit cost * total burden for reviewing inventory.

(F) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule and update that inventory annually. The initial submission of inventory information is assumed to be reviewed as part of the sampling plan. This burden reflects only review of the annual inventory updates.

5.4.4.3 Annualized Costs for Coliform Monitoring

Annualized cost estimates for air carriers and the Agency to perform coliform monitoring and review results for the final rule are presented in Exhibit 5.15.

Exhibit 5.15 Air Carrier and Agency Cost Estimates for Coliform Monitoring ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Coliform Monitoring	$ 4.89	$ 0.04	$ 4.93	$ 4.82	$ 0.04	$ 4.86
Total	**$ 4.89**	**$ 0.04**	**$ 4.93**	**$ 4.82**	**$ 0.04**	**$ 4.86**

5.4.5 Routine Disinfection and Flushing

5.4.5.1 Air Carrier

Under the final rule, all air carriers subject to the ADWR are required to perform routine disinfection and flushing of their aircraft. EPA is providing air carriers with significant flexibility by allowing air carriers to choose their routine disinfection and flushing frequency if there are no manufacturer's recommendations. Based on manufacturer's guidelines, air carriers perform disinfection and flushing either quarterly, thrice annually, twice annually, or annually, which will determine their coliform monitoring frequencies. When the frequency is not defined by the water system manufacturer, air carriers will select the frequency they prefer. Section 5.4.4 provided a detailed discussion of coliform monitoring. For modeling purposes, EPA assumed 30 percent of air carriers will perform disinfection and flushing quarterly, 30 percent thrice annually, 30 percent twice annually, and 10 percent annually (column D, Exhibit 5.16).

Based on observation of aircraft disinfection and flushing practices, EPA assumes 5 hours per aircraft for routine disinfection and flushing (column F, Exhibit 5.16). Unit chemical costs are assumed to be approximately $1.00 per application. EPA assumes air carriers currently perform at least periodic disinfection and flushing of the aircraft water systems as part of their maintenance programs; therefore, equipment costs have not been included in the estimated costs of the ADWR.

Recordkeeping and Reporting

Under the final rule, air carriers are required to record routine disinfection activities. EPA assumes air carriers will require 15 minutes for this recordkeeping activity per aircraft.

Exhibit 5.16 Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing

			Routine Disinfection and Flushing							
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Disinfection and Flushing (aircraft/year)	Self-Certification (aircraft/year)	Routine Disinfection and Flushing Labor Burden (hours/aircraft)	Self Certification Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Self-Certification Cost ($/hour)	Unit Chemical Costs ($/application)	Total Routine Disinfection and Flushing Costs ($/year)
A	B	C=B*A	D	E	F	G	H	I	J	K=(D*F*H)+(D*J)
1	381	381	1,067	0	5	0.5	$20.19	$65.42	$ 1	$108,855
2	2,080	4,160	5,824	0	5	0.5	$20.19	$65.42	$ 1	$594,276
3	756	2,268	2,117	0	5	0.5	$20.19	$65.42	$ 1	$215,997
4	421	1,684	1,179	0	5	0.5	$20.19	$65.42	$ 1	$120,284
5	956	4,780	2,677	0	5	0.5	$20.19	$65.42	$ 1	$273,139
6	871	5,226	2,439	0	5	0.5	$20.19	$65.42	$ 1	$248,853
7	298	2,086	834	0	5	0.5	$20.19	$65.42	$ 1	$85,142
8	809	6,472	2,265	0	5	0.5	$20.19	$65.42	$ 1	$231,139
≥ 9	755	9,354	2,114	0	5	0.5	$20.19	$65.42	$ 1	$215,711
Total	**7,327**	**36,411**	**20,516**	**0**						**$2,093,396**

			Recordkeeping					Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Total Cost for Self Certification ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Routine Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	L=E*G*I	M	N=D*M	O	P=N*O	Q=(D*F)+(E*G) + N	R=K+L+P	S
1	381	381	$ -	0.25	267	$34.27	$ 9,141	5,601	$ 117,996	
2	2,080	4,160	$ -	0.25	1,456	$34.27	$ 49,903	30,576	$ 644,180	
3	756	2,268	$ -	0.25	529	$34.27	$ 18,138	11,113	$ 234,135	
4	421	1,684	$ -	0.25	295	$34.27	$ 10,101	6,189	$ 130,384	
5	956	4,780	$ -	0.25	669	$34.27	$ 22,936	14,053	$ 296,075	
6	871	5,226	$ -	0.25	610	$34.27	$ 20,897	12,804	$ 269,750	
7	298	2,086	$ -	0.25	209	$34.27	$ 7,150	4,381	$ 92,291	
8	809	6,472	$ -	0.25	566	$34.27	$ 19,409	11,892	$ 250,549	
≥ 9	755	9,354	$ -	0.25	529	$34.27	$ 18,114	11,099	$ 233,825	
Total	**7,327**	**36,411**	**$0**				**$ 175,789**	**107,707**	**$ 2,269,185**	**$ -**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Assume 30% of aircraft will perform routine disinfection and flushing quarterly, 30% of aircraft will perform routine disinfection and flushing thrice annually, 30% of aircraft will perform routine disinfection and flushing twice annually, and 10% of aircraft will perform routine disinfection and flushing annually.

(E) Self-certification submittal not required under Alternative 4 (Final Rule).

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Labor hours for self-certification reflects EPA estimate.

(H) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(I) Based on costs for transportation, storage, and distribution managers from Exhibit 5.1.

(J) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(M) Based on EPA estimate.

(O) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

5.4.5.2 Agency

Under the final rule, the Agency is not required to assist air carriers with or perform routine disinfection or flushing. Additionally, air carriers are not required to submit their records to the Agency; the Agency may review these records during a compliance audit. Therefore, the Agency will not incur costs for routine disinfection and flushing.

5.4.5.3 Annualized Costs for Routine Disinfection and Flushing

Annualized cost estimates for air carriers and the Agency to perform routine disinfection and flushing for the final rule are presented in Exhibit 5.17.

Exhibit 5.17 Air Carrier and Agency Cost Estimates for Routine Disinfection and Flushing ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Routine Disinfection and Flushing	$ 2.08	$ -	$ 2.08	$ 2.05	$ -	$ 2.05
Total	**$ 2.08**	**$ -**	**$ 2.08**	**$ 2.05**	**$ -**	**$ 2.05**

5.4.6 Disinfection and Flushing as Corrective Action

5.4.6.1 Air Carrier

Under the final rule, EPA assumes that 100 percent of aircraft performing annual and twice annual coliform monitoring, 50 percent of aircraft performing quarterly coliform monitoring, and 54 percent of aircraft performing monthly coliform monitoring will perform corrective action disinfection and flushing after a positive routine total coliform sample. As described in Section 5.4.4, EPA assumes the remainder of aircraft with a total coliform-positive routine sample will collect three repeat samples within 24 hours of notification of the total coliform-positive routine sample result (column G, Exhibit 5.13). EPA assumes 5.7 percent of aircraft performing repeat sampling will have at least one additional positive total coliform sample and will perform corrective action.

EPA assumes that the corrective action disinfection and flushing procedure will be conducted during routine disinfection and flushing events whenever possible, and therefore, would not incur separate costs for corrective action disinfection and flushing events other than the cost of collection, shipping, and analysis of two follow-up coliform samples required as part of corrective action.

As a costing assumption, EPA assumes that of the aircraft with a positive routine coliform sample, 0 percent of the aircraft performing annual, twice annual, and quarterly monitoring, and 46 percent of aircraft performing monthly monitoring will not coordinate routine and corrective action disinfection and flushing and will incur the full cost for corrective action

disinfection and flushing. The estimated number of unique corrective action disinfection and flushing events are shown in column D, Exhibit 5.18.

The estimated number of aircraft performing corrective action disinfection and flushing is based on the assumption that during routine coliform monitoring no more than one of the two samples would be total coliform-positive per aircraft. This assumption potentially overestimates the number of aircraft that need to undergo disinfection and flushing as corrective action in cases where both routine samples are total coliform-positive for an aircraft (*i.e.*, an aircraft with positive samples from both routine monitoring sampling points is treated as two corrective actions in the cost model when only one disinfection and flushing event will be necessary in such a case).

Based on observation of aircraft disinfection and flushing practices, EPA assumes 5 hours per aircraft for corrective action disinfection and flushing (column F, Exhibit 5.18). Unit chemical costs are assumed to be approximately $1.00 per application. As noted for routine disinfection and flushing procedures, equipment costs are not included as they are assumed to be used for existing aircraft maintenance procedures.

Exhibit 5.18 Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing

			Corrective Action Disinfection and Flushing					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unique Corrective Action Disinfection and Flushing (aircraft/year)	Repeat Disinfection and Flushing (aircraft/year)	Corrective Action Disinfection and Flushing Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Chemical Costs ($/application)	Total Corrective Action Disinfection and Flushing Costs ($/year)
A	B	C=B*A	D	E	F	G	H	I=((D+E)*(F*G))+(D+E)*H)
1	381	381	21	0	5	$20.19	$ 1	$2,097
2	2,080	4,160	112	0	5	$20.19	$ 1	$11,446
3	756	2,268	41	0	5	$20.19	$ 1	$4,160
4	421	1,684	23	0	5	$20.19	$ 1	$2,317
5	956	4,780	52	0	5	$20.19	$ 1	$5,261
6	871	5,226	47	0	5	$20.19	$ 1	$4,793
7	298	2,086	16	0	5	$20.19	$ 1	$1,640
8	809	6,472	44	0	5	$20.19	$ 1	$4,452
≥ 9	755	9,354	41	0	5	$20.19	$ 1	$4,155
Total	**7,327**	**36,411**	**395**	**0**				**$40,318**

			Recordkeeping				Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Corrective Action Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	J	K	L	M=K*L	N=((D+E)*F)+K	O=I+M	P
1	381	381	0.25	16	$34.27	$ 551	119	$ 2,648	
2	2,080	4,160	0.25	88	$34.27	$ 3,009	649	$ 14,455	
3	756	2,268	0.25	32	$34.27	$ 1,094	236	$ 5,254	
4	421	1,684	0.25	18	$34.27	$ 609	131	$ 2,926	
5	956	4,780	0.25	40	$34.27	$ 1,383	298	$ 6,644	
6	871	5,226	0.25	37	$34.27	$ 1,260	272	$ 6,053	
7	298	2,086	0.25	13	$34.27	$ 431	93	$ 2,071	
8	809	6,472	0.25	34	$34.27	$ 1,170	252	$ 5,622	
≥ 9	755	9,354	0.25	32	$34.27	$ 1,092	235	$ 5,247	
Total	**7,327**	**36,411**				**$ 10,600**	**2,285**	**$ 50,918**	**$ -**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Assume 100% of aircraft performing annual routine coliform monitoring, 100% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 54% of aircraft performing monthly routine coliform monitoring will perform corrective action disinfection and flushing after a positive routine total coliform sample. Assume the remainder of aircraft with a TC+ sample will perform repeat sampling. Assume 5.7% of aircraft performing repeat sampling will have at least one additional TC+ sample and will perform corrective action. Additionally, of the aircraft with routine coliform monitoring coliform TC+ samples, assume 0% of the 100% of aircraft performing annual routine coliform monitoring coliform, 0% of the 100% of aircraft performing twice annual routine coliform monitoring, 0% of the 50% of aircraft performing quarterly routine coliform monitoring, and 46% of aircraft performing monthly routine coliform monitoring will incur costs for corrective action disinfection and flushing. Remainder of aircraft performing corrective action disinfection and flushing assumed to coordinate schedule with routine disinfection and flushing schedule, and therefore do not incur separate costs for corrective action disinfection and flushing. Assume entire aircraft flushed if either lavatory or galley has a positive total coliform sample. Assume no more than one TC+ per aircraft.

(E) Assumes first flushing/disinfecting is successful.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(H) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(J) Based on EPA estimate.

(K), (M) Recordkeeping burden and costs based on total number of corrective action disinfection and flushing events + repeat disinfection and flushing events. Total number of corrective action disinfection and flushing events derived from Exhibit 5.13, column I.

(L) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Recordkeeping and Reporting

Under the final rule, air carriers are required to maintain a maintenance log for corrective action disinfection activities. EPA assumes air carriers will require 15 minutes for this recordkeeping activity per event per aircraft.

5.4.6.2 Agency

Under the final rule, the Agency is not required to assist air carriers with or perform corrective action disinfection or flushing. Additionally, air carriers are not required to submit their maintenance logs to the Agency. Therefore, the Agency will not incur costs for corrective action disinfection and flushing but may include review of theses records during compliance audits.

5.4.6.3 Annualized Costs for Corrective Action Disinfection and Flushing

Annualized cost estimates for air carriers and the Agency to perform disinfection and flushing as corrective action for the final rule are presented in Exhibit 5.19.

Exhibit 5.19 Air Carrier and Agency Cost Estimates for Corrective Action Disinfection and Flushing ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Total	**$ 0.05**	**$ -**	**$ 0.05**	**$ 0.05**	**$ -**	**$ 0.05**

5.4.7 Self-Inspection and Compliance Audit

5.4.7.1 Air Carrier

Under the final rule, all air carriers subject to the ADWR will undergo compliance audits at the Agency's discretion, which is assumed to be once every five years, beginning in year 3 of the 25-year compliance period. Compliance audits will involve a detailed review of each air carrier's aircraft records, including their O&M plan. EPA expects that air carriers will incur a recordkeeping and reporting burden while assisting Agency staff with conducting compliance audits and in reporting that self-inspections were completed. EPA assumes that each air carrier will require 24 hours to satisfy recordkeeping and reporting requirements under the compliance audit and self-inspection rule provision (column E, Exhibit 5.20).

EPA anticipates that the labor burden for self-inspections is already captured under FAA requirements and, therefore, is not included in the cost estimate for self-inspections. EPA assumes that air carriers already conduct major maintenance checks, which include components

of self-inspections, every five years for each aircraft. Therefore, with the exception of reporting and recordkeeping burden, no additional costs for self-inspections are incurred by air carriers under the ADWR (see Exhibit 5.20). The cost model assumes that 20 percent of the air carrier labor cost is incurred each year, beginning in year 3 of the 25-year compliance period.

Exhibit 5.20 Air Carrier Burden and Cost Estimates for Compliance Audit and Self-Inspection

		Reporting and Recordkeeping Costs Associated with Compliance Audit of Aircraft PWS			Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unit Labor Cost ($/hour)	Unit labor burden (hours/air carrier)	Total Labor Burden (hours/audit cycle)	Total O&M Cost ($/audit cycle)	Total Capital Cost ($)
A	B	C=B*A	D	E	F	G=D*F	H
1	381	381	$42.86	24.0	78.62	$ 3,370	$ -
2	2,080	4,160	$42.86	24.0	429.23	$ 18,396	$ -
3	756	2,268	$42.86	24.0	156.01	$ 6,686	$ -
4	421	1,684	$42.86	24.0	86.88	$ 3,723	$ -
5	956	4,780	$42.86	24.0	197.28	$ 8,455	$ -
6	871	5,226	$42.86	24.0	179.74	$ 7,703	$ -
7	298	2,086	$42.86	24.0	61.50	$ 2,636	$ -
8	809	6,472	$42.86	24.0	166.95	$ 7,155	$ -
≥ 9	755	9,354	$42.86	24.0	155.80	$ 6,677	$ -
Total	**7,327**	**36,411**			**1,512**	**$ 64,801**	**$ -**

Sources:

(D) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(E) Labor burden reflects EPA estimate for reporting and recordkeeping only. EPA assumes that air carriers already conduct major maintenance checks, which include sanitary survey components, every 5 years for each aircraft. Therefore, with the exception of reporting and recordkeeping burden, no additional costs for sanitary surveys are incurred by air carriers under the ADWR.

(F), (G) All aircraft undergo compliance audits once in 5 years. The Agency will review electronic data for all aircraft at the air carrier office site. Fractional costs incurred by aircraft (assuming even distribution across aircraft of all sizes) are represented in the exhibt for presentation and calculation purposes only.

5.4.7.2 Agency

Under the final rule, the Agency or designated agents of the Agency will perform compliance audits of air carriers. For purposes of this analysis, it is estimated that the Agency will conduct compliance audits at least every five years for each air carrier, beginning in year 3 of the 25-year compliance period. EPA assumes that an Agency will require 16 hours to conduct a compliance audit for each air carrier, regardless of fleet size or aircraft type (column B, Exhibit 5.21). Labor hours for conducting the audit include on-site and Agency recordkeeping efforts. The cost model assumes that 20 percent of the Agency labor cost in column E of Exhibit 5.21 is incurred each year, beginning in year 3 of the 25-year compliance period.

Exhibit 5.21 Agency Burden and Cost Estimates for Compliance Audit

Compliance Activity	Labor Cost ($/hour)	Unit Labor Burden (hours/air carrier)	Unit Cost ($/air carrier)	Total Labor Burden (hours/audit cycle)	Total Labor Cost ($/audit cycle)
	A	B	C=A*B	D=B*63	E=C*63
Conducting Compliance Audit of Aircraft PWSs	$50.14	16	$ 802	1,008	$ 50,545
Total		**16**	**$ 802**	**1,008**	**$ 50,545**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for conducting compliance audits reflect EPA estimate.

(D), (E) Total burden and O&M costs for conducting compliance audits for 63 U.S. air carriers subject to ADWR. All aircraft undergo compliance audits once in 5 years.

5.4.7.3 Annualized Costs for Compliance Audit

Annualized cost estimates for air carriers and the Agency to perform compliance audits for the final rule are presented in Exhibit 5.22.

Exhibit 5.22 Air Carrier and Agency Cost Estimates for Compliance Audit ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Compliance Audit	$ 0.01	$ 0.01	$ 0.02	$ 0.01	$ 0.01	$ 0.02
Total	**$ 0.01**	**$ 0.01**	**$ 0.02**	**$ 0.01**	**$ 0.01**	**$ 0.02**

5.5 Estimated Costs to Air Carrier Passengers

EPA assumes that air carriers will pass on some or all of the costs of a new regulation to their passengers in the form of ticket price increases. EPA estimates that 708.4 million passengers travel each year on aircraft that are affected by the ADWR (column E, Exhibit 5.3). Exhibit 5.24 in Section 5.7 estimates air carriers' total annualized cost of the ADWR to be $7.04 million using a 3 percent discount rate, and $6.95 million using a 7 percent discount rate. The cost passed on to passengers can be roughly estimated by dividing the air carriers' annualized costs incurred by the number of passengers traveling each year. Based on this approximation, EPA estimates that passengers could face a relatively negligible increase of one cent per ticket.

5.6 Non-quantified Costs and Uncertainties in Cost Estimates

5.6.1 Non-quantified Costs

Although EPA has estimated the majority of costs of the final ADWR, there are some costs that the Agency was not able to quantify, such as:

- Air carrier costs due to unanticipated flight interruptions from aircraft water system corrective action maintenance needs. This includes the direct costs related to transporting an aircraft to a maintenance facility for the performance of disinfection and flushing corrective action events and any indirect costs of schedule disruptions or delays if an aircraft must be unexpectedly taken out of service.

- Passenger costs due to flight cancellations or delays related to unanticipated aircraft water system maintenance triggered solely by water quality issues.

- Air carrier costs to provide bottled water and any antiseptic hand gels or wipes due to lack of onboard tap water during an acute coliform violation.

- Air carrier customer service response to customer concerns following public notification that the water onboard an aircraft is not to be used for human consumption.

EPA has attempted to minimize costs by building flexibility into the ADWR, including various alternatives from which air carriers select compliance scenarios that best meet their flight schedules and other routine aircraft operations and maintenance needs. The final rule also includes provisions that minimize situations in which an aircraft is taken out of service solely due to drinking water system water quality issues, but which are necessary to protect consumers from water of unacceptable quality when the system cannot be physically shut-off or the flow through the taps cannot be prevented.

Exhibit 5.23 presents the number of monitoring and disinfection and flushing events per year for all of the alternatives considered during rule development and the final ADWR. EPA assumes coliform monitoring and routine disinfection and flushing of the water system would not disrupt service because the air carrier would incorporate these tasks into the aircraft operations and maintenance program. Only the unanticipated corrective action disinfection and flushing events shown in Column E of the exhibit reflect the events that the Agency anticipates could result in disruption to air carrier schedules for all regulatory alternatives. Alternative 1 does not have such events because the current regulations to not specify a corrective action for contaminated water systems, although it is anticipated some action is taken by the air carrier to correct the problem.

Exhibit 5.23 Summary of Monitoring and Disinfection and Flushing Events for All Alternatives

Rule Alternative	Monitoring			Disinfection and Flushing		
	Routing Monitoring Coliform Sampling Events/year	Disinfectant Residual Monitoring Sampling Events/year	Total number of sampling events/year	Routine Disinfection and Flushing Events/year	Corrective Action Disinfection and Flushing Events/year	Total number of disinfection and flushing events/year
	A	B	C=A+B	D	E	F=D+E
Alt 1	87,924	87,924	175,848	-	-	-
Alt 2	7,708	7,708	15,416	29,308	528	29,836
Alt 3	14,654	-	14,654	29,308	528	29,836
Alt 4 (Final Rule)	25,436	-	25,436	20,516	395	20,911

(E) The number of potential unanticipated corrective action disinfection and flushing events is shown for the Alternatives, all other disinfection and flushing events, whether based on a routine schedule or in response to monitoring results, would occur during scheduled water system operations and maintenance.

Of the corrective action disinfection and flushing events noted in Column E, an unknown percentage will not disrupt service because the aircraft will either prevent public access to the water by shutting-off the system or preventing water flow through the taps, thereby obtaining more flexibility with the corrective action disinfection and flushing schedule, or will perform the action within the maximum time frame specified by the rule. In addition, of the alternatives that would require disinfection and flushing, Alternative 4 (the final rule) has the least number of estimated unanticipated disruption events (an estimated maximum of 395 corrective action disinfection and flushing events/year).

EPA does not have sufficient data to quantify the disruption to air carriers; however, EPA believes that the disruption cost per event would be lower for the final rule compared to Alternatives 1-3 due to the significant flexibility offered to air carriers in choosing monitoring frequencies under the final rule. EPA assumes that the increased flexibility of the final rule will allow air carriers to schedule routine monitoring and disinfection and flushing to coincide with existing routine maintenance checks. This will in turn decrease potential disruption to air carrier flight schedules and thus decrease air carrier burden and cost for complying with ADWR monitoring and disinfection and flushing requirements. Therefore, if disruption costs were included in the quantified costs of the rule, the costs for the final rule would likely decrease with respect to other alternatives.

5.6.2 Uncertainties in Cost Estimates

Many factors contribute to uncertainty in the national cost estimates including:

- Percent of aircraft that will be subject to each total coliform monitoring option.
- Expected results from total coliform monitoring.
- Estimated time for air carrier management to read, understand, and decide how to best comply with the ADWR; and to develop a training program, train staff, and oversee compliance.
- Percent of aircraft that will collect routine total coliform samples while aircraft are out of service for routine maintenance.
- Labor burden necessary for self-inspections above what is necessary for FAA-related inspections.
- Labor burden and costs associated with correcting significant deficiencies that are identified during self-inspections above what is necessary for FAA-related inspections.

For simplicity, EPA assumed for this analysis that all air carriers subject to the final rule will spend equal management time on ADWR requirements, regardless of fleet size or aircraft type. Assuming equal burden for all air carriers to comply with these rule management and oversight requirements could result in an over- or under-estimate of the costs presented. Regarding the expected results for coliform monitoring, EPA assumed that during routine coliform monitoring, each total coliform-positive sample would prompt an action by the air carrier. This assumption potentially over-estimates the number of aircraft that need to undergo disinfection and flushing as corrective action or repeat monitoring in cases where more than one routine sample is total coliform-positive in a given monitoring period. For example, an aircraft with positive samples from both routine sampling points is treated as two corrective actions or repeat sample collection events in the cost model when only one disinfection and flushing event would be necessary in such a case. Also, the number of sample results that prompt corrective action or repeat sampling may decrease over time as air carriers correct problems that lead to total coliform-positive samples.

In developing costs for air carriers to comply with the self-inspection requirements, EPA assumed that with the exception of reporting and record-keeping burden, no additional costs for self-inspections are incurred by air carriers. Labor burden for self-inspections, which involves a thorough review and inspection of an aircraft water system as well as addressing any deficiencies, is already captured under current FAA requirements and therefore is not included in the cost estimate for this rule. Additionally, EPA has assumed that deficiencies noted during self-inspections will be addressed during routine maintenance, and so has not accounted for costs associated with corrective actions stemming from deficiencies noted during self-inspections. This assumption potentially under-estimates air carrier burden for self-inspections.

5.7 Total Annualized Implementation and Incremental Costs for the Final ADWR

Exhibit 5.24 presents the itemized and total annualized implementation costs to air carriers and the Agency for the final ADWR at 3 and 7 percent discount rates. Note that portions of Exhibit 5.24 have been presented in sections throughout this chapter, but are being repeated here for convenience.

Exhibit 5.24 Total Annualized Present Value Implementation Costs for the Final ADWR ($Millions, 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Sampling Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.003
O&M Plan	$ 0.01	$ 0.0001	$ 0.01	$ 0.02	$ 0.0001	$ 0.02
Coliform Monitoring	$ 4.89	$ 0.04	$ 4.93	$ 4.82	$ 0.04	$ 4.86
Routine Disinfection and Flushing	$ 2.08	$ -	$ 2.08	$ 2.05	$ -	$ 2.05
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Compliance Audit	$ 0.01	$ 0.01	$ 0.02	$ 0.01	$ 0.01	$ 0.02
Total	**$ 7.04**	**$ 0.30**	**$ 7.34**	**$ 6.95**	**$ 0.30**	**$ 7.25**

Exhibit 5.25 presents the annualized incremental costs for the final rule at 3 and 7 percent discount rates. The incremental costs represent the difference in total costs between the baseline (i.e., the existing NPDWRs) and the final rule provisions. EPA notes that the cost of the proposed ADWR was significantly less than the current regulatory requirements of the NPDWRs. The current NPDWR requirements, considered to be the baseline against which to compare the set of regulatory requirements of the final ADWR, would continue to apply to the aircraft water system industry if the requirements of the ADWR were not promulgated. The reduction in cost (i.e., the incremental savings of the ADWR compared to the regulatory

baseline) is the result of tailoring the current regulations for transient non-community public water systems to the specific operational characteristics of aircraft drinking water systems.

EPA estimates that the total annualized incremental savings of this ADWR is $22.15 million at a 3 percent discount rate and $21.83 million at a 7 percent discount rate, as presented in Exhibit 5.25. The incremental savings represent the difference in total annualized implementation costs between the baseline (i.e., the existing NPDWRs) and the final rule provisions.

Exhibit 5.25 Total Annualized Incremental Cost: Existing NPDWRs and the ADWR ($Millions, 2008$)

	Alt 1 (Existing NPDWRs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4 - Alt 1)	Alt 1 (Existing NPDWRs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4 - Alt 1)
	3%			7%		
Implementation	0.01	0.01	0	0.02	0.02	0
Annual Administration	0.24	0.24	0	0.23	0.23	0
Monitoring Plan	0.002	0.002	0	0.004	0.003	(0.001)
O&M Plan	-	0.01	0.01	-	0.02	0.02
Coliform Monitoring	25.37	4.93	(20.44)	25.02	4.86	(20.16)
Disinfectant Residual Monitoring	3.17	-	(3.17)	3.13	-	(3.13)
Routine Disinfection and Flushing	-	2.08	2.08	-	2.05	2.05
Corrective Action Disinfection and Flushing	-	0.05	0.05	-	0.05	0.05
Sanitary Survey/Compliance Audit	0.7	0.02	(0.68)	0.69	0.02	(0.67)
Turbidity Monitoring	-	-	-	-	-	-
Total	$29.49	$7.34	$(22.15)	$29.08	$7.25	$(21.83)

The regulatory baseline does not reflect the AOCs, which are interim enforcement actions applying to 45 air carriers. As discussed earlier in this document, in 2004, EPA found all aircraft that were public water systems to be out of compliance with the NPDWRs. EPA subsequently placed 45 air carriers under Administrative Orders on Consent (AOCs) that will remain in effect until the tailored aircraft drinking water regulations are final. The air carrier AOCs combine sampling, best management practices, corrective action, public notification, and reporting and recordkeeping to ensure public health protection. With respect to sampling under the AOCs, air carriers with greater than 20 aircraft were required to sample 25 percent of their fleet quarterly, while air carriers with 20 or fewer aircraft were required to sample the entire fleet quarterly. Because the majority of the air carriers are currently subject to the requirements of the AOCs, EPA notes that if the AOCs were considered to be an alternative baseline, the incremental cost of the final ADWR would be $0.18 million at the 3 percent discount rate and $0.18 million at the 7 percent discount rate, Exhibit 5.26.

Exhibit 5.26 Total Annualized Incremental Cost: Requirements Similar to AOCs and the ADWR ($Millions, 2008$)

	Alt 2 (AOCs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4-Alt 2)	Alt 2 (AOCs)	Alt 4 (Final Rule)	Incremental Cost (Alt 4-Alt 2)
	3%			7%		
Implementation	0.01	0.01	0	0.02	0.02	0
Annual Administration	0.24	0.24	0	0.23	0.23	0
Monitoring Plan	0.002	0.002	0	0.004	0.003	(0.001)
O&M Plan	-	0.01	0.01	-	0.02	0.02
Coliform Monitoring	1.67	4.93	3.26	1.65	4.86	3.21
Disinfectant Residual Monitoring	0.67	-	(0.67)	0.66	-	(0.66)
Routine Disinfection and Flushing	4.52	2.08	(2.44)	4.46	2.05	(2.41)
Corrective Action Disinfection and Flushing	0.05	0.05	0	0.05	0.05	0
Sanitary Survey/Compliance Audit	-	0.02	0.02	-	0.02	0.02
Turbidity Monitoring	-	-	-	-	-	-
Total	7.16	7.34	0.18	7.07	7.25	0.18

5.8 Comparison of Regulatory Alternatives

5.8.1 Comparison to the final ADWR

Exhibit 5.27 provides a summary of the annualized present value costs for implementing each regulatory alternative considered during the regulatory development process at 3 and 7 percent discount rates. EPA used the same process for developing cost estimates for all regulatory alternatives. Unit costs were multiplied by the number of air carriers or aircraft performing various components of each alternative, and results were summed for all components.

The $7.3 million implementation cost for the final rule (which includes both the costs to air carriers and EPA) lies between the least costly and most costly alternatives. The cost of the final rule is approximately one-fourth of the costs incurred by air carriers and the Agency under the baseline. As a result of tailoring NPDWRs to the specific operational characteristics of aircraft drinking water systems, the costs for the final rule are slightly higher than those under Alternative 2 – requirements similar to the AOCs; however EPA made several assumptions about the frequency of disinfection and flushing and monitoring in order to estimate the implementation costs. If all of the air carriers followed the quarterly disinfection and flushing frequency, as was required under the AOCs, the difference between the two alternatives would be negligible.

EPA believes the increased flexibility of the final rule will reduce non-quantified costs to the air carriers such as for unanticipated disinfection and flushing events, and will provide the maximum protection with the least disruption to air carriers, thus making it the least costly alternative.

Exhibit 5.27 Comparison of Total Annualized Present Value Implementation Costs by Regulatory Alternative ($Millions, 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4 (Final Rule)	Alt 1	Alt 2	Alt 3	Alt 4 (Final Rule)
	3%				7%			
Implementation	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Annual Administration	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23
Monitoring Plan	0.002	0.002	0.001	0.002	0.004	0.004	0.002	0.003
O&M Plan	-	-	0.01	0.01	-	-	0.01	0.02
Coliform Monitoring	25.37	1.67	2.23	4.93	25.02	1.65	2.20	4.86
Disinfectant Residual Monitoring	3.17	0.67	-	-	3.13	0.66	-	-
Routine Disinfection and Flushing	-	4.52	2.97	2.08	-	4.46	2.93	2.05
Corrective Action Disinfection and Flushing	-	0.05	0.05	0.05	-	0.05	0.05	0.05
Sanitary Survey/Compliance Audit	0.70	-	-	0.02	0.69	-	-	0.02
Turbidity Monitoring	-	-	12.92	-	-	-	12.74	-
Total	**29.49**	**7.16**	**18.43**	**7.34**	**29.08**	**7.07**	**18.19**	**7.25**

5.8.2 Comparison of the proposed ADWR and final ADWR

As discussed in Chapter 2 of this document, a collaborative rule development process was used for the proposed ADWR. This process provided an opportunity for stakeholders to inform the Agency about existing operations and maintenance practices for aircraft water systems and to convey concerns regarding existing regulations applicable to aircraft water systems, public health issues, fleet operations issues that are unique to the air carrier industry, and potential rule alternatives. Public comment was received on the proposed rule, and modifications have been incorporated into the final ADWR. This document presents a discussion of the final ADWR with comparison to the three alternatives considered when developing the ADWR. Some of the modifications to the proposed rule that are incorporated into the final rule affected the estimated cost of the regulation; other changes had no net effect on cost but may have affected non-quantified costs. This section provides a discussion of the cost of the elements of the final ADWR compared to the proposed rule, and summarizes the assumptions that have been incorporated into the cost estimates.

The total annualized present value costs at 3 percent and 7 percent discount rates for the rule provisions are shown in Exhibit 5.28 for the proposed and final rules. The costs reported for the final rule are from Exhibit 5.24; the costs for the proposed rule include adjustments for the general cost assumptions and methodology described in Section 5.2, with all costs adjusted to 2008 dollars.

As noted in Section 5.2.1, the labor rate for the technical labor category used for air carrier cost estimates decreased from that used for cost estimates for the proposed rule – this affected all cost estimates that apply a labor rate for air carrier technical staff. Because this decreased labor rate has been incorporated into the cost estimates for all of the alternatives and the final ADWR, as well as the proposed rule costs presented in Exhibit 5.28, it does not affect the comparison of the rule options and final rule. It is notable, however, to explain the approximately $25,000 decreased cost estimate presented for the proposed rule in this document

compared to the *Economic and Supporting Analysis Document for the Proposed ADWR* (USEPA, 2008a).

The final ADWR includes an extension of the compliance dates to 18 months after rule promulgation for the coliform sampling plan, operations and maintenance plans, and the aircraft inventory; the proposed rule specified a six-month timeframe for these requirements. In addition, the final rule adjusts the timeframe for beginning to conduct sampling and other compliance requirements to 24 months after final rule promulgation from 12 months specified in the proposed rule. These delays in compliance dates have a slight effect on the timing of the costs represented by the 25-year compliance period captured by these estimates.

The discussion below summarizes the other changes made for the final ADWR and the Agency's assumptions that affected the cost of those changes. Some of the final rule provisions and cost estimate parameters affected all, or nearly all, aspects of the cost estimates for the regulation.

Exhibit 5.28 Comparison of Proposed and Final ADWR Total Annualized Present Value Costs ($Millions, 2008$)

	Proposed ADWR *	Final ADWR	Proposed ADWR *	Final ADWR
	3%		7%	
Implementation	0.01	0.01	0.01	0.02
Annual Administration	0.25	0.24	0.25	0.23
Monitoring Plan	0.002	0.002	0.004	0.003
O&M Plan	0.01	0.01	0.02	0.02
Coliform Monitoring	5.50	4.93	5.57	4.86
Routine Disinfection and Flushing	2.21	2.08	2.23	2.05
Corrective Action Disinfection and Flushing	0.13	0.05	0.13	0.05
Compliance Audit	0.02	0.02	0.02	0.02
Total	**8.13**	**7.34**	**8.24**	**7.25**

* For the proposal, the total annualized present value cost at a 3% discount rate is less than at a 7% discount rate by a small amount. Changes in the implementation schedule (later implementation) for the final rule result in a larger calculated difference in present value costs, which results in total annualized present value costs slightly greater at a 3% discount rate than at a 7% rate.

Implementation

This category addresses air carrier one-time costs for reading and understanding the rule, becoming familiar with its provisions, and training employees on the rule. Based on public comment that air carriers would typically have more than one person responsible for this task, the final ADWR provides a burden allowance for each air carrier to read and understand the rule of 8 hours per carrier, increased from 2 hours per carrier in the proposed rule. The Agency assumes, on average, each air carrier will have four staff persons who will need to read and understand the rule at 2 hours estimated burden for each person. The 8 hours per air carrier for staff training is unchanged from the proposed rule.

The Agency burden estimates for implementation include reading and understanding the rule, program development, modifying existing database systems, and providing air carrier training and technical assistance and staff training. The estimate of Agency hourly burden for each item is unchanged from the proposed rule.

Annual Administration

The Annual Administration category addresses the Agency's rule implementation and enforcement activities that must occur on an ongoing basis; air carriers do not have costs in this category. Implementation activity estimates include ongoing technical assistance to air carriers and staff training events. The assumptions for this category are unchanged from the proposed rule.

Monitoring Plan

The air carrier coliform monitoring plan will include the selected monitoring frequency and the respective routine disinfection and flushing frequency. The estimated burden assumptions applied to the final rule are unchanged from the proposed rule, including the assumption that air carriers will prepare one plan to address the entire aircraft fleet.

Operations and Maintenance Plan

All air carriers subject to the ADWR will need to develop or update existing O&M plans and practices with ADWR-specific requirements and submit a statement to the Agency that the plan is completed. The air carrier operations and maintenance plans are reviewed by the Agency during compliance audits; Agency review of the statement submitted by the air carrier is captured in this category. No estimated burden assumptions or requirements have changed that affect this estimate.

Coliform Monitoring

The coliform monitoring category includes cost estimates for routine sampling and repeat sampling; follow-up coliform monitoring is captured under corrective action disinfection and flushing estimates. Each aircraft routine coliform monitoring schedule is determined by the routine disinfection and flushing frequency that should be based on manufacturer's recommendations. Several provisions in the final rule and their related assumptions affect the estimated cost for this category. Those provisions include addition of a fourth routine disinfection and flushing/coliform monitoring frequency option, reduction of the number of repeat samples to three in the final rule from four in the proposed rule, and allowing repeat sampling if more than one routine sample is total coliform-positive but *E. coli*-negative. The proposed rule limited the option of repeat sampling to situations when more than one routine sample was total coliform-positive. Assumptions pertaining to the amount of time it would take to implement each of the items, such as collecting a water sample or Agency oversight, are unchanged from the proposed rule.

The assumptions of the percentage of aircraft that would select each of the monitoring frequency options have been adjusted to incorporate the fourth option that is included in the final

rule. For the final rule, the Agency assumed 10 percent of the aircraft would select monthly monitoring with routine disinfection and flushing one time per year or less; 30 percent would select monitoring quarterly with routine disinfection and flushing twice per year; 30 percent would select monitoring twice per year with routine disinfection and flushing three times per year; and 30 percent would select annual monitoring with routine disinfection and flushing on a quarterly basis. The proposed rule assumed 10 percent of the aircraft would monitor monthly, 45 percent quarterly, and 45 percent annually.

The final ADWR utilized the coliform monitoring findings of the AOCs analyzed as of December 31, 2008, in the estimates of the percentage of routine and repeat samples that will be total coliform-positive and *E. coli*-positive. A discussion of the AOCs' data is found in Chapter 3 of this document. For the final rule, a routine sample total coliform-positive rate of 3.6 percent and a repeat sample total coliform-positive rate of 5.7 percent are assumed based on the AOCs results for data collected under EPA-approved air carrier QAPPs and CRMPs. The proposed rule applied a routine sample rate of 3.1 percent based on data available at the time, and a repeat sample rate of 50 percent.

The final ADWR estimates assume that whenever possible, an aircraft will perform routine coliform monitoring immediately prior to initiating routine disinfection and flushing procedures while the aircraft is out of service for the later. In such a case, if a routine coliform sample is total-coliform positive, the Agency assumes the air carrier will perform disinfection and flushing procedures and collect follow-up samples as a response to the sample results instead of opting for repeat sampling. As described below, the Agency assumes the disinfection and flushing event would count toward routine requirements and corrective action requirements as long as follow-up samples are collected. For example, an aircraft on quarterly routine disinfection and flushing is assumed to collect the required annual coliform sample during one of the periods the aircraft is out of service for the quarterly event. Of the routine coliform sample results that are assumed to occur when routine disinfection and flushing is not immediately available, the cost estimates assume 50 percent of the aircraft will perform repeat sampling in lieu of unscheduled disinfection and flushing with follow-up sampling. This assumption of the percentage of repeat sampling affects both the repeat sample and follow-up sample cost estimates; although the follow-up sample costs are included in the corrective action disinfection and flushing category (see Section 5.4.4.1 for details on these assumptions).

Routine Disinfection and Flushing

The addition of the fourth option for routine disinfection and flushing frequencies in the final rule adjusted the assumptions for the percentage of aircraft that would select each option. The new twice-yearly routine disinfection and flushing frequency was assigned to 30 percent of the aircraft, which decreased the number of aircraft assumed to select either thrice-annually or semi-annually disinfection and flushing from 45 percent under the proposed rule options.

Corrective Action Disinfection and Flushing

As described for coliform monitoring, assumptions pertaining to the number of corrective action disinfection and flushing events that would be incurred were recalculated based on whether the aircraft was anticipated to already be scheduled for immediate disinfection and

flushing. The Agency assumed, based on comments received during the public comment period for the proposed rule, that air carriers would seek to minimize the number of times unanticipated disinfection and flushing events would occur and would take advantage of the ability to perform this action as part of the routine disinfection and flushing activities. Also, the estimated reduction in the repeat sample coliform-positive rate to 5.7 percent in the final rule affected the anticipated costs for this category because fewer events were expected to be triggered by repeat sample results.

Compliance Audit and Self-Inspections

The final ADWR does not incorporate any changes regarding air carrier or Agency responsibilities or schedules for the self-inspection and compliance audit provisions over the proposed rule.

5.9 Comparison of Costs and Benefits

The qualitative analyses suggest that benefits are greater under the final rule than under the baseline requirements represented by Alternative 1. The final rule will likely deliver a level of desired benefits at a cost that is acceptable to the air carrier industry, which increases the likelihood that real benefits will accrue. Additionally, the final rule represents an approach that accomplishes the goals of the traditional drinking water rules, but is specifically tailored to this unique industry and setting. As a result, the final rule is expected to have a substantially lower cost than a less-tailored approach – only about one-fourth the cost of the Alternative 1 (the baseline).

EPA is limited by the purpose, quality, and quantity of data available in developing meaningful benefits analyses. In the absence of additional statistical analyses, only general observations of the data can be made, and only with adequate qualifiers. Any comparison of risk between the alternatives considered for the final rule requires robust data that would support: 1) direct comparisons of the overall baseline conditions with the overall conditions under each of the alternatives, or 2) comparisons of specific regulatory components (i.e., disinfection and flushing frequencies) that could be used to compare the baseline and all alternatives. See Chapter 3 for a more detailed description of baseline data.

5.10 Other Economic Measures

The lack of a quantitative risk assessment prevents the use of other economic measures, specifically, a break-even analysis and measure of cost-effectiveness based on the value of changes in health conditions.

6. Statutory and Administrative Requirements

6. 1 Introduction

As part of the rulemaking process, EPA is required to address the direct and indirect burdens that the ADWR may place on certain types of businesses and populations. This chapter presents the analyses performed by EPA in accordance with the following 12 Federal mandates:

1) Executive Order 12866: Regulatory Planning and Review

2) The Regulatory Flexibility Act

3) Analysis of small air carrier affordability to determine variance technologies in accordance with Section 1415(e)(1) of the 1996 SDWA Amendments

4) Feasible technologies available to all air carriers as required by Section 1412(b)(4)(E) of the 1996 SDWA Amendments

5) Technical, financial, and managerial capacity assessment as required by Section 1420(d)(3) of the 1996 Amendments to SDWA

6) Paperwork Reduction Act (a separate Information Collection Request document contains the complete analysis)

7) Unfunded Mandates Reform Act of 1995

8) Impacts on sensitive subpopulations as required by Section 1412(b)(3)(c)(i) of the 1996 SDWA Amendments

9) Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks)

10) Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).

11) Executive Order 13132 (Federalism).

12) Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use)

Many of the requirements and executive orders listed above call for an explanation of why the rule is necessary, the statutory authority for the rule, and the primary objectives that the rule is intended to achieve (refer to Chapter 1 for more information regarding the objectives of the rule). More specifically, they are designed to assess the financial and health effects of the

rule on small air carriers and examine how much additional capacity air carriers will need to meet ADWR requirements.

6. 2 Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866, [58 Federal Register 51735; October 4, 1993] this action is a "significant regulatory action" because it raises novel legal or policy issues. Accordingly, EPA submitted this action to OMB for review under Executive Order 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action.

This document represents an analysis of potential costs and benefits associated with this action. An economic rationale for the rule is required by Executive Order 12866, which states:

> "[E]ach agency shall identify the problem that it intends to address (including, where applicable, the failures of the private markets or public institutions that warrant new agency action) as well as assess the significance of that problem." (Section 1, b(1))

Federal regulation of aircraft drinking water systems is necessary as a result of the information gap that exists with regard to the safety or quality of the drinking water. Because of limited monitoring, there is a lack of information on the potential risks associated with drinking and using the water onboard aircraft. As a result, aircraft passengers do not receive sufficient information on drinking water quality to make informed decisions about drinking water on aircraft. Federal intervention can be used to close this gap.

6. 3 Regulatory Flexibility Act

The RFA generally requires an agency to prepare a regulatory flexibility analysis for any rule subject to public notice and comment requirements under the Administrative Procedure Act or other statute, unless the Agency certifies that the rule will not have a significant economic impact on a substantial number of small entities (5 United States Code (U.S.C.) 603(a)). Small entities include small businesses, small organizations, and small governmental jurisdictions. The RFA provides the following default definitions for each type of small entity: (1) a small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district, or special district with a population of less than 50,000; and (3) a small organization that is any "not-for-profit enterprise that is independently owned and operated and is not dominant in the field."

U.S. aircraft subject to the final ADWR may be owned and operated by businesses. Therefore, the screening analysis for the ADWR uses the following definition for small entities: A "small business" is any firm that is independently owned and operated and is not dominant in its field of operation (Small Business Act, 15 U.S.C. 632). The SBA definitions of small

businesses use categories are defined by National American Industry Classification System (NAICS) codes. EPA has determined that the following businesses would be affected by the ADWR based on the NAICS:

- 481111 – Scheduled passenger air transportation
- 481211 – Nonscheduled chartered passenger air transportation

SBA defines a small business for air carriers (NAICS codes 481111 and 481211) as having fewer than 1,500 employees (13 CFR 121.201). EPA used this SBA standard definition as an alternative to the definition EPA has used for small stationary PWSs ("a PWS that serves 10,000 of fewer people"). This is because the air carrier is the business entity rather than the individual aircraft water system. The Agency requested but did not receive comments on the use of this alternative definition of small entity.

EPA conducted a screening analysis to determine if the ADWR would have a significant economic impact on a substantial number of small entities. Chapter 3 of this document provides data on air carriers potentially subject to the ADWR, and Chapter 5 discusses actions that air carriers would need to take to comply with the rule and their associated costs. Using information from these two chapters, along with additional information from Dun & Bradstreet (D&B) reports, EPA conducted a quantitative analysis of small entity impacts resulting from the rule.

Based on EPA's screening level analysis of small entities presented in Appendix D, EPA has estimated that 30 of the 63 air carriers subject to this final rule are small businesses. These 30 air carriers represent 48 percent of the universe of air carriers subject to the final rule, and all will be subject to the various provisions. Therefore, EPA has determined that a substantial number of small entities will be impacted by this rule.

In evaluating whether this rule will have a significant impact on these small entities, EPA first determined the present value costs of the rule for these air carriers. EPA followed the same methodology as was used to develop the average annualized costs for the rule overall. EPA estimates a total annual implementation cost for all small air carriers of $524,380 at a 3 percent discount rate and $521,110 at a 7 percent discount rate. EPA also determined the average annual rule cost per small air carrier of $17,543 (annualized at 3 percent).

EPA estimates the average annual incremental rule cost for small entities (the difference between the final rule and the existing NPDWRs (presented as Alternative 1)) is a reduction of $258,599 at a 3 percent discount rate for compliance with the ADWR. Because the majority of the air carriers are currently subject to the requirements of the AOCs, EPA notes that if the AOCs were considered to be an alternative baseline, the incremental average annual rule cost between the final rule and requirements similar to those of the AOCs, (presented as Alternative 2) is a reduction of $32,188 (i.e., cost savings).

Recognizing the variation of company sizes within this group, EPA has estimated the average annual incremental cost for small air carriers with fewer than 500 employees and for small air carriers with 500 or more employees. For the 17 air carriers with fewer than 500

employees, the annual incremental cost between the ADWR and Alternative 1 for each air carrier is a reduction of $78,042 at a 3 percent discount rate, and the annual incremental average rule cost between the ADWR and Alternative 2 is a reduction of $7,781 at a 3 percent discount rate. For the 13 small air carriers with 500 or more employees, the incremental cost between the ADWR and Alternative 1 for each air carrier is a reduction of $230,712 at a 3 percent discount rate, and the incremental average rule cost between the ADWR and Alternative 2 is a reduction of $20,104 at a 3 percent discount rate.

The final rule has been shown to offer a cost reduction over the existing regulations (i.e., baseline), and so the annualized incremental costs are negative. Therefore, EPA has not compared the average annual incremental costs to small entities against the average annual revenue of the small entities as is normally done for this analysis.

Based on this analysis, EPA certifies that the final ADWR will not have a significant impact on a substantial number of small entities; therefore, the Agency did not develop an Initial Regulatory Flexibility Analysis for the rule.

6. 4 Small-Air Carrier Affordability

Section 1415(e)(1) of SDWA does not apply to the final ADWR since small air carriers are not required to install compliance technologies and, therefore, primacy agencies do not need to grant variances to small air carriers in lieu of complying with an MCL.

6. 5 Feasible Treatment Technologies for All Air Carriers

Section 1412(b)(4)(E) of the 1996 SDWA Amendments requires that feasible technologies and treatment techniques are available for entities to comply with a NPDWR. The only treatment technique required under the ADWR is disinfection and flushing of aircraft water systems. Because this process is simple, affordable, and well within the existing technical capabilities of aircraft maintenance technicians it is considered a feasible treatment technique for all aircraft.

6. 6 Effect of Compliance with the ADWR on the Technical, Managerial, and Financial Capacity of Air Carriers

Section 1420(d)(3) of SDWA, as amended, requires that, in promulgating a NPDWR, the Administrator shall include an analysis of the likely effect of compliance with the regulation on the technical, managerial, and financial (TMF) capacity of regulated entities. The following analysis fulfills this statutory obligation by identifying the incremental impact that the ADWR will have on the TMF of regulated air carriers. Analyses presented in this document reflect only

the impact of new or revised requirements, as established by the ADWR; the impacts of previously established requirements are not considered.

Overall capacity is defined in *Guidance on Implementing the Capacity Development Provisions of the Safe Drinking Water Act Amendments of 1996* (USEPA, 1998) as the ability to plan for, achieve, and maintain compliance with applicable drinking water standards. Capacity encompasses three components: technical, managerial, and financial. Technical capacity is the operational ability of an air carrier to meet SDWA requirements. Key issues of technical capacity include:

- Source water adequacy—Do air carriers have a reliable source of water with adequate quantity? Is the source generally of good quality and adequately protected?

- Infrastructure adequacy—Can the air carrier provide water that meets SDWA standards? What is the condition of its infrastructure, including water fill ports, storage tanks, and pipes? Does the air carrier have an improvement plan?

- Technical knowledge and implementation—Do the personnel conducting monitoring and disinfection have sufficient knowledge of applicable standards? Can the personnel effectively implement this technical knowledge? Do the personnel understand the air carrier's technical and operational characteristics? Does the air carrier have an effective O&M program?

Managerial capacity is the ability of an air carrier's managers to make financial, operating, and staffing decisions that enable the air carrier to achieve and maintain compliance with SDWA requirements. Key issues include:

- Ownership accountability—Are the owners clearly identified? Can they be held accountable for the air carrier?

- Staffing and organization—Are the operators and managers clearly identified? Is the air carrier properly organized and staffed? Do personnel understand the management aspects of regulatory requirements and air carrier operations? Do they have adequate expertise to manage air carrier drinking water operations (*i.e.*, to disinfect and flush aircraft and monitor for total coliform to meet the ADWR requirements)? Do personnel have the necessary certifications and training?

- Effective external linkages—Does the air carrier interact well with customers, regulators, and other entities?

Financial capacity is an air carrier's ability to acquire and manage sufficient financial resources to allow the air carrier to achieve and maintain compliance with SDWA requirements. Key issues include:

- Revenue sufficiency – Do revenues cover costs?

- Creditworthiness – Is the air carrier financially healthy? Does it have access to capital?

- Fiscal management and controls – Are adequate books and records maintained? Are appropriate budgeting, accounting, and financial planning methods used? Does the air carrier manage its revenues effectively?

6.6.1 Requirements of the Final ADWR

This capacity analysis is presented only for the final rule, although EPA took similar considerations into account in the selection of the proposed rule option over the other alternatives. This process led to the incorporation of more flexibility to enable air carriers to better coordinate rule activities with existing O&M activities.

The final ADWR establishes five requirements that may affect the TMF capacity of affected air carriers:

1. Developing the aircraft water system O&M manual

2. Developing a coliform sampling plan

3. Monitoring for total coliform

4. Disinfection and flushing of aircraft

5. Taking corrective action for total coliform-positive samples

In addition, personnel from air carriers regulated under the ADWR will need to familiarize themselves with the rule and its requirements. Air carriers must also perform recordkeeping and reporting activities related to monitoring, disinfection and flushing, public notification, inventory, and self-inspections. Where applicable, the impacts of recordkeeping and reporting are considered as a part of the individual rule components.

6.6.2 Air Carriers Subject to the Final ADWR

The ADWR will apply to all aircraft that serve water to an average of 25 or more people daily for at least 60 days per year. EPA estimates that the ADWR may affect 7,327 aircraft (see Exhibit 6.5). While most will not, some air carriers may require increased TMF capacity to comply with the new requirements for their aircraft, or will need to tailor their compliance approaches to match their capacities. Refer to section 6.6.4 for a detailed discussion of changes in TMF capacity.

6.6.3 Impact of the ADWR on Air Carrier Capacity

The estimates presented in Exhibit 6.1 reflect the anticipated impact of the final ADWR on air carrier capacity based on the expected measures that air carriers will be required to adopt. The extent of the expected impact of a particular requirement on air carrier capacity is estimated using a scale of 0-5, where 0 represents a requirement that is not expected to have any impact, 1 represents a requirement that is expected to have a minimal impact, and 5 represents a requirement that is expected to have a very significant impact on air carrier capacity. Criteria used to develop the scores and associated impacts are discussed further in section 6.6.4.

Exhibit 6.1 Estimated Impacts of the ADWR on Air Carriers' Technical, Managerial, and Financial Capacity

(0 = no impact, 1 = minimal impact, and 5 = very significant impact)

Requirement	Number and Percent of Air Carriers	Technical Capacity			Managerial Capacity			Financial Capacity		
		Source Water Adequacy	Infrastructure Adequacy	Technical Knowledge & Implementation	Ownership Accountability	Staffing & Organization	Effective External Linkages	Revenue Sufficiency	Credit Worthiness	Fiscal Mgmt. & Controls
Familiarization with requirements of the rule	63 (100%)	0	0	1	1	1	1	1	1	1
Updating O&M plan	63 (100%)	0	0	1	1	1	1	1	1	1
Developing a sampling plan	63 (100%)	0	0	1	1	1	1	0	0	0
Monitoring for total coliform	63 (100%)	0	2	2	2	2	2	2	2	2
Disinfection & flushing of aircraft	63 (100%)	0	1	0	1	2	1	1	1	1
Corrective action for total coliform-positive samples	10 (16%)	0	1	1	1	2	1	1	1	1

Note: To analyze the impact of these requirements on air carrier capacity, the requirements believed to have the most impact on affected air carriers (*i.e.,* monitoring for total coliform), were analyzed first. These initial analyses were then used as the basis against which the relative impacts of the remaining requirements were assessed. The impact estimates developed for each requirement were also compared to the Ground Water Rule and the LT2ESWTR to ensure cross-rule consistency and enable cross-rule comparisons.

Source: Number and percent of air carriers impacted by each requirement are derived from the ADWR Cost Model. Impact on capacity is determined relative to previous regulations based on the cost and number of air carriers that require additional capacity to comply with each requirement, as described in section 6.6.4.

6.6.4 Derivation of the ADWR Scores

To analyze the impact compliance with all new requirements will have on the technical, managerial, and financial capacity of air carriers (and assign scores in accordance with the process described in Section 6.6.3 above), it is necessary to complete the following steps:

1. Determine the type and number of air carriers to which the regulation applies.

2. List all of the requirements of the regulation.

3. Determine the type and number of air carriers to which each requirement applies.

4. Evaluate the impact of each requirement on the capacity of affected air carriers.

The determination of the universe of affected air carriers and the evaluation of the capacity impact of individual requirements requires the use of cost and technical information contained in economic analyses developed for other rules, information collection requests, and other supporting documentation for the rule. These data sources are also used to develop a qualitative description of the expected response of affected air carriers to each requirement.

Within these sub-categories, a professional with extensive water system experience reviewed the costs, number of air carriers affected, and complexity of each requirement. After estimating the technical, managerial, and financial impacts within each sub-category, the professional assigned the scores using best professional judgment. Costs were considered cumulatively for each requirement for small and large air carriers. This score reflects the additional capacity that air carriers will need to develop to comply with each requirement.

These scores were reviewed by the EPA Rule Manager and other EPA staff cognizant of small air carrier issues to ensure that they accurately reflect the cumulative impact of the rule requirements on air carrier capacity. Any disagreements over the assignments were discussed. The EPA Rule Manager and other EPA staff discussed the rationale for the disagreement and evaluate whether the assignments need to be adjusted. EPA adjusted the assignments only after review of the rule support documents and an analysis of the expected air carrier response to the rule requirements.

Most regulated air carriers will likely not face more than a minimal challenge to their technical, managerial, and financial capacity as a result of efforts to familiarize themselves with the ADWR requirements (Exhibit 6.1). All air carriers subject to the rule should have existing O&M plans. EPA expects air carriers to spend 80 hours developing their O&M plans with ADWR specific requirements. Air carriers will need to develop a sampling plan, which is expected to take 10 hours. Since the sampling locations are likely to be the similar types of aircraft and the sampling frequency is either monthly, quarterly, twice annually, or annually, the sampling plan should be relatively simple to develop and should not require a high technical skill level.

EPA is providing air carriers the flexibility of choosing one of four monitoring and disinfection schedules that can most easily be integrated into air carriers' current O&M schedules if there are no manufacturer's recommendations specifying a frequency. Air carriers already have the infrastructure and technical knowledge for disinfecting and flushing aircraft, but may need to adjust their O&M schedules to accommodate additional disinfection events. While air carriers are required by existing regulations and AOCs to monitor for total coliform, some may need to invest in a modest amount of additional monitoring equipment, including refrigerators, coolers, gel packs, and thermometers.

Aircraft that receive one or more routine total coliform-positive samples followed by a repeat total coliform-positive sample, or that receive a single *E. coli*-positive sample result must perform corrective action, which consists of disinfection and flushing and follow-up coliform monitoring. In addition, air carriers must perform recordkeeping activities, assumed to include the completion of a maintenance log for disinfection and flushing events. Corrective actions do not require different technical skills and are expected to occur infrequently (*i.e.,* a maximum of 3.6 percent of routine samples). Therefore, corrective actions are expected to have limited impact on air carriers.

Overall, EPA assumes that air carriers will have the technical, financial, and managerial capacity to implement ADWR requirements based on the scale and complexity of their operations. The nature of their operations generally assures that they have access to the technical and managerial expertise to carry out all activities required by the final ADWR.

6. 7 Paperwork Reduction Act

The information collection requirements for the ADWR have been submitted for approval to OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* The information collected as a result of this rule will allow EPA to determine appropriate requirements for specific air carriers and evaluate compliance with the rule.

The Paperwork Reduction Act requires EPA to estimate the burden on air carriers and primacy agencies of complying with the rule. Burden means the total time, effort, and financial resources required to generate, maintain, retain, disclose, or provide information to or for a Federal agency. This burden includes the time needed to conduct these activities:

- Review instructions.
- Develop, acquire, install, and employ technology and systems for the purposes of collecting, validating, verifying, processing, maintaining, and disclosing information.
- Adjust the existing ways to comply with any previously applicable instructions and requirements.
- Train personnel to respond to information collected.

- Search data sources.
- Complete and review the collection of information.
- Transmit or otherwise disclose the information.

For the first three years after publication of the final ADWR in the *Federal Register*, information requirements are associated with implementation activities, sampling and O&M plans, submittal of fleet inventory, self-inspections, monitoring, and disinfection and flushing activities. The information collection requirements are mandatory under Part 141 of the NPDWRs. The calculation of ADWR information collection burden and costs can be found in the *Information Collection Request for the Aircraft Drinking Water Rule* (USEPA, 2009).

The total burden associated with ADWR requirements over the three years covered by the Information Collection Request is 62,291 hours, an average of 20,764 hours per year. The total cost over the three-year clearance period is $7.54 million, an average of $2.5 million per year (simple average over three years). The average burden per response (*i.e.*, the amount of time needed for each activity that requires a collection of information) is 0.3 hours; the average cost per response is $41.

Exhibit 6.2 provides a summary of the results of the Information Collection Request calculations.

Exhibit 6.2 Average Annual Burden Hours and Costs for the ADWR Information Collection Request

	Average Annual Burden (Hours)	Average Annual Labor Costs	Average Annual O&M Costs	Average Annual Capital Costs	Average Annual Costs
Air Carriers	17,583	$632,262	$1,719,536	$1,393	$2,353,191
Agency	3,180	$159,214	-	-	$159,214
Total	**20,764**	**$791,746**	**$1,719,536**	**$1,393**	**$2,512,405**

Note: Data represent burden and cost for only the 3-year Information Collection Request clearance period. Data are based on nominal (or undiscounted) values. Detail may not add due to independent rounding.

Source: *Information Collection Request for the Aircraft Drinking Water Rule* (USEPA, 2009).

6. 8 Unfunded Mandates Reform Act

The UMRA of 1995, Public Law 104-4, consists of four Titles and numerous sections. Sections 202 and 205 of Title II, entitled "Regulatory Accountability and Reform," are relevant to the ADWR and are discussed in this section. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and

final rules with "Federal mandates" that may result in expenditures by the private sector of $100 million or more in any one year.

Section 205 generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule before promulgating a rule for which a written statement is needed under Section 202. The provisions of Section 205 do not apply when they are inconsistent with applicable law. Moreover, Section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for the private sector in any one year. Under the final rule, the likely compliance scenario is expected to result in total annualized costs to air carriers of $7.04 million using a 3 percent discount rate, or $6.95 million using a 7 percent discount rate. Thus, the ADWR is not subject to the requirements of section 202 and 205 of the UMRA.

Social Benefits and Costs

The social benefits are those that are accrued primarily by the public through increased protection from illness and potential death that would have been caused by exposure to microbial pathogens in drinking water. Although EPA did not assign a monetary value to the reductions in illness, a qualitative analysis of the public health benefits is included in Chapter 4. Additional benefits may include reduced risks to sensitive subpopulations, reduced outbreak risks, and reduced risk-averting behavior (*e.g.*, purchasing bottled water). In addition, certain non-health-related benefits may exist, such as enhanced aesthetic water quality.

Measuring the social costs of the final rule requires considering regulatory alternatives, calculating regulatory compliance costs, and estimating any disproportionate impacts. Chapter 5 of this document details the cost analysis performed for the ADWR. EPA considered several regulatory alternatives and numerous methods to identify aircraft most at risk to microbial contamination. Chapter 2 provides a detailed discussion of these alternatives. EPA chose the final rule because it provided substantial benefits at an acceptable level of costs, and incorporated significant flexibility for air carriers to comply with the rule. In addition, the Workgroup (described in Chapter 2) supported the proposed regulatory option, which incorporated feedback from two stakeholder meetings, and the final rule incorporates several changes to accommodate suggestions by commenters on the proposed rule. Exhibit 6.3 summarizes the annualized costs estimated for each regulatory alternative evaluated during the rule development process using a 3 percent and 7 percent discount rate, respectively.

Exhibit 6.3 Total Annualized Costs of Regulatory Alternatives ($Millions, 2008$)

	Alt 1	Alt 2	Alt 3	Final Rule	Alt 1	Alt 2	Alt 3	Final Rule
	3%				7%			
Total	29.49	7.16	18.43	7.34	29.08	7.07	18.19	7.25

Note: Detail may not add due to independent rounding.

Source: Exhibit 5.25.

Disproportionate Budgetary Effects

After exploring possible disproportionate effects of the ADWR on geographic areas and groups of customers, EPA determined that the ADWR will not have any disproportionate budgetary effects. Only one segment of the private economy is directly affected by this rule—the air carrier industry. All air carriers with aircraft subject to the rule will incur some costs.

As seen in Exhibit 6.4, compliance costs and other effects of the ADWR will be greater in certain regions, but aircraft owned by private companies do not rely on or impact a region's financial resources. Also, the ADWR is a national mandate and applies uniformly to all air carriers that meet the definition of a TNCWS. Regulated air carriers are expected to pass some or all of the increased costs onto their customers, which are not necessarily from the same region where the air carrier is based. The final rule is not expected to affect urban and rural customers disproportionately.

Exhibit 6.4 Number and Percent of Air Carriers and Aircraft by Region

EPA Region	Number of Air Carriers With Headquarters in Region	Percent of Total Air Carriers	Number of Aircraft	Percent of Total Aircraft
1	1	1.6%	7	0.1%
2	3	4.8%	597	8.1%
3	1	1.6%	36	0.5%
4	14	22.2%	1,317	18.0%
5	16	25.4%	1,638	22.4%
6	8	12.7%	2,457	33.5%
7	2	3.2%	28	0.4%
8	2	3.2%	314	4.3%
9	13	20.6%	741	10.1%
10	3	4.8%	192	2.6%
Total	**63**	**100%**	**7,327**	**100%**

Source: Air carrier Web sites as of January 2007 and Exhibit 5.3.

Macroeconomic Effects

Under UMRA Section 202, EPA is required to estimate the potential macroeconomic effects of the regulation. Although, as noted previously, the ADWR is not subject to UMRA

requirements, EPA did evaluate these potential effects. These include effects on productivity, economic growth, full employment, and creation of Gross Domestic Product (GDP) (USEPA, 2000). Macroeconomic effects tend to be measurable in nationwide econometric models only if the economic impact of the regulation reaches 0.25 percent to 0.5 percent of GDP. In the third quarter of 2008, real GDP was $14,413 billion (U.S. Department of Commerce Bureau of Economic Analysis (BEA), 2008); thus, a rule would have to cost at least $36 billion annually to have a measurable effect. A regulation with a smaller aggregate effect is unlikely to have any measurable impact, unless it is highly focused on a particular geographic region or economic sector. The ADWR should not have a measurable effect on the national economy; the total annualized costs for the final rule range from $7.25 million to $7.34 million using a 3 and 7 percent discount rate, respectively. Using these annualized figures as a measure, the annual costs of the ADWR is an insignificant fraction of a $36 billion annual cost that would be considered a measurable macroeconomic impact. Thus, annualized ADWR costs measured as a percentage of the national GDP will only decline over time as GDP grows.

6. 9 Impacts on Sensitive Subpopulations

EPA's Office of Water has historically considered risks to sensitive subpopulations, including children, when establishing drinking water assessments, advisories or other guidance, and standards. Maximizing health protection for sensitive subpopulations requires minimizing exposure to contaminated drinking water. The health effects of waterborne illnesses on sensitive subpopulations are much more severe and debilitating than on the general population. These sensitive subpopulations include pregnant women, the young, the elderly (especially those weakened by other conditions), the malnourished and disease-impaired (especially those with diabetes), and a broad category of those with compromised immune systems, such as Acquired Immune Deficiency Syndrome (AIDS) patients, people with lupus or cystic fibrosis, transplant recipients, and individuals undergoing chemotherapy (Rose, 1997). Immunocompromised individuals are a growing proportion of the population with the relatively new and severe problem magnified by the AIDS epidemic and the escalation in organ and tissue transplantations. In total, these subgroups represent almost 20 percent of the population of the United States.

The duration, severity, and cost of waterborne illnesses are often much larger in immunocompromised individuals. Similarly, infectious diseases are a major problem for the elderly because immune function declines with age. As a result, waterborne diseases may increase the possibility of significantly higher mortality rates in the elderly than in the general population. Potential health benefits of the ADWR to both sensitive subpopulations and the general public are discussed in greater detail in Chapter 4 of this document.

6.9.1 Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule initiated after April 21, 1998, that (1) is determined to be "economically significant" as defined under Executive Order 12866; and (2) concerns an environmental, health, or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets

both criteria, EPA must evaluate the environmental, health, or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

The final ADWR is not subject to the Executive Order because it not is economically significant as defined in Executive Order 12866. Nevertheless, EPA expects that the ADWR will provide additional protection to children since they also travel in aircraft and may consume drinking water onboard planes. Further, young children are more susceptible than adults to some waterborne illnesses and the risk of mortality resulting from diarrhea is often greatest in the very young and elderly (Rose, 1997; Gerba et al., 1996). Since viral and bacterial illnesses often disproportionately affect children, the benefits of the rule accrue disproportionately to children.

6. 10 Environmental Justice

Executive Order 12898 (59 FR 7629) establishes a Federal policy for incorporating environmental justice into Federal agency missions by directing agencies to identify and address disproportionately high adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. This Executive Order does not apply to the final ADWR since air carrier customers have a choice whether to board an aircraft and passengers do not necessarily represent minority or low-income populations. Furthermore, since the rule applies to all air carriers that meet the definition of a TNCWS, passengers served by regulated air carriers receive equal protection from contaminated aircraft water systems.

6.10.1 Federalism

Executive Order 13132, “Federalism” (64 FR 43255; August 10, 1999), requires EPA to develop an accountable process to ensure “meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications.” “Policies that have Federalism implications” are defined in the executive order to include regulations that have “substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.”

The ADWR will be implemented by EPA, in coordination with other federal agencies including the FDA and FAA. The ADWR will not have Federalism implications because it will not impose any direct compliance costs on State or local governments.

6. 11 Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355; May 22, 2001), provides that agencies shall prepare and submit to the Administrator of the Office of Information and Regulatory Affairs, OMB, a statement of Energy Effects for certain actions identified as "significant energy actions." Section 4(b) of Executive Order 13211 defines "significant energy actions" as "any action by an agency (normally published in the *Federal Register*) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking: (1)(i) that is a significant regulatory action under Executive Order 12866 or any successor order, and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action."

The Executive Order 13211 does not apply to the ADWR since none of the final rule requirements involve installation of treatment or other components that use a measurable amount of energy.

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Appendix A

ADWR Aircraft and Population Baseline

Exhibit A.1 Background Calculations for ADWR Aircraft and Population Baseline (as of January 2007)

Code for Airline Name	Aircraft Models	Number of Aircraft	Flights/Year/Aircraft	Flights/Year	Carrying Capacity (passengers/aircraft)	Load Factor	Estimated # of passengers/aircraft	Total # of passengers/year	Onboard staff/aircraft	Total # of Onboard staff/year	Number of Lavatories	Number of Galleys	Total # of Available Sampling Points
A	B	C	D	E=C*D	F	G	H=F*G	I=E*H	J	K=E*J	L	M	N=L+M
Total Available Sampling Points = 1													
1	Beechjet 400A	1	514	514	8	0.798	6	3,286	2	1,029	1	0	1
1	Hawker 700A	1	514	514	8	0.798	6	3,286	2	1,029	1	0	1
10	ATR 72 - Super ATR	41	1,752	71,818	66	0.744	49	3,526,545	3	215,454	1	0	1
10	SAAB 340B (SF3)	30	1,752	52,550	34	0.744	25	1,329,296	3	157,649	1	0	1
11	Beechcraft KingAir 90	1	514	514	6	0.798	5	2,464	2	1,029	1	0	1
14	CRJ 200	94	1,840	172,936	50	0.772	39	6,675,326	3	518,808	1	0	1
31	Dash 8 (Q100 and Q200)	8	4,563	36,500	37	0.798	30	1,078,124	3	109,500	1	0	1
49		1	1,864	1,864	25	0.798	20	37,201	3	5,592	1	0	1
52	CRJ 200	122	2,050	250,124	50	0.793	40	9,917,399	3	750,371	1	0	1
58	CRJ 200	35	888	31,089	50	0.777	39	1,207,823	3	93,268	1	0	1
58	Dash 8 Q100	38	888	33,754	37	0.777	29	970,399	3	101,263	1	0	1
58	Dash 8 Q200	9	888	7,994	37	0.777	29	229,831	3	23,983	1	0	1
Totals		**381**		**660,172**				**24,980,980**		**1,978,974**			
Total Available Sampling Points = 2													
1	Jetstream 41	1	514	514	14	0.798	11	5,750	2	1,029	1	1	2
2	Embraer ERJ-145 (ERJ)	36	1,557	56,057	50	0.746	37	2,090,939	3	168,172	1	1	2
3	CRJ 200	70	2,186	153,000	50	0.708	35	5,416,200	3	459,000	1	1	2
10	CRJ 700-701ER	25	1,752	43,791	70	0.744	52	2,280,656	4	175,166	1	1	2
10	ERJ 145LR	108	1,752	189,179	50	0.744	37	7,037,452	3	567,536	1	1	2
11	Falcon 20F	13	514	6,688	9	0.798	7	48,051	2	13,376	1	1	2
13	LearJet 35	1	514	514	8	0.798	6	3,286	2	1,029	1	1	2
14	ATR 72-210	12	1,840	22,077	66	0.772	51	1,124,863	3	66,231	1	1	2
14	CRJ 200	18	1,840	33,115	40	0.772	31	1,022,603	3	99,346	1	1	2
14	CRJ 700	32	1,840	58,872	70	0.772	54	3,181,432	4	235,487	1	1	2
15	Cessna Citation Encore	15	609	9,128	7	0.798	6	51,008	2	18,256	1	1	2
15	Cessna Citation Sovereign	14	609	8,519	8	0.798	6	54,408	2	17,039	1	1	2
15	Gulfstream 200	24	609	14,604	9	0.798	7	104,931	2	29,209	1	1	2
15	Raytheon Hawker 400XP	38	609	23,124	7	0.798	6	129,220	2	46,247	1	1	2
16	Jetstream 3100	2	1,864	3,728	19	0.798	15	56,545	2	7,456	1	1	2
17	Dash 8 Q100	7	3,031	21,216	37	0.473	18	371,301	2	42,432	1	1	2
19	ERJ 145LR	63	1,612	101,571	50	0.721	36	3,661,650	3	304,714	1	1	2
21	CRJ 200/700	150	1,967	295,000	53	0.730	39	11,485,333	3	885,000	1	1	2
22	ERJ 145	140	466	65,205	50	0.833	42	2,715,808	3	195,616	1	1	2
22	ERJ 145XR	104	466	48,438	50	0.833	42	2,017,458	3	145,315	1	1	2
23	ATR–72	12	777	9,321	66	0.780	51	479,867	4	37,286	1	1	2
23	CRJ 100/200	141	777	109,527	50	0.780	39	4,271,545	3	328,580	1	1	2
25	ERJ 135	30	1,443	43,277	37	0.786	29	1,258,583	3	129,831	1	1	2
25	ERJ 145	140	1,443	201,959	50	0.786	39	7,937,007	3	605,878	1	1	2
25	ERJ 145XR	96	1,443	138,486	50	0.786	39	5,442,519	3	415,459	1	1	2
27	Beechjet 400A/Hawker 400XP	200	514	102,890	7	0.798	6	574,973	2	205,781	1	1	2
27	Cessna Citation X	1	514	514	8	0.798	6	3,286	2	1,029	1	1	2
27	Raytheon Hawker 800XP	1	514	514	8	0.798	6	3,286	2	1,029	1	1	2
28	Dash 8 (Q200)	18	1,557	28,029	37	0.746	28	773,647	3	84,086	1	1	2
30	CRJ 700	15	1,864	27,959	66	0.798	53	1,473,146	4	111,838	1	1	2
33	CRJ 700 (CR7)	20	2,294	45,882	70	0.748	52	2,402,400	4	183,529	1	1	2
33	Dash 8 Q200 (DH8)	28	2,294	64,235	37	0.748	28	1,777,776	3	192,706	1	1	2
33	Dash 8 Q400 (DH4)	20	2,294	45,882	74	0.748	55	2,539,680	4	183,529	1	1	2
35	Cessna Citation VII	1	514	514	8	0.798	6	3,286	2	1,029	1	1	2
35	LearJet 31A	3	514	1,543	8	0.798	6	9,857	2	3,087	1	1	2
35	LearJet 35A	2	514	1,029	8	0.798	6	6,571	2	2,058	1	1	2
35	LearJet 45	2	514	1,029	8	0.798	6	6,571	2	2,058	1	1	2
35	LearJet 60	3	514	1,543	8	0.798	6	9,857	2	3,087	1	1	2
36	CRJ 200/100	61	2,693	164,272	50	0.746	37	6,127,343	3	492,816	1	1	2
37	CRJ 200	2	2,078	4,156	50	0.693	35	144,000	3	12,468	1	1	2
41	CRJ 200/440	126	858	108,072	47	0.827	39	4,200,656	3	324,216	1	1	2
44	CRJ 200	124	1,904	236,096	50	0.766	38	9,042,477	3	708,288	1	1	2
44	CRJ 440	1	1,904	1,904	44	0.766	34	64,172	3	5,712	1	1	2
51	Fairchild 328JETs	10	5,955	59,550	32	0.634	20	1,208,150	3	178,650	1	1	2
52	CRJ 700ER	64	2,050	131,212	80	0.793	63	8,324,112	4	524,849	1	1	2
52	Embraer Brasilia 120ER (EM2)	62	2,050	127,112	30	0.793	24	3,023,994	3	381,336	1	1	2
58	Dash 8 Q300	12	888	10,659	50	0.777	39	414,111	3	31,978	1	1	2
60	Falcon 20	12	420	5,045	12	0.798	10	48,326	2	10,089	1	1	2
Totals		**2,080**		**2,826,558**				**104,430,089**		**8,639,938**			
Total Available Sampling Points = 3													
60	LearJet	1	420	420	8	0.798	6	2,685	2	841	1	1	2
1	Gulfstream III	1	514	514	13	0.798	10	5,339	2	1,029	2	1	3
5	B737-400 Combi (73Q)	1	1,301	1,301	72	0.765	55	71,649	4	5,203	2	1	3
10	ERJ 135LR	39	1,752	68,315	37	0.744	28	1,880,563	3	204,944	1	2	3
10	ERJ 140LR	59	1,752	103,348	44	0.744	33	3,383,190	3	310,043	1	2	3
11	B737-200	2	514	1,029	56	0.798	45	45,998	3	3,087	1	2	3
12	B737-300	3	793	2,379	138	0.784	108	257,422	5	11,897	1	2	3
15	Boeing Business Jet	3	609	1,826	18	0.798	14	26,233	2	3,651	2	1	3
15	Cessna Citation Excel/XLS	112	609	68,154	7	0.798	6	380,859	2	136,308	1	2	3
15	Cessna Citation V Ultra	69	609	41,988	7	0.798	6	234,637	2	83,976	1	2	3
15	Cessna Citation X	72	609	43,813	8	0.798	6	279,815	2	87,627	1	2	3
15	Falcon 2000EX	50	609	30,426	10	0.798	8	242,895	2	60,852	1	2	3
15	Raytheon Hawker 1000	1	609	609	9	0.798	7	4,372	2	1,217	1	2	3
15	Raytheon Hawker 800XP	82	609	49,899	6	0.798	5	239,009	2	99,797	1	2	3
19	ERJ 135LR	17	1,612	27,408	37	0.721	27	731,168	3	82,224	1	2	3
19	ERJ 140LR	15	1,612	24,184	44	0.721	32	767,203	3	72,551	1	2	3
20	SAAB 340B	36	514	18,520	34	0.798	27	502,690	3	55,561	1	2	3
22	ERJ 135	30	466	13,973	37	0.833	31	430,650	3	41,918	1	2	3
23	CRJ 700	27	777	20,973	70	0.780	55	1,145,138	4	83,893	2	1	3
25	B727-200	30	1,443	43,277	37	0.786	29	1,258,583	3	129,831	1	2	3
27	Embraer Legacy	1	514	514	13	0.798	10	5,339	2	1,029	1	2	3
36	CRJ 700ER	15	2,693	40,395	64	0.746	48	1,928,606	3	121,184	2	1	3
36	CRJ 900	38	2,693	102,333	86	0.746	64	6,565,297	4	409,333	2	1	3
37	SAAB 340	52	2,078	108,052	34	0.693	24	2,545,920	3	324,156	1	2	3
Totals		**756**		**813,650**				**22,935,259**		**2,332,151**			

Code for Airline Name	Aircraft Models	Number of Aircraft	Flights/Year/Aircraft	Flights/Year	Carrying Capacity (passengers/aircraft)	Load Factor	Estimated # of passengers/aircraft	Total # of passengers/year	Onboard staff/aircraft	Total # of Onboard staff/year	Number of Lavatories	Number of Galleys	Total # of Available Sampling Points
A	B	C	D	E=C*D	F	G	H=F*G	I=E*H	J	K=E*J	L	M	N=L+M
Total Available Sampling Points = 4													
4	B717-200	85	2,093	177,870	117	0.735	86	15,295,963	4	711,481	3	1	4
15	Gulfstream 450	6	609	3,651	14	0.798	11	40,806	2	7,302	2	2	4
15	Gulfstream 550	7	609	4,260	14	0.798	11	47,607	2	8,519	2	2	4
19	ERJ 170LR	52	1,612	83,837	70	0.721	50	4,231,240	3	251,510	2	2	4
24	Gulfstream G-IV	1	514	514	15	0.798	12	6,160	2	1,029	2	2	4
32	B717-200	11	1,962	21,577	123	0.891	110	2,364,680	5	107,885	3	1	4
34	A320	87	1,479	128,688	150	0.820	123	15,828,563	5	643,438	2	2	4
34	Embraer 190	9	1,479	13,313	102	0.820	84	1,113,458	4	53,250	2	2	4
37	Avro RJ 85	23	2,078	47,792	69	0.693	48	2,285,280	3	143,377	2	2	4
41	Avro RJ 85	16	858	13,723	69	0.827	57	783,101	4	54,894	2	2	4
46	ERJ 170	16	674	10,790	70	0.721	50	544,571	3	32,370	2	2	4
48	Embraer 170	40	674	26,975	110	0.721	79	2,139,387	4	107,900	2	2	4
52	CRJ 900	11	2,050	22,552	88	0.793	70	1,573,777	4	90,208	2	2	4
54	A319	25	1,472	36,794	138	0.792	109	4,021,476	5	183,972	2	2	4
57	Embraer 170	18	888	15,989	72	0.777	56	894,479	4	63,955	2	2	4
58	CRJ 700	14	888	12,436	70	0.777	54	676,381	4	49,743	2	2	4
Totals		**421**		**620,761**				**51,846,929**		**2,510,833**			
Total Available Sampling Points = 5													
1	A319 Executive	1	514	514	72	0.798	57	29,570	4	2,058	3	2	5
5	B737-200 Combi (73M)	7	1,301	9,106	111	0.765	85	773,210	4	36,423	2	3	5
6	MD 87	2	770	1,539	130	0.798	104	159,740	5	7,696	3	2	5
7	B737-200	10	3,249	32,490	127	0.798	101	3,294,031	5	162,450	2	3	5
8	A319	37	1,362	50,383	124	0.798	99	4,985,497	4	201,532	3	2	5
18	B727-200 (coach)	10	514	5,145	173	0.798	138	710,502	5	25,723	2	3	5
23	MD 88	120	777	93,214	142	0.780	111	10,324,414	5	466,071	3	2	5
29	A318	7	1,582	11,073	114	0.806	92	1,017,406	4	44,291	3	2	5
29	A319	48	1,582	75,927	132	0.806	106	8,078,054	5	379,636	3	2	5
38	B737-800	9	514	4,630	173	0.798	138	639,452	5	23,150	3	2	5
39	B717	22	1,367	30,083	88	0.716	63	1,895,473	4	120,332	2	3	5
41	A319-100	66	858	56,609	124	0.827	103	5,805,162	5	283,046	3	2	5
41	A320-200	73	858	62,613	148	0.827	122	7,663,608	5	313,066	3	2	5
43	B737-200	5	514	2,572	80	0.798	64	164,278	4	10,289	2	3	5
43	B737-300	2	514	1,029	100	0.798	80	82,139	4	4,116	2	3	5
45	B737-800	2	514	1,029	170	0.798	136	139,636	5	5,145	3	2	5
47	MD 87	1	514	514	135	0.798	107	55,238	5	2,572	3	2	5
50	B737-800	1	1,864	1,864	189	0.798	151	281,237	5	9,320	3	2	5
53	B737-300	194	2,291	444,376	137	0.730	100	44,442,051	4	1,777,504	3	2	5
53	B737-500	25	2,291	57,265	122	0.730	89	5,100,017	4	229,060	3	2	5
53	B737-700	249	2,291	570,359	137	0.730	100	57,041,601	4	2,281,436	3	2	5
54	A321	6	1,472	8,831	198	0.792	157	1,384,786	6	52,984	3	2	5
57	A319	54	888	47,966	120	0.777	93	4,472,395	4	191,866	3	2	5
61	B737-200 Advanced	1	514	514	27	0.798	22	11,089	3	1,543	3	2	5
63	B737-400	3	514	1,543	150	0.798	120	184,813	5	7,717	3	2	5
63	B737-800	1	514	514	189	0.798	151	77,621	5	2,572	3	2	5
Totals		**956**		**1,571,705**				**158,813,021**		**6,641,598**			
Total Available Sampling Points = 6													
4	B737-700	23	2,093	48,130	137	0.735	101	4,846,413	4	192,519	3	3	6
5	B737-400 (734)	40	1,301	52,033	144	0.765	110	5,731,902	5	260,163	3	3	6
5	B737-700 (73G)	22	1,301	28,618	124	0.765	95	2,714,693	4	114,472	3	3	6
7	B737-700	8	3,249	25,992	124	0.798	99	2,572,976	4	103,968	3	3	6
8	A320	56	1,362	76,255	150	0.798	120	9,127,762	5	381,277	3	3	6
18	B727-200 (VIP)	6	514	3,087	59	0.798	47	145,386	3	9,260	3	3	6
22	B737-500	63	466	29,342	114	0.833	95	2,786,419	4	117,370	3	3	6
22	B737-700	36	466	16,767	124	0.833	103	1,731,910	5	83,836	3	3	6
23	B737-200	17	777	13,205	100	0.780	78	1,030,018	4	52,821	3	3	6
23	B737-800	71	777	55,152	150	0.780	117	6,452,759	5	275,759	3	3	6
23	MD 90	16	777	12,429	150	0.780	117	1,454,143	5	62,143	3	3	6
26	B727-200	2	514	1,029	170	0.798	136	139,636	5	5,145	3	3	6
26	B737-300	2	514	1,029	134	0.798	107	110,066	5	5,145	3	3	6
38	B727-200	9	514	4,630	60	0.798	48	221,775	3	13,890	3	3	6
38	B727-400	2	514	1,029	68	0.798	54	55,854	4	4,116	3	3	6
39	MD 81/82	10	1,367	13,674	111	0.716	79	1,081,869	4	54,696	3	3	6
39	MD 88	2	1,367	2,735	143	0.716	102	280,013	5	13,674	3	3	6
41	B757-200	46	858	39,455	182	0.827	151	5,938,516	5	197,275	3	3	6
41	DC 9-30	68	858	58,325	100	0.827	83	4,823,448	4	233,299	3	3	6
41	DC 9-40	8	858	6,862	110	0.827	91	624,211	4	27,447	3	3	6
41	DC 9-50	29	858	24,874	125	0.827	103	2,571,324	5	124,369	3	3	6
43	B737-400	1	514	514	72	0.798	57	29,570	4	2,058	3	3	6
43	B757-200	2	514	1,029	82	0.798	65	66,943	4	4,116	3	3	6
47	B737-400	3	514	1,543	144	0.798	115	177,420	5	7,717	3	3	6
56	A319	55	1,065	58,587	120	0.820	98	5,764,957	4	234,348	3	3	6
56	A320-200	97	1,065	103,326	147	0.820	121	12,454,927	5	516,630	3	3	6
56	B737-300	64	1,065	68,174	123	0.820	101	6,876,021	4	272,696	3	3	6
56	B737-500	30	1,065	31,957	108	0.820	89	2,830,070	4	127,826	3	3	6
57	A320	20	888	17,765	142	0.777	110	1,960,124	5	88,827	3	3	6
57	B737-400	40	888	35,531	144	0.777	112	3,975,462	5	177,654	3	3	6
59	A320-212	1	1,864	1,864	142	0.798	113	211,300	5	9,320	3	3	6
59	A320-214	9	1,864	16,776	168	0.798	134	2,249,896	5	83,878	3	3	6
60	DC 9-30	13	420	5,465	74	0.798	59	322,847	4	21,860	3	3	6
Totals		**871**		**857,181**				**91,360,628**		**3,879,569**			

Code for Airline Name	Aircraft Models	Number of Aircraft	Flights/Year/Aircraft	Flights/Year	Carrying Capacity (passengers/aircraft)	Load Factor	Estimated # of passengers/aircraft	Total # of passengers/year	Onboard staff/aircraft	Total # of Onboard staff/year	Number of Lavatories	Number of Galleys	Total # of Available Sampling Points
A	B	C	D	E=C*D	F	G	H=F*G	I=E*H	J	K=E*J	L	M	N=L+M
Total Available Sampling Points = 7													
5	B737-800 (738)	15	1,301	19,512	160	0.765	122	2,388,293	5	97,561	3	4	7
5	B737-900 (739)	12	1,301	15,610	172	0.765	132	2,053,932	5	78,049	4	3	7
5	MD 80 (MD-82/MD-83)	26	1,301	33,821	140	0.765	107	3,622,244	5	169,106	3	4	7
6	MD 83	13	770	10,005	150	0.798	120	1,198,047	5	50,024	3	4	7
8	B737-300	35	1,362	47,660	133	0.798	106	5,058,301	5	238,298	3	4	7
8	B757-200	13	1,362	17,702	190	0.798	152	2,683,997	6	106,213	4	3	7
12	B737-800	12	793	9,517	175	0.784	137	1,305,766	5	47,586	4	3	7
12	B757-200	6	793	4,759	197	0.784	154	734,959	6	28,552	4	3	7
16	B727-200	5	1,864	9,320	149	0.798	119	1,104,860	5	46,599	3	4	7
22	B737-300	48	466	22,356	124	0.833	103	2,309,213	5	111,781	3	4	7
26	B727-200	2	514	1,029	170	0.798	136	139,636	5	5,145	3	4	7
26	B727-200	3	514	1,543	147	0.798	117	181,116	5	7,717	3	4	7
47	B737-200	3	514	1,543	100	0.798	80	123,208	4	6,173	4	3	7
47	B757-200	5	514	2,572	193	0.798	154	396,320	6	15,434	4	3	7
47	MD 83	1	514	514	161	0.798	129	66,122	5	2,572	3	4	7
57	A321	28	888	24,872	169	0.777	131	3,265,952	5	124,358	4	3	7
57	B737-300	40	888	35,531	126	0.777	98	3,478,529	4	142,123	3	4	7
57	B757-200	31	888	27,536	193	0.777	150	4,129,373	5	137,682	4	3	7
Totals		**298**		**285,402**				**34,239,869**		**1,414,970**			
Total Available Sampling Points = 8													
9	B737-800	77	917	70,611	142	0.819	116	8,211,903	5	353,054	3	5	8
9	B757-223	143	917	131,134	184	0.819	151	19,761,441	5	655,672	4	4	8
9	MD 80	327	917	299,867	130	0.819	106	31,926,834	5	1,499,335	3	5	8
23	B737-332	21	777	16,313	128	0.780	100	1,628,640	4	65,250	4	4	8
23	B757-200	121	777	93,991	199	0.780	155	14,589,294	6	563,946	4	4	8
40	B757-200ER	5	69	345	278	0.798	222	76,566	7	2,415	4	4	8
42	B757-200ER	3	514	1,543	223	0.798	178	274,755	6	9,260	4	4	8
55	B737-800	5	1,864	9,320	162	0.798	129	1,205,302	5	46,599	3	5	8
56	B757-200	97	1,065	103,326	172	0.820	141	14,573,111	5	516,630	4	4	8
57	B767-200	10	888	8,883	203	0.777	158	1,401,074	6	53,296	5	3	8
Totals		**809**		**735,333**				**93,648,921**		**3,765,459**			
> 9 Total Available Sampling Points													
12	B757-300	4	793	3,172	247	0.784	194	614,332	6	19,034	5	4	9
22	B737-800	103	466	47,973	155	0.833	129	6,193,983	5	239,863	4	5	9
22	B737-900	12	466	5,589	167	0.833	139	777,497	5	27,945	4	5	9
22	B757-200	41	466	19,096	175	0.833	146	2,783,703	5	95,479	4	5	9
23	B767-300	24	777	18,643	250	0.780	195	3,635,357	6	111,857	6	3	9
41	B757-300	16	858	13,723	224	0.827	185	2,542,241	6	82,341	5	4	9
41	DC 10-30	12	858	10,293	273	0.827	226	2,323,767	7	72,048	5	4	9
62	DC 10	9	1,864	16,776	273	0.798	218	3,656,082	7	117,429	4	5	9
9	A300-605R	34	917	31,179	267	0.819	219	6,817,968	7	218,252	7	3	10
22	B757-300	17	466	7,918	216	0.833	180	1,424,635	6	47,507	5	5	10
32	B-767-300	1	1,962	1,962	252	0.891	225	440,428	7	13,731	6	4	10
32	B767-300ER	3	1,962	5,885	252	0.891	225	1,321,284	7	41,192	6	4	10
32	B767-300ER	4	1,962	7,846	259	0.891	231	1,810,649	7	54,923	6	4	10
32	B767-300ER	7	1,962	13,731	264	0.891	235	3,229,806	7	96,115	6	4	10
23	B767-400ER	21	777	16,313	285	0.780	222	3,626,269	7	114,188	6	5	11
23	B777-200	8	777	6,214	268	0.780	209	1,299,034	7	43,500	6	5	11
40	B767-300ER	3	69	207	215	0.798	172	35,529	6	1,242	6	5	11
9	B767-223ER	16	917	14,672	158	0.819	129	1,898,636	5	73,362	5	7	12
22	B767-200ER	10	466	4,658	174	0.833	145	675,072	5	23,288	5	7	12
12	Lockheed L-1011	4	793	3,172	283	0.784	222	703,870	7	22,207	6	7	13
22	B767-400ER	35	466	16,301	235	0.833	196	3,191,075	6	97,808	6	7	13
22	B777-200ER	18	466	8,384	283	0.833	236	1,976,332	7	58,685	6	7	13
41	A330-200	9	858	7,719	243	0.827	201	1,551,306	6	46,317	7	6	13
56	B767-300	35	1,065	37,283	213	0.820	175	6,511,780	6	223,696	8	5	13
62	MD 11	8	1,864	14,912	400	0.798	319	4,761,685	9	134,205	7	6	13
9	B767-323ER	58	917	53,187	212	0.819	174	9,234,824	6	319,124	8	6	14
41	B747-200	3	858	2,573	353	0.827	292	751,181	8	20,585	6	8	14
42	DC 10-30	5	514	2,572	380	0.798	303	780,320	9	23,150	8	6	14
23	B767-232	14	777	10,875	204	0.780	159	1,730,430	6	65,250	7	8	15
23	B767-300ER	59	777	45,830	214	0.780	167	7,650,003	6	274,982	9	6	15
41	A330-300	11	858	9,435	298	0.827	246	2,325,186	7	66,044	8	7	15
56	B777-200	52	1,065	55,391	367	0.820	301	16,669,459	8	443,130	10	5	15
41	B747-400	16	858	13,723	403	0.827	333	4,573,764	9	123,511	8	9	17
57	A330-300	9	888	7,994	226	0.777	176	1,403,835	6	47,966	9	8	17
9	B777-200IGW	44	917	40,349	247	0.819	202	8,162,334	7	282,443	9	9	18
56	B747-400	30	1,065	31,957	347	0.820	285	9,092,909	8	255,652	15	10	25
Totals		**755**		**607,507**				**126,176,568**		**3,998,054**			
Total All Sampling Point Categories		**7,327**		**8,978,269**				**708,432,263**		**35,161,545**			

Source: See Section 3.2.1 for data sources. Aircraft and population baseline data as of January 2007.

Notes:

(G) Weighted average of available load factors (0.798) used for aircraft without publicly available load factor data.

(I), (K) - Load factor (G) used to determine number of passengers and staff onboard. Weighted average of available load factors (0.798) used for aircraft without publically available load factor data.

(J) FAA Requirement (14CFR 91.533 and 14CFR 125.269). Number of onboard staff/aircraft based based on estimated number of passengers/aircraft (H). (H<=19, 2 pilots), (19<H<51, 2 pilots, 1 flight attendant), (50<H<101, 2 pilots, 2 flight attendants), and one additional flight attendant for every 50 passengers above 100 passengers.

Exhibit A.2 ADWR Aircraft and Population Baseline (as of January 2007)

# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	# of Onboard Staff/year	# of Passengers/year	Total # of Potentially Affected Persons/year
A	B	C=B*A	D	E	F=D+E
1	381	381	1,978,974	24,980,980	26,959,953
2	2,080	4,160	8,639,938	104,430,089	113,070,026
3	756	2,268	2,332,151	22,935,259	25,267,410
4	421	1,684	2,510,833	51,846,929	54,357,762
5	956	4,780	6,641,598	158,813,021	165,454,619
6	871	5,226	3,879,569	91,360,628	95,240,197
7	298	2,086	1,414,970	34,239,869	35,654,839
8	809	6,472	3,765,459	93,648,921	97,414,380
≥ 9	755	9,354	3,998,054	126,176,568	130,174,622
Total	**7,327**	**36,411**	**35,161,545**	**708,432,263**	**743,593,809**

Source: See Section 3.2.1 for data sources. Aircraft and population baseline data as of January 2007.

Notes:

(A) Each qualifying lavatory and galley on an aircraft is assumed to have only one sampling point. Therefore, the number of available sampling points is representative of the number of lavatories and galleys on an aircraft.

(B), (D), (E) Derived from Appendix B.

(C) Average number of sampling points used for > 9 sampling points size category.

Appendix B

Aircraft Drinking Water Sampling Data

Aircraft Drinking Water Sampling Data

Source of Data

Aircraft drinking water sampling data was collected as part of the Administrative Orders on Consent (AOC). AOCs were established by Office of Enforcement and Compliance Assistance (OECA) with 45 air carriers. EPA has processed sampling data from 25 of the 45 air carriers as of December 31, 2008. Samples were taken from 2005 to 2008. Data for air carriers with an approved quality assurance project plan (QAPP) and comprehensive representative monitoring plan (CRMP) are only available for 2 air carriers in 2005, 5 air carriers in 2006, 8 air carriers in 2007, and 12 air carriers in 2008. A description of the sampling process used and other details can be found in the AOCs. Only data collected under approved QAPPs and CRMPs was used for the Occurrence Baseline for the final ADWR.

Features of the Data (based on AOCs)

Total number of airlines under AOCs is 45.

Total estimated number of aircraft is 6,046. Each aircraft is a Transient Non-Community Water System (TNCWS).

The source of the water is considered to be finished surface water or ground water under the direct influence of surface water received from a PWS.

Each aircraft system's data covers, in-part or full, 4 quarters (1 year) each for Monitoring Period. Data represents different years: 2005 to 2008.

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Exhibit B.1 Montioring Period for Year 2005: Sampling Data for All Airlines

	Routine Samples									Repeat Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines									***Total Coliform and Chlorine Residual Data for All Airlines***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	2.7%	1.5%	65	1	2,402	5.5%	129	50	2,352	12.5%	0.0%	47	0	375	2.2%	8	4	371
Calendar Qtr 3	0.0%	0.0%	0	0	30	0.0%	0	0	30	16.7%	0.0%	8	0	48	0.0%	0	0	48
Calendar Qtr 4	1.8%	0.0%	14	0	773	3.2%	17	241	532	1.4%	0.0%	3	0	215	7.0%	12	43	172
Total	2.5%	1.3%	79	1	3205	5.0%	146	291	2,914	9.1%	0.0%	58	0	638	3.4%	20	47	591
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	2.7%	1.5%	65	1	2,402	5.5%	129	50	2,352	12.5%	0.0%	47	0	375	2.2%	8	4	371
Calendar Qtr 3	0.0%	0.0%	0	0	22	0.0%	0	0	22	16.7%	0.0%	8	0	48	0.0%	0	0	48
Calendar Qtr 4	1.8%	0.0%	14	0	757	2.1%	11	241	516	1.4%	0.0%	3	0	215	7.0%	12	43	172
Total	2.5%	1.3%	79	1	3181	4.8%	140	291	2,890	9.1%	0.0%	58	0	638	3.4%	20	47	591
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 3	0.0%	0.0%	0	0	8	0.0%	0	0	8	0.0%	0.0%	0	0	8	0.0%	0	0	8
Calendar Qtr 4	0.0%	0.0%	0	0	16	37.5%	6	0	16	0.0%	0.0%	0	0	16	37.5%	6	0	16
Total	0.0%	0.0%	0	0	24	25.0%	6	0	24	0.0%	0.0%	0	0	24	25.0%	6	0	24

Exhibit B.1 Montioring Period for Year 2005: Sampling Data for All Airlines

	All Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	4.0%	0.9%	112	1	2,777	5.0%	137	54	2,723
Calendar Qtr 3	10.3%	0.0%	8	0	78	0.0%	0	0	78
Calendar Qtr 4	1.7%	0.0%	17	0	988	4.1%	29	284	704
Total	3.6%	0.7%	137	1	3843	4.7%	166	338	3,505
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	4.0%	0.9%	112	1	2,777	5.0%	137	54	2,723
Calendar Qtr 3	11.4%	0.0%	8	0	70	0.0%	0	0	70
Calendar Qtr 4	1.7%	0.0%	17	0	972	3.3%	23	284	688
Total	3.6%	0.7%	137	1	3819	4.6%	160	338	3,481
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 3	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	0.0%	0.0%	0	0	0	0.0%	0	0	0

Exhibit B.2 Montioring Period for Year 2006: Sampling Data for All Airlines

	Routine Samples									Repeat Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines									***Total Coliform and Chlorine Residual Data for All Airlines***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	24	8.3%	2	0	24	0.0%	0.0%	0	0	24	0.0%	0	0	24
Calendar Qtr 1	2.0%	0.0%	21	0	1,070	5.0%	38	308	762	1.5%	0.0%	4	0	260	8.8%	19	44	216
Calendar Qtr 2	4.0%	9.1%	33	3	823	14.0%	78	265	558	4.8%	9.5%	42	4	880	5.3%	46	16	864
Calendar Qtr 3	5.5%	1.9%	53	1	969	44.4%	326	234	735	2.9%	0.0%	32	0	1,098	34.6%	308	207	891
Calendar Qtr 4	2.7%	0.0%	15	0	565	45.4%	206	111	454	1.7%	0.0%	12	0	714	55.7%	398	0	714
Totals	3.5%	3.3%	122	4	3451	25.7%	650	918	2,533	3.0%	4.4%	90	4	2976	28.5%	771	267	2,709
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	2.0%	0.0%	20	0	1,024	3.8%	27	308	716	1.6%	0.0%	4	0	252	7.2%	15	44	208
Calendar Qtr 2	3.5%	12.0%	25	3	722	12.2%	56	263	459	4.8%	9.8%	41	4	846	5.3%	45	0	846
Calendar Qtr 3	2.6%	0.0%	18	0	702	44.6%	213	224	478	1.9%	0.0%	16	0	864	34.6%	299	0	864
Calendar Qtr 4	1.9%	0.0%	9	0	484	44.9%	168	110	374	1.5%	0.0%	10	0	676	57.0%	385	0	676
Totals	2.5%	4.2%	72	3	2932	22.9%	464	905	2,027	2.7%	5.6%	71	4	2638	28.7%	744	44	2,594
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	24	8.3%	2	0	24	0.0%	0.0%	0	0	24	0.0%	0	0	24
Calendar Qtr 1	2.2%	0.0%	1	0	46	23.9%	11	0	46	0.0%	0.0%	0	0	8	50.0%	4	0	8
Calendar Qtr 2	7.9%	0.0%	8	0	101	22.2%	22	2	99	2.9%	0.0%	1	0	34	5.6%	1	16	18
Calendar Qtr 3	13.1%	2.9%	35	1	267	44.0%	113	10	257	6.8%	0.0%	16	0	234	33.3%	9	207	27
Calendar Qtr 4	7.4%	0.0%	6	0	81	47.5%	38	1	80	5.3%	0.0%	2	0	38	34.2%	13	0	38
Total	9.6%	2.0%	50	1	519	36.8%	186	13	506	5.6%	0.0%	19	0	338	23.5%	27	223	115

Exhibit B.2 Montioring Period for Year 2006: Sampling Data for All Airlines

	All Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	48	4.2%	2	0	48
Calendar Qtr 1	1.9%	0.0%	25	0	1,330	5.8%	57	352	978
Calendar Qtr 2	4.4%	9.3%	75	7	1,703	8.7%	124	281	1,422
Calendar Qtr 3	4.1%	1.2%	85	1	2,067	39.0%	634	441	1,626
Calendar Qtr 4	2.1%	0.0%	27	0	1,279	51.7%	604	111	1,168
Totals	3.3%	3.8%	212	8	6427	27.1%	1,421	1,185	5,242
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	1.9%	0.0%	24	0	1,276	4.5%	42	352	924
Calendar Qtr 2	4.2%	10.6%	66	7	1,568	7.7%	101	263	1,305
Calendar Qtr 3	2.2%	0.0%	34	0	1,566	38.2%	512	224	1,342
Calendar Qtr 4	1.6%	0.0%	19	0	1,160	52.7%	553	110	1,050
Totals	2.6%	4.9%	143	7	5570	26.1%	1,208	949	4,621
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	48	4.2%	2	0	48
Calendar Qtr 1	1.9%	0.0%	1	0	54	27.8%	15	0	54
Calendar Qtr 2	6.7%	0.0%	9	0	135	19.7%	23	18	117
Calendar Qtr 3	10.2%	2.0%	51	1	501	43.0%	122	217	284
Calendar Qtr 4	6.7%	0.0%	8	0	119	43.2%	51	1	118
Total	8.1%	1.4%	69	1	857	34.3%	213	236	621

Exhibit B.3 Montioring Period for Year 2007: Sampling Data for All Airlines

	Routine Samples									Repeat Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines									***Total Coliform and Chlorine Residual Data for All Airlines***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	44	0.0%	0	38	6	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	1.7%	4.5%	22	1	1,312	29.4%	310	258	1,054	1.0%	0.0%	7	0	670	49.1%	322	14	656
Calendar Qtr 2	2.7%	0.0%	45	0	1,698	13.4%	179	361	1,337	5.0%	0.0%	13	0	262	7.7%	18	28	234
Calendar Qtr 3	3.8%	2.2%	45	1	1,177	27.1%	266	196	981	12.1%	0.0%	36	0	297	33.1%	79	58	239
Calendar Qtr 4	7.0%	11.1%	63	7	901	11.7%	89	141	760	8.1%	0.0%	41	0	509	1.4%	6	83	426
Total	3.4%	5.1%	175	9	5132	20.4%	844	994	4,138	5.6%	0.0%	97	0	1738	27.3%	425	183	1,555
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	1.8%	0.0%	21	0	1,158	19.7%	177	258	900	1.1%	0.0%	7	0	666	49.4%	322	14	652
Calendar Qtr 2	2.7%	0.0%	42	0	1,529	3.9%	46	361	1,168	5.0%	0.0%	13	0	258	6.1%	14	28	230
Calendar Qtr 3	3.9%	0.0%	43	0	1,105	22.1%	201	196	909	12.5%	0.0%	36	0	289	30.7%	71	58	231
Calendar Qtr 4	7.5%	11.1%	63	7	837	5.2%	36	141	696	8.1%	0.0%	41	0	509	1.4%	6	83	426
Total	3.7%	4.1%	169	7	4629	12.5%	460	956	3,673	5.6%	0.0%	97	0	1722	26.8%	413	183	1,539
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	44	0.0%	0	38	6	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.6%	100.0%	1	1	154	86.4%	133	0	154	0.0%	0.0%	0	0	4	0.0%	0	0	4
Calendar Qtr 2	1.8%	0.0%	3	0	169	78.7%	133	0	169	0.0%	0.0%	0	0	4	100.0%	4	0	4
Calendar Qtr 3	2.8%	50.0%	2	1	72	90.3%	65	0	72	0.0%	0.0%	0	0	8	100.0%	8	0	8
Calendar Qtr 4	0.0%	0.0%	0	0	64	82.8%	53	0	64	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	1.2%	33.3%	6	2	503	82.6%	384	38	465	0.0%	0.0%	0	0	16	75.0%	12	0	16

Exhibit B.3 Montioring Period for Year 2007: Sampling Data for All Airlines

	All Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	44	0.0%	0	38	6
Calendar Qtr 1	1.5%	3.4%	29	1	1,982	37.0%	632	272	1,710
Calendar Qtr 2	3.0%	0.0%	58	0	1,960	12.5%	197	389	1,571
Calendar Qtr 3	5.5%	1.2%	81	1	1,474	28.3%	345	254	1,220
Calendar Qtr 4	7.4%	6.7%	104	7	1,410	8.0%	95	224	1,186
Total	4.0%	3.3%	272	9	6870	22.3%	1,269	1,177	5,693
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	1.5%	0.0%	28	0	1,824	32.2%	499	272	1,552
Calendar Qtr 2	3.1%	0.0%	55	0	1,787	4.3%	60	389	1,398
Calendar Qtr 3	5.7%	0.0%	79	0	1,394	23.9%	272	254	1,140
Calendar Qtr 4	7.7%	6.7%	104	7	1,346	3.7%	42	224	1,122
Total	4.2%	2.6%	266	7	6351	16.7%	873	1,139	5,212
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	44	0.0%	0	38	6
Calendar Qtr 1	0.6%	100.0%	1	1	158	84.2%	133	0	158
Calendar Qtr 2	1.7%	0.0%	3	0	173	79.2%	137	0	173
Calendar Qtr 3	2.5%	50.0%	2	1	80	91.3%	73	0	80
Calendar Qtr 4	0.0%	0.0%	0	0	64	82.8%	53	0	64
Total	1.2%	33.3%	6	2	519	82.3%	396	38	481

Exhibit B.4 Montioring Period for Year 2008: Sampling Data for All Airlines

	Routine Samples									Repeat Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines									***Total Coliform and Chlorine Residual Data for All Airlines***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	6.0%	6.7%	60	4	995	23.8%	225	50	945	13.7%	0.0%	63	0	459	27.2%	111	51	408
Calendar Qtr 2	6.7%	4.5%	66	3	988	22.7%	217	33	955	10.4%	0.0%	44	0	424	30.9%	117	45	379
Calendar Qtr 3	17.8%	0.0%	18	0	101	24.2%	24	2	99	10.2%	0.0%	5	0	49	12.2%	5	8	41
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	6.9%	4.9%	144	7	2084	23.3%	466	85	1,999	12.0%	0.0%	112	0	932	28.1%	233	104	828
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	6.1%	6.8%	59	4	963	23.2%	212	50	913	13.7%	0.0%	63	0	459	27.2%	111	51	408
Calendar Qtr 2	6.7%	4.5%	66	3	988	22.7%	217	33	955	10.4%	0.0%	44	0	424	30.9%	117	45	379
Calendar Qtr 3	17.8%	0.0%	18	0	101	24.2%	24	2	99	10.2%	0.0%	5	0	49	12.2%	5	8	41
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	7.0%	4.9%	143	7	2052	23.0%	453	85	1,967	12.0%	0.0%	112	0	932	28.1%	233	104	828
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP									***Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP***								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	3.1%	0.0%	1	0	32	40.6%	13	0	32	3.1%	0.0%	1	0	32	40.6%	13	0	32
Calendar Qtr 2	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 3	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	3.1%	0.0%	1	0	32	40.6%	13	0	32	3.1%	0.0%	1	0	32	40.6%	13	0	32

Exhibit B.4 Montioring Period for Year 2008: Sampling Data for All Airlines

	All Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	8.5%	3.3%	123	4	1,454	24.8%	336	101	1,353
Calendar Qtr 2	7.8%	2.7%	110	3	1,412	25.0%	334	78	1,334
Calendar Qtr 3	15.3%	0.0%	23	0	150	20.7%	29	10	140
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	8.5%	2.7%	256	7	3016	24.7%	699	189	2,827
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	8.6%	3.3%	122	4	1,422	24.5%	323	101	1,321
Calendar Qtr 2	7.8%	2.7%	110	3	1,412	25.0%	334	78	1,334
Calendar Qtr 3	15.3%	0.0%	23	0	150	20.7%	29	10	140
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	8.5%	2.7%	255	7	2984	24.5%	686	189	2,795
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 2	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 3	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 4	0.0%	0.0%	0	0	0	0.0%	0	0	0
Total	0.0%	0.0%	0	0	0	0.0%	0	0	0

Exhibit B.5 Montioring Period for All Years (2005-2008): Sampling Data for All Airlines

	Routine Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	68	6.7%	2	38	30
Calendar Qtr 1	3.1%	4.9%	103	5	3,377	20.8%	573	616	2,761
Calendar Qtr 2	3.5%	3.3%	209	7	5,911	11.6%	603	709	5,202
Calendar Qtr 3	5.1%	1.7%	116	2	2,277	33.4%	616	432	1,845
Calendar Qtr 4	4.1%	7.6%	92	7	2,239	17.9%	312	493	1,746
Total	3.7%	4.0%	520	21	13,872	18.2%	2,106	2,288	11,584
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	3.2%	4.0%	100	4	3,145	16.4%	416	616	2,529
Calendar Qtr 2	3.5%	3.5%	198	7	5,641	9.1%	448	707	4,934
Calendar Qtr 3	4.1%	0.0%	79	0	1,930	29.0%	438	422	1,508
Calendar Qtr 4	4.1%	8.1%	86	7	2,078	13.6%	215	492	1,586
Total	3.6%	3.9%	463	18	12,794	14.4%	1,517	2,237	10,557
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	68	6.7%	2	38	30
Calendar Qtr 1	1.3%	33.3%	3	1	232	67.7%	157	0	232
Calendar Qtr 2	4.1%	0.0%	11	0	270	57.8%	155	2	268
Calendar Qtr 3	10.7%	5.4%	37	2	347	52.8%	178	10	337
Calendar Qtr 4	3.7%	0.0%	6	0	161	60.6%	97	1	160
Total	5.3%	5.3%	57	3	1,078	57.4%	589	51	1,027
	Total Coliform and Chlorine Residual Data for All Airlines by Region								
Region 2	5.4%	16.7%	12	2	222	23.4%	51	4	218
Region 4	4.6%	2.1%	189	4	4,119	13.6%	553	55	4,064
Region 5	1.8%	1.1%	95	1	5,379	4.4%	142	2,122	3,257
Region 6	6.2%	5.0%	160	8	2,585	30.8%	796	0	2,585
Region 9	4.0%	12.8%	47	6	1,166	50.5%	564	49	1,117
Region 10	4.2%	0.0%	17	0	401	0.0%	0	58	343
Total	3.7%	4.0%	520	21	13,872	18.2%	2,106	2,288	11,584
	Total Coliform and Chlorine Residual Data for All Airlines by Sample Location								
Galley	0.9%	12.7%	55	7	6,224	18.3%	1,056	451	5,773
Lavatory	6.1%	3.0%	462	14	7,576	18.0%	1,046	1,780	5,796
Composite*	14.3%	0.0%	1	0	7	66.7%	4	1	6
Unknown Sample Site	3.1%	0.0%	2	0	65	0.0%	0	56	9
Total	3.7%	4.0%	520	21	13,872	18.2%	2,106	2,288	11,584
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP by Sample Location								
Galley	0.8%	12.8%	47	6	5,695	14.1%	743	425	5,270
Lavatory	5.9%	2.9%	413	12	7,027	14.6%	770	1,755	5,272
Composite*	14.3%	0.0%	1	0	7	66.7%	4	1	6
Unknown Sample Site	3.1%	0.0%	2	0	65	0.0%	0	56	9
Total	3.6%	3.9%	463	18	12,794	14.4%	1,517	2,237	10,557

*Composite sample of Galley and Lavatory sources.

Exhibit B.5 Montioring Period for All Years (2005-2008): Sampling Data for All Airlines

	Repeat Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	24	0.0%	0	0	24
Calendar Qtr 1	5.3%	0.0%	74	0	1,389	35.3%	452	109	1,280
Calendar Qtr 2	7.5%	2.7%	146	4	1,941	10.2%	189	93	1,848
Calendar Qtr 3	5.4%	0.0%	81	0	1,492	32.2%	392	273	1,219
Calendar Qtr 4	3.9%	0.0%	56	0	1,438	31.7%	416	126	1,312
Total	5.7%	1.1%	357	4	6,284	25.5%	1,449	601	5,683
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	5.4%	0.0%	74	0	1,377	35.3%	448	109	1,268
Calendar Qtr 2	7.6%	2.8%	145	4	1,903	10.1%	184	77	1,826
Calendar Qtr 3	5.2%	0.0%	65	0	1,250	31.7%	375	66	1,184
Calendar Qtr 4	3.9%	0.0%	54	0	1,400	31.6%	403	126	1,274
Total	5.7%	1.2%	338	4	5,930	25.4%	1,410	378	5,552
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	24	0.0%	0	0	24
Calendar Qtr 1	0.0%	0.0%	0	0	12	33.3%	4	0	12
Calendar Qtr 2	2.6%	0.0%	1	0	38	22.7%	5	16	22
Calendar Qtr 3	6.6%	0.0%	16	0	242	48.6%	17	207	35
Calendar Qtr 4	5.3%	0.0%	2	0	38	34.2%	13	0	38
Total	5.4%	0.0%	19	0	354	29.8%	39	223	131
	Total Coliform and Chlorine Residual Data for All Airlines by Region								
Region 2	10.3%	0.0%	7	0	68	28.3%	17	8	60
Region 4	14.0%	0.0%	156	0	1,114	21.4%	233	23	1,091
Region 5	2.4%	0.0%	18	0	742	9.2%	56	132	610
Region 6	3.7%	3.1%	128	4	3,466	32.6%	1,057	225	3,241
Region 9	9.2%	0.0%	35	0	381	23.8%	86	20	361
Region 10	2.5%	0.0%	13	0	513	0.0%	0	193	320
Total	5.7%	1.1%	357	4	6,284	25.5%	1,449	601	5,683
	Total Coliform and Chlorine Residual Data for All Airlines by Sample Location								
Galley	1.3%	8.6%	35	3	2,715	24.4%	611	208	2,507
Lavatory	9.0%	0.3%	290	1	3,227	26.9%	765	379	2,848
Composite*	9.6%	0.0%	32	0	334	21.6%	69	14	320
Unknown Sample Site	0.0%	0.0%	0	0	8	50.0%	4	0	8
Total	5.7%	1.1%	357	4	6,284	25.5%	1,449	601	5,683
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP by Sample Location								
Galley	1.1%	10.3%	29	3	2,547	24.2%	593	95	2,452
Lavatory	9.1%	0.4%	277	1	3,045	26.9%	748	269	2,776
Composite*	9.6%	0.0%	32	0	334	21.6%	69	14	320
Unknown Sample Site	0.0%	0.0%	0	0	4	0.0%	0	0	4
Total	5.7%	1.2%	338	4	5,930	25.4%	1,410	378	5,552

*Composite sample of Galley and Lavatory sources.

Exhibit B.5 Montioring Period for All Years (2005-2008): Sampling Data for All Airlines

	All Samples								
	Percent TC+	Of the TC+ samples, percent EC+ or FC+	Total # of TC+ samples	Total # TC+ samples that are EC+ or FC+	Total # of TC Samples	Percent CL_2 Residual Non-detect	Total # of CL_2 Residual Non-detect	Total # of Disinfection Unknown	Total # of CL_2 Residual Samples
	Total Coliform and Chlorine Residual Data for All Airlines								
Unknown Calendar Qtr	0.0%	0.0%	0	0	92	3.7%	2	38	54
Calendar Qtr 1	3.7%	2.8%	177	5	4,766	25.4%	1,025	725	4,041
Calendar Qtr 2	4.5%	3.1%	355	11	7,852	11.2%	792	802	7,050
Calendar Qtr 3	5.2%	1.0%	197	2	3,769	32.9%	1,008	705	3,064
Calendar Qtr 4	4.0%	4.7%	148	7	3,677	23.8%	728	619	3,058
Total	4.4%	2.9%	877	25	20,156	20.6%	3,555	2,889	17,267
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	0	0.0%	0	0	0
Calendar Qtr 1	3.8%	2.3%	174	4	4,522	22.8%	864	725	3,797
Calendar Qtr 2	4.5%	3.2%	343	11	7,544	9.3%	632	784	6,760
Calendar Qtr 3	4.5%	0.0%	144	0	3,180	30.2%	813	488	2,692
Calendar Qtr 4	4.0%	5.0%	140	7	3,478	21.6%	618	618	2,860
Total	4.3%	2.7%	801	22	18,724	18.2%	2,927	2,615	16,109
	Total Coliform and Chlorine Residual Data for Airlines with Unapproved QAPP & CRMP								
Unknown Calendar Qtr	0.0%	0.0%	0	0	92	3.7%	2	38	54
Calendar Qtr 1	1.2%	33.3%	3	1	244	66.0%	161	0	244
Calendar Qtr 2	3.9%	0.0%	12	0	308	55.2%	160	18	290
Calendar Qtr 3	9.0%	3.8%	53	2	589	52.4%	195	217	372
Calendar Qtr 4	4.0%	0.0%	8	0	199	55.6%	110	1	198
Total	5.3%	3.9%	76	3	1,432	54.2%	628	274	1,158
	Total Coliform and Chlorine Residual Data for All Airlines by Region								
Region 2	6.6%	10.5%	19	2	290	24.5%	68	12	278
Region 4	6.6%	1.2%	345	4	5,233	15.2%	786	78	5,155
Region 5	1.8%	0.9%	113	1	6,121	5.1%	198	2,254	3,867
Region 6	4.8%	4.2%	288	12	6,051	31.8%	1,853	225	5,826
Region 9	5.3%	7.3%	82	6	1,547	44.0%	650	69	1,478
Region 10	3.3%	0.0%	30	0	914	0.0%	0	251	663
Total	4.4%	2.9%	877	25	20,156	20.6%	3,555	2,889	17,267
	Total Coliform and Chlorine Residual Data for All Airlines by Sample Location								
Galley	1.0%	11.1%	90	10	8,939	20.1%	1,667	659	8,280
Lavatory	7.0%	2.0%	752	15	10,803	21.0%	1,811	2,159	8,644
Composite*	9.7%	0.0%	33	0	341	22.4%	73	15	326
Unknown Sample Site	2.7%	0.0%	2	0	73	23.5%	4	56	17
Total	4.4%	2.9%	877	25	20,156	20.6%	3,555	2,889	17,267
	Total Coliform and Chlorine Residual Data for Airlines with Approved QAPP & CRMP by Sample Location								
Galley	0.9%	11.8%	76	9	8,242	17.3%	1,336	520	7,722
Lavatory	6.9%	1.9%	690	13	10,072	18.9%	1,518	2,024	8,048
Composite*	9.7%	0.0%	33	0	341	22.4%	73	15	326
Unknown Sample Site	2.9%	0.0%	2	0	69	0.0%	0	56	13
Total	4.3%	2.7%	801	22	18,724	18.2%	2,927	2,615	16,109

*Composite sample of Galley and Lavatory sources.

Appendix C

Cost Model

Section Number	Section Title	Exhibit Title	Exhibit Number
C.0	Assumptions	Assumptions	C.0
C.1	Implementation and Annual Administration	Air Carrier Burden and Cost Estimates for Implementation (2008$)	C.1a
		Agency Burden and Cost Estimates for Implementation (2008$)	C.1b
		Agency Burden and Cost Estimates for Annual Administrative Activities (2008$)	C.1c
C.2	Monitoring Plan	Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 1	C.2a
		Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 2	C.2b
		Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 3	C.2c
		Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 1	C.2d
		Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 2	C.2e
		Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 3	C.2f
C.3	Coliform Monitoring	Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 1	C.3a
		Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 2	C.3b
		Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 3	C.3c
		Agency Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 1	C.3d
		Agency Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 2	C.3e
		Agency Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 3	C.3f
C.4	Disinfectant Residual Monitoring	Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 1	C.4a
		Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 2	C.4b
		Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 3	C.4c
		Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 1	C.4d
		Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 2	C.4e
		Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 3	C.4f
C.5	Turbidity Monitoring	Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 1	C.5a
		Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 2	C.5b
		Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 3	C.5c
		Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 1	C.5d
		Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 2	C.5e
		Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 3	C.5f
C.6	Nitrate/Nitrite Monitoring	Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 1	C.6a
		Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 2	C.6b
		Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 3	C.6c
		Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 1	C.6d
		Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 2	C.6e
		Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 3	C.6f
C.7	O&M Plan	Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 1	C.7a
		Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 2	C.7b
		Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 3	C.7c
		Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 1	C.7d
		Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 2	C.7e
		Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 3	C.7f
C.8	Routine Disinfection and Flushing	Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 1	C.8a
		Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 2	C.8b
		Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 3	C.8c
		Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 1	C.8d
		Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 2	C.8e
		Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 3	C.8f
C.9	Corrective Action Disinfection and Flushing	Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 1	C.9a
		Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 2	C.9b
		Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 3	C.9c
C.10	Sanitary Survey/Compliance Audit	Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 1	C.10a
		Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 2	C.10b
		Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 3	C.10c
		Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 1	C.10d
		Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 2	C.10e
		Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 3	C.10f

Section Number	Section Title	Exhibit Title	Exhibit Number
C.11	Rule Schedule	Rule Schedule	C.11
C.12	Nominal Costs	Nominal Rule Activity Costs for Alternative 1, by Year	C.12a
		Nominal Air Carrier Activity Costs for Alternative 1, by Year	C.12b
		Nominal Agency Activity Costs for Alternative 1, by Year	C.12c
		Nominal Rule Activity Costs for Alternative 2, by Year	C.12d
		Nominal Air Carrier Activity Costs for Alternative 2, by Year	C.12e
		Nominal Agency Activity Costs for Alternative 2, by Year	C.12f
		Nominal Rule Activity Costs for Alternative 3, by Year	C.12g
		Nominal Air Carrier Activity Costs for Alternative 3, by Year	C.12h
		Nominal Agency Activity Costs for Alternative 3, by Year	C.12i
		Nominal Rule Activity Costs for Alternative 4 (Final Rule), by Year	C.12j
		Nominal Air Carrier Activity Costs for Alternative 4 (Final Rule), by Year	C.12k
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C.13	Present Value at 3 Percent	Present Value of Rule Activity Costs for Alternative 1 at 3 Percent, by Year	C.13a
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		Present Value of Air Carrier Activity Costs for Alternative 2 at 3 Percent, by Year	C.13e
		Present Value of Agency Activity Costs for Alternative 2 at 3 Percent, by Year	C.13f
		Present Value of Rule Activity Costs for Alternative 3 at 3 Percent, by Year	C.13g
		Present Value of Air Carrier Activity Costs for Alternative 3 at 3 Percent, by Year	C.13h
		Present Value of Agency Activity Costs for Alternative 3 at 3 Percent, by Year	C.13i
		Present Value of Rule Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year	C.13j
		Present Value of Air Carrier Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year	C.13k
		Present Value of Agency Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year	C.13l
C.14	Present Value at 7 Percent	Present Value of Rule Activity Costs for Alternative 1 at 7 Percent, by Year	C.14a
		Present Value of Air Carrier Activity Costs for Alternative 1 at 7 Percent, by Year	C.14b
		Present Value of Agency Activity Costs for Alternative 1 at 7 Percent, by Year	C.14c
		Present Value of Rule Activity Costs for Alternative 2 at 7 Percent, by Year	C.14d
		Present Value of Air Carrier Activity Costs for Alternative 2 at 7 Percent, by Year	C.14e
		Present Value of Agency Activity Costs for Alternative 2 at 7 Percent, by Year	C.14f
		Present Value of Rule Activity Costs for Alternative 3 at 7 Percent, by Year	C.14g
		Present Value of Air Carrier Activity Costs for Alternative 3 at 7 Percent, by Year	C.14h
		Present Value of Agency Activity Costs for Alternative 3 at 7 Percent, by Year	C.14i
		Present Value of Rule Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year	C.14j
		Present Value of Air Carrier Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year	C.14k
		Present Value of Agency Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year	C.14l
C.15	Summary	Summary of Rule Costs (Millions of 2008$)	C.15a
		Summary of Rule Costs (Millions of 2008$), Alternative 1	C.15b
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		Summary of Rule Costs (Millions of 2008$), Alternative 3	C.15d
		Summary of Rule Costs (Millions of 2008$), Alternative 4 (Final Rule)	C.15e

C.0 Assumptions

C.0 Assumptions

	Alt 1 (Current Regulations)	Alt 2 (AOCs)	Alt 3 (WSG 29)	Alt 4 (Final Rule)
Implementation & Annual Administration	Identical for all alternatives			
Monitoring Plan	Develop Sample Siting Plan to include sample collection locations (all air carriers).	Develop QAPP, Develop Montoring Plan (all air carriers).	Develop Monitoring Plan (50% of air carriers).	Develop Sampling Plan per ADWR requirements and report sampling frequency to Agency (all air carriers).
O&M Plan	Not required	Not required	50% of air carriers will develop O&M plans in lieu of required monitoring.	Update existing O&M manual and practices with ADWR specific requirements and submit statement to Agency indicating that O&M manual has been updated (all air carriers).
Coliform Monitoring	1) One TC sample collected monthly/aircraft. 2) 15% TC+. 3) 4% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling. 4) Four repeat samples collected within 24 hours of notification of TC+. 5) Four additional coliform samples collected per aircraft with routine coliform monitoring TC+ (assume no waivers). 6) No post disinfection monitoring samples collected.	1) One galley and one lavatory TC sample collected annually/aircraft. 2) 3.6% TC+. 3) 5.7% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling. 4) Four repeat samples collected within 24 hours of notification of TC+. 5) No additional colform samples collected. 6) Four corrective action follow-up samples collected per aircraft with positive routine coliform monitoring sample that undergoes corrective action disinfection and flushing.	1) One TC sample collected quarterly/aircraft not implementing O&M plan. Assuming 50% of aircraft implement O&M plan. 2) 3.6% TC+. 3) 5.7% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling. 4) Repeat monitoring not specified, assumed no repeat monitoring samples. 4) No additional coliform samples collected. 5) No corrective action follow-up samples collected.	1) One galley and one lavatory TC sample collected/aircraft. 30% annually, 30% twice annually, 30% quarterly, and 10% monthly. 2) 3.6% TC+. 3) 5.7% of aircraft performing repeat sampling will have at least one additional TC+ during repeat sampling. 4) 0% of aircraft performing annual routine coliform monitoring, 0% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 46% of aircraft performing monthly routine coliform monitoring with TC+ will collect three repeat samples within 24 hours of notification of TC+ as an option to immediate corrective action. 5) No additional coliform samples collected. 6) Two corrective action follow-up samples taken per aircraft that undergoes corrective action flushing and disinfecting.
Disinfectant Residual Monitoring	Collected monthly at same locations as routine coliform monitoring samples.	Collected annually at 1 lavatory and 1 galley on each aircraft.	Not required	Not required
Turbidity Monitoring	Not required	Not required	Daily/aircraft. Assuming 50% of aircraft implement O&M plan.	Not required
Nitrate/Nitrite Monitoring	Not required	Not required	Not required	Not required
Routine Disinfection & Flushing	1) Not required 2) Self-certification not required	1) Quarterly/aircraft 2) Quarterly self-certification	1) Quarterly/aircraft 2) Self-certification not required	1) 30% quarterly, 30% thrice annually, 30% twice annually, and 10% annually. 2) Self-certification not required
Corrective Action Disinfection & Flushing	Not required	After TC+	After TC+	1) 100% of aircraft performing annual routine coliform monitoring, 100% of aircraft performing twice annual routine coliform monitoring, 50% of aircraft performing quarterly routine coliform monitoring, and 54% of aircraft performing monthly routine coliform monitoring perform corrective action disinfection and flushing after TC+ routine sample. Assume the remainder of aircraft will perform repeat sampling. 2) EPA assumes the corrective action disinfection and flushing procedure will be conducted during routine disinfection and flushing events whenever possible, and therefore, would not incur separate costs for corrective action disinfection and flushing events other than the cost of collection, shipping, and analysis of two follow-up coliform samples required as part of corrective action. 3) EPA assumes that of the aircraft with a positive routine coliform sample, 0 percent of the aircraft performing annual, twice annual, and quarterly monitoring, and 46 percent of aircraft performing monthly monitoring will not coordinate the events and will incur the full cost for corrective action disinfection and flushing.
Sanitary Survey/Compliance Audit	EPA performs surveys. Only recordkeeping burden for aircraft.	Not required	Not required	EPA performs compliance audit. Aircraft confirm self-inspection and report any deficiencies.

C.1 Implementation and Annual Administration

Exhibit C.1a Air Carrier Burden and Cost Estimates for Implementation (2008$)

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Read and Understand Rule	$42.86	8	$ 343	504	$ 21,600
Train Personnel	$42.86	8	$ 343	504	$ 21,600
Total		**16**	**$ 686**	**1,008**	**$ 43,201**

Notes:

(1) Detail may not add due to independent rounding.

(2) Air carrier burden and cost estimates for Implementation activities are assumed to be identical for Alternatives 1-3 and the Final Rule.

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for start-up activities reflect EPA estimate.

(D), (E) National totals for all 63 U.S. air carriers subject to ADWR to perform implementation activities. Assumes all air carriers spend equal time performing implementation activities, regardless of fleet size or aircraft type.

Exhibit C.1b Agency Burden and Cost Estimates for Implementation (2008$)

Compliance Activity	Labor Cost ($/hour) A	One-time labor burden (hours/Region) B	Unit Cost C=A*B	Total Labor Burden (hours) D=B*10	Total Cost ($) E=C*10
Read and Understand Rule	$50.14	8	$ 401	80	$ 4,012
Program Development	$50.14	40	$ 2,006	400	$ 20,058
Modify/Develop Data Management Systems	$50.14	115	$ 5,767	1,150	$ 57,666
Air Carrier Training and Technical Assistance	$50.14	80	$ 4,012	800	$ 40,115
Staff Training	$50.14	40	$ 2,006	400	$ 20,058
Total		**283**	**$ 14,191**	**2,830**	**$ 141,908**

Notes:

(1) Detail may not add due to independent rounding.

(2) Agency burden and cost estimates for Implementation activities are assumed to be identical for Alternatives 1-3 and the Final Rule.

Sources:

(A) Agency labor costs from Section 5.2.1

(B) Labor hours for start-up activities reflect EPA estimate.

(D), (E) National totals for Agency (EPA Regions) to implement ADWR for 63 U.S. air carriers subject to ADWR. Assumes each region spends equal time performing implementation activities, regardless of number of air carriers headquartered in their region, air carrier fleet size or aircraft type.

Exhibit C.1c Agency Burden and Cost Estimates for Annual Administrative Activities (2008$)

Compliance Activity	Labor Cost ($/hour)	Labor (hours/Region/year)	Cost ($/year)	Total Labor Burden (hours/year)	Total Cost ($/year)
	A	B	C=A*B	D=B*10	E=C*10
Lab Certification	$50.14	-	$ -	-	$ -
Ongoing Technical Assistance	$50.14	500	$ 25,072	5,000	$ 250,720
Staff Training	$50.14	16	$ 802	160	$ 8,023
Total		**516**	**$ 25,874**	**5,160**	**$ 258,743**

Notes:

(1) Detail may not add due to independent rounding.

(2) Agency burden and cost estimates for annual administrative activities are assumed to be identical for Alternatives 1-3 and the Final Rule.

(3) No costs are associated with lab certification under the ADWR because it is not anticipated that the Agency will need to oversee lab certification programs in addition to what is being done for the Total Coliform Rule.

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for start-up activities reflect EPA estimate.

(D), (E) National totals for Agency (EPA Regions) to implement ADWR for 63 U.S. air carriers subject to ADWR. Assumes each region spends equal time performing implementation activities, regardless of number of air carriers headquartered in their region, air carrier fleet size or aircraft type.

C.2 Monitoring Plan

Exhibit C.2a Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 1

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Develop Sample Siting Plan to include sample collection locations	$42.86	10	$ 429	630	$ 27,001
Total		**10**	**$ 429**	**630**	**$ 27,001**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing sampling siting plans reflect EPA estimate.

(D), (E) Assume all 63 U.S. air carriers subject to ADWR will develop sample siting plans. Assumes all air carriers spend equal time developing and sample siting plans, regardless of fleet size or aircraft type.

Exhibit C.2b Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 2

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Develop QAPP	$42.86	10	$ 429	630	$ 27,001
Develop Monitoring Plan	$42.86	10	$ 429	630	$ 27,001
Total		**20**	**$ 857**	**1,260**	**$ 54,001**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing QAPP and monitoring plans reflect EPA estimate.

(D), (E) Assume all 63 U.S. air carriers subject to ADWR will develop QAPPs and monitoring plans. Assumes all air carriers spend equal time developing QAPPs and monitoring plans, regardless of fleet size or aircraft type.

Exhibit C.2c Air Carrier Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 3

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*(63/2)	E=C*(63/2)
Develop Monitoring Plan	$42.86	10	$ 429	315	$ 13,500
Total		**10**	**$ 429**	**315**	**$ 13,500**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing monitoring plans reflect EPA estimate.

(D), (E) Assume 50% of the 63 U.S. air carriers subject to ADWR will develop monitoring plans. Assumes all air carriers spend equal time developing monitoring plans, regardless of fleet size or aircraft type.

Exhibit C.2d Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 1

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Review Air Carrier Sample Siting Plan	$50.14	5	$ 251	315	$ 15,795
Total		**5**	**$ 251**	**315**	**$ 15,795**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing sample siting plan reflect EPA estimate.

(D), (E) Assume all 63 U.S. air carriers subject to ADWR will develop sample siting plans. Assumes Agency spends equal time reviewing air carrier sample siting plans, regardless of fleet size or aircraft type.

Exhibit C.2e Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 2

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*63	E=C*63
Review Air Carrier QAPP	$50.14	5	$ 251	315	$ 15,795
Review Air Carrier Monitoring Plan	$50.14	5	$ 251	315	$ 15,795
Total		**5**	**$ 251**	**315**	**$ 15,795**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing QAPP and monitoring plan reflect EPA estimate.

(D), (E) Assume all 63 U.S. air carriers subject to ADWR will develop QAPPs and monitoring plans. Assumes Agency spends equal time reviewing air carrier QAPPs and monitoring plans, regardless of fleet size or aircraft type.

Exhibit C.2f Agency Burden and Cost Estimates for Monitoring Plan (2008$), Alternative 3

Compliance Activity	Labor Cost ($/hour)	One-time labor burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*(63/2)	E=C*(63/2)
Review Air Carrier Monitoring Plan	$50.14	5	$ 251	158	$ 7,898
Total		**5**	**$ 251**	**158**	**$ 7,898**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing monitoring plans reflect EPA estimate.

(D), (E) Assume 50% of the 63 U.S. air carriers subject to ADWR will develop monitoring plans. Assumes Agency spends equal time reviewing air carrier monitoring plans, regardless of fleet size or aircraft type.

C.3 Coliform Monitoring

Exhibit C.3a Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 1

			TC Samples						TC Sampling			Analysis			
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Coliform Monitoring (samples/year)	Routine Coliform Monitoring TC+ (samples/year)	Additional TC+ (samples/year)	Repeat (samples/year)	Additional Routine Coliform Monitoring (samples/year)	Corrective Action Coliform Follow-up Sample (post-disinfection sample) (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample set)	Total Shipping Cost ($/year)
A	B	C=B*A	D=12*B	E=D*0.15	F=E*0.04	G=E*4	H=G*4	I	J	K=J(D+G+H+I)	L=K*AA	M	N=M(D+G+H+I)	O	P=O(D+G/4)
1	381	381	4,572	686	27	2,743	10,973	-	0.5	9,144	$ 313,403	0	-	$107	565,110
2	2,080	4,160	24,960	3,744	150	14,976	59,904	-	0.5	49,920	$ 1,710,966	0	-	$107	3,085,117
3	756	2,268	9,072	1,361	54	5,443	21,773	-	0.5	18,144	$ 621,870	0	-	$107	1,121,321
4	421	1,684	5,052	758	30	3,031	12,125	-	0.5	10,104	$ 346,306	0	-	$107	624,440
5	956	4,780	11,472	1,721	69	6,883	27,533	-	0.5	22,944	$ 786,386	0	-	$107	1,417,967
6	871	5,226	10,452	1,568	63	6,271	25,085	-	0.5	20,904	$ 716,467	0	-	$107	1,291,893
7	298	2,086	3,576	536	21	2,146	8,582	-	0.5	7,152	$ 245,129	0	-	$107	442,002
8	809	6,472	9,708	1,456	58	5,825	23,299	-	0.5	19,416	$ 665,467	0	-	$107	1,199,933
≥ 9	755	9,354	9,060	1,359	54	5,436	21,744	-	0.5	18,120	$ 621,048	0	-	$107	1,119,838
Total	**7,327**	**36,411**	**87,924**	**13,189**	**528**	**52,754**	**211,018**	**0**		**175,848**	**$ 6,027,042**		**0**		**$ 10,867,622**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) One TC sample collected monthly per aircraft.

(E) Assume 15% of coliform samples will be TC+.

(F) Assume 4% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling.

(G) Four repeat samples collected within 24 hours of notification of TC+.

(H) Four additional routine coliform monitoring samples collected per aircraft with positive routine coliform monitoring sample in the month following notification of TC+. Assume no systems receive waiver.

(I) Post disinfection monitoring not specified, assumed no follow-up samples collected.

(J) Assume 0.5 hour for sample collection and for process, storage, and shipping of sample. (Sample set burden is 0.5 hour for (1) routine samples, 2 hours for (4) repeat samples, and 0 hour for (0) corrective action follow-up samples.)

(M) Assume all analysis conducted by outside lab.

(O) Estimated courier fees based on costs from various courier services in major cities. Assumed courier services required for each sample set. (Sample set consists of 1 routine samples, and 4 repeat samples. Assumed airport distance of 20-30 miles from lab. Assumed courier would return cooler to air carrier. 100% of shipping costs incurred by TC monitoring, since residual samples are analyzed immediately and do not require shipping, turbidity samples are not required under Alt. 1, and the space required to ship annual nitrate/nitrate samples is negligible.

(Q) Average coliform analysis costs based on costs from various labs across the country. Assume all analysis conducted by outside lab.

(S) Assume air carriers will replace coolers, gel packs, and thermometers once a year. 100% of the unit equipment cost is incurred by total coliform monitoring, since residual samples are immediately read and will not require shipping in a cooler.

(T) Coolers, gel packs, and thermometers are purchased by air carriers. The costs for this equipment are assumed to be distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(U) Assume each air carrier will purchase three new refrigerators. 100% of the refrigerator cost is incurred by total coliform monitoring, since disinfectant residual monitoring does not require the use of a refrigerator.

(V) Refrigerators are purchased by air carriers. Assume costs for 63 airlines are distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(W), (X), (Y) Based on EPA estimate.

(Y) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule. For modeling purposes, this reporting burden is captured in Year 3 and follows the same schedule as coliform monitoring.

(Z) Assume burden for 63 airlines is distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(AA) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(AB) Columns W and X applied on a sample set basis. Assume a sample set consists of (1) routine sample, (4) repeat samples, and (0) corrective action follow-up samples.

Exhibit C.3a Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 1 (cont'd)

	Analysis						Recordkeeping							Totals		
# of Available Sampling Points	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample set)	Report Monitoring Results (hours/sample set)	Report Water System Inventory/Changes (hours/air carrier)	Report Water System Inventory/Changes Burden (hours/year)	Labor Cost ($/hour)	Recordkeeping and Reporting Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	Q	R=Q(D+G+H+I)	S	T	U	V	W	X	Y	Z	AA	AB=((W+X)*(D+G/4+H/4))+Z	AC=AB*AA	AD=K+M+AB	AE=L+P+R+T+AC	AF=V
1	$22.16	405,307	$ 219	$ 717	$ 597	$ 1,956	0.25	0.25	1.00	3.28	$34.27	4,004	$ 137,226	13,148	$ 1,421,764	$ 1,956
2	$22.16	2,212,700	$ 219	$ 3,917	$ 597	$ 10,677	0.25	0.25	1.00	17.88	$34.27	21,858	$ 749,161	71,778	$ 7,761,860	$ 10,677
3	$22.16	804,231	$ 219	$ 1,424	$ 597	$ 3,881	0.25	0.25	1.00	6.50	$34.27	7,945	$ 272,291	26,089	$ 2,821,138	$ 3,881
4	$22.16	447,859	$ 219	$ 793	$ 597	$ 2,161	0.25	0.25	1.00	3.62	$34.27	4,424	$ 151,633	14,528	$ 1,571,030	$ 2,161
5	$22.16	1,016,991	$ 219	$ 1,800	$ 597	$ 4,907	0.25	0.25	1.00	8.22	$34.27	10,046	$ 344,326	32,990	$ 3,567,470	$ 4,907
6	$22.16	926,568	$ 219	$ 1,640	$ 597	$ 4,471	0.25	0.25	1.00	7.49	$34.27	9,153	$ 313,711	30,057	$ 3,250,279	$ 4,471
7	$22.16	317,012	$ 219	$ 561	$ 597	$ 1,530	0.25	0.25	1.00	2.56	$34.27	3,132	$ 107,332	10,284	$ 1,112,036	$ 1,530
8	$22.16	860,613	$ 219	$ 1,523	$ 597	$ 4,153	0.25	0.25	1.00	6.96	$34.27	8,501	$ 291,380	27,917	$ 3,018,916	$ 4,153
≥ 9	$22.16	803,167	$ 219	$ 1,422	$ 597	$ 3,876	0.25	0.25	1.00	6.49	$34.27	7,934	$ 271,931	26,054	$ 2,817,406	$ 3,876
Total		**$ 7,794,448**		**$ 13,797**		**$ 37,611**				**63**			**$ 2,638,990**	**252,845**	**$ 27,341,900**	**$ 37,611**

Exhibit C.3b Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 2

			TC Samples						TC Sampling			Analysis			
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Coliform Monitoring (samples/year)	Routine Coliform Monitoring TC+ (samples/year)	Additional TC+ (samples/year)	Repeat (samples/year)	Additional Routine Coliform Monitoring (samples/year)	Corrective Action Coliform Follow-up Sample (post-disinfection monitoring) (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample set)	Total Shipping Cost ($/year)
A	B	C=B*A	D	E=D*0.036	F=E*0.057	G=E*4	H	I	J	K=J(D+G+H+I)	L=K*AA	M	N=M(D+G+H+I)	O	P=O(D/2+G/4+I/4)
1	381	381	762	27	2	110	0	110	0.5	491	$ 16,819	0	-	$107	46,847
2	2,080	4,160	4,160	150	9	599	0	599	0.5	2,679	$ 91,822	0	-	$107	255,752
3	756	2,268	1,512	54	3	218	0	218	0.5	974	$ 33,374	0	-	$107	92,956
4	421	1,684	842	30	2	121	0	121	0.5	542	$ 18,585	0	-	$107	51,765
5	956	4,780	1,912	69	4	275	0	275	0.5	1,231	$ 42,203	0	-	$107	117,547
6	871	5,226	1,742	63	4	251	0	251	0.5	1,122	$ 38,450	0	-	$107	107,096
7	298	2,086	596	21	1	86	0	86	0.5	384	$ 13,155	0	-	$107	36,641
8	809	6,472	1,618	58	3	233	0	233	0.5	1,042	$ 35,713	0	-	$107	99,473
≥ 9	755	9,354	1,510	54	3	217	0	217	0.5	972	$ 33,330	0	-	$107	92,833
Total	**7,327**	**36,411**	**14,654**	**528**	**30**	**2,110**	**0**	**2,110**		**9,437**	**$ 323,451**		**0**		**$ 900,910**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) One galley and one lavatory TC sample collected annually per aircraft.

(E) Assume 3.6% of coliform samples will be TC+ based on AOC data.

(F) Assume 5.7% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling (based on AOC data).

(G) Four repeat samples collected within 24 hours of notification of TC+. Assume aircraft with less than four sampling points collect a total of 400mL of samples from all available sampling points.

(H) Additional routine coliform monitoring not specified, assumed no additional routine coliform monitoring samples collected.

(I) Four follow-up samples collected per aircraft with positive routine coliform monitoring sample that undergoes corrective action disinfection and flushing.

(J) Assume 0.5 hour for sample collection and for process, storage, and shipping of sample. (Sample set burden is 1 hour for (2) routine samples, 2 hours for (4) repeat samples, and 2 hour for (4) corrective action follow-up samples.)

(M) Assume all analysis conducted by outside lab.

(O) Estimated courier fees based on costs from various courier services in major cities. Assumed courier services required for each sample set. (Sample set consists of 2 routine samples, 4 repeat samples, and 4 corrective action follow-up samples.) Assumed airport distance of 20-30 miles from lab. Assumed courier would return cooler to air carrier. 100% of shipping costs incurred by TC monitoring, since residual samples are analyzed immediately and do not require shipping.

(Q) Average coliform analysis costs based on costs from various labs across the country. Assume all analysis conducted by outside lab.

(S) Assume air carriers will replace coolers, gel packs, and thermometers once a year. 100% of the unit equipment cost is incurred by total coliform monitoring, since residual samples are immediately read and will not require shipping in a cooler.

(T) Coolers, gel packs, and thermometers are purchased by air carriers. The costs for this equipment are assumed to be distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(U) Assume each aircraft will purchase three new refrigerators. 100% of the refrigerator cost is incurred by total coliform monitoring, since disinfectant residual monitoring does not require the use of a refrigerator.

(V) Refrigerators are purchased by air carriers. Assume costs for 63 airlines are distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(W), (X), (Y) Based on EPA estimate.

(Y) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule. For modeling purposes, this reporting burden is captured in Year 3 and follows the same schedule as coliform monitoring.

(Z) Assume burden for 63 airlines is distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(AA) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(AB) Columns W and X applied on a sample set basis. Assume a sample set consists of (2) routine samples, (4) repeat samples, and (4) corrective action follow-up samples.

Exhibit C.3b Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 2 (cont'd)

	Analysis						Recordkeeping							Totals		
# of Available Sampling Points	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample set)	Report Monitoring Results (hours/sample set)	Report Water System Inventory/Changes (hours/air carrier)	Report Water System Inventory/Changes Burden (hours/year)	Labor Cost ($/hour)	Recordkeeping and Reporting Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	Q	R=Q(D+G+H+I)	S	T	U	V	W	X	Y	Z	AA	AB=((W+X)*(D/2+G/4+H+I/4))+Z	AC=AB*AA	AD=K+M+AB	AE=L+P+R+T+AC	AF=V
1	$22.16	21,751	$ 219	$ 717	$ 597	$ 1,956	0.25	0.25	1.00	3.28	$34.27	221	$ 7,582	712	$ 93,717	$ 1,956
2	$22.16	118,748	$ 219	$ 3,917	$ 597	$ 10,677	0.25	0.25	1.00	17.88	$34.27	1,208	$ 41,391	3,887	$ 511,630	$ 10,677
3	$22.16	43,160	$ 219	$ 1,424	$ 597	$ 3,881	0.25	0.25	1.00	6.50	$34.27	439	$ 15,044	1,413	$ 185,958	$ 3,881
4	$22.16	24,035	$ 219	$ 793	$ 597	$ 2,161	0.25	0.25	1.00	3.62	$34.27	244	$ 8,378	787	$ 103,556	$ 2,161
5	$22.16	54,579	$ 219	$ 1,800	$ 597	$ 4,907	0.25	0.25	1.00	8.22	$34.27	555	$ 19,024	1,786	$ 235,153	$ 4,907
6	$22.16	49,726	$ 219	$ 1,640	$ 597	$ 4,471	0.25	0.25	1.00	7.49	$34.27	506	$ 17,332	1,628	$ 214,245	$ 4,471
7	$22.16	17,013	$ 219	$ 561	$ 597	$ 1,530	0.25	0.25	1.00	2.56	$34.27	173	$ 5,930	557	$ 73,301	$ 1,530
8	$22.16	46,186	$ 219	$ 1,523	$ 597	$ 4,153	0.25	0.25	1.00	6.96	$34.27	470	$ 16,099	1,512	$ 198,994	$ 4,153
≥ 9	$22.16	43,103	$ 219	$ 1,422	$ 597	$ 3,876	0.25	0.25	1.00	6.49	$34.27	438	$ 15,024	1,411	$ 185,712	$ 3,876
Total		**$ 418,302**		**$ 13,797**		**$ 37,611**				**63**			**$ 145,804**	**13,691**	**$ 1,802,264**	**$ 37,611**

Exhibit C.3c Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 3

			TC Samples						TC Sampling			Analysis			
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Coliform Monitoring (samples/year)	Routine Coliform Monitoring TC+ (samples/year)	Additional TC+ (samples/year)	Repeat (samples/year)	Additional Routine Coliform Monitoring (samples/year)	Corrective Action Coliform Follow-up Sample (post-disinfection sample) (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample set)	Total Shipping Cost ($/year)
A	B	C=B*A	D = 4*B*0.5	E=D*0.036	F=E*0.057	G	H	I	J	K=J(D+G+H+I)	L=K*AA	M	N=M(D+G+H+I)	O	P=O*D
1	381	381	762	27	2	0	0	-		381	$ 13,058	0	-	$107	81,900
2	2,080	4,160	4,160	150	9	0	0	-		2,080	$ 71,290	0	-	$107	447,118
3	756	2,268	1,512	54	3	0	0	-		756	$ 25,911	0	-	$107	162,510
4	421	1,684	842	30	2	0	0	-		421	$ 14,429	0	-	$107	90,498
5	956	4,780	1,912	69	4	0	0	-		956	$ 32,766	0	-	$107	205,503
6	871	5,226	1,742	63	4	0	0	-		871	$ 29,853	0	-	$107	187,231
7	298	2,086	596	21	1	0	0	0.5		298	$ 10,214	0	-	$107	64,058
8	809	6,472	1,618	58	3	0	0	0.5		809	$ 27,728	0	-	$107	173,903
≥ 9	755	9,354	1,510	54	3	0	0	0.5		755	$ 25,877	0	-	$107	162,295
Total	**7,327**	**36,411**	**14,654**	**528**	**30**	**0**	**0**	0.5 **0**		**7,327**	**$ 251,127**		**0**		**$ 1,575,018**
								0.5							
								0.5							
								0.5							
								0.5							
								0.5							

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) One TC sample collected quarterly per aircraft not implementing O&M plan. Assuming 50% of aircraft implement O&M plan.

(E) Assume 3.6% of coliform samples will be TC+ based on AOC data.

(F) Assume 5.7% of aircraft with initial TC+ samples will have at least one additional TC+ during repeat sampling (based on AOC data).

(G) Repeat monitoring not specified in Water Supply Guidance 29, assumed no repeat monitoring samples.

(H) Additional routine coliform monitoring not specified, assumed no additional routine coliform monitoring samples collected.

(I) Post disinfection monitoring not specified, assumed no follow-up samples collected.

(J) Assume 0.5 hour for sample collection and for process, storage, and shipping of sample. (Sample set burden is 0.5 hour for (1) routine samples, 0 hours for (0) repeat samples, and 0 hour for (0) corrective action follow-up samples.)

(M) Assume all analysis conducted by outside lab.

(O) Estimated courier fees based on costs from various courier services in major cities. Assumed courier services required for each sample set. (Sample set consists of 1 routine sample.) Assumed airport distance of 20-30 miles from lab. Assumed courier would return cooler to air carrier. 100% of shipping costs incurred by TC monitoring, since quarterly turbidity samples will not take up a significant amount of space, and residual samples are analyzed immediately and do not require shipping, and nitrate/nitrite monitoring is not required under Alt.3.

(Q) Average coliform analysis costs based on costs from various labs across the country. Assume all analysis conducted by outside lab.

(S) Assume air carriers will replace coolers, gel packs, and thermometers once a year. 100% of the unit equipment cost is incurred by total coliform monitoring, since quarterly turbidity samples will not take up a significant amount of space, residual samples are immediately read and will not require shipping in a cooler, and nitrate/nitrite monitoring is not required under Alt.3.

(T) Coolers, gel packs, and thermometers are purchased by air carriers. The costs for this equipment are assumed to be distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(U) Assume each aircraft will purchase three new refrigerators. 100% of the refrigerator cost is incurred total coliform monitoring, since quarterly turbidity samples will not take up a significant amount of space, disinfectant residual monitoring does not require the use of a refrigerator, and nitrate/nitrite monitoring is not required under Alt.3.

(V) Refrigerators are purchased by air carriers. Assume costs for 63 airlines are distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(W), (X), (Y) Based on EPA estimate.

(Y) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule. For modeling purposes, this reporting burden is captured in Year 3 and follows the same schedule as coliform monitoring.

(Z) Assume burden for 63 airlines is distributed evenly across the 7,327 aircraft. Fractional burden is shown for calculation purposes only.

(AA) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(AB) Columns W and X applied on a sample set basis. Assume a sample set consists of (1) routine samples, (0) repeat samples, (0) corrective action follow-up samples

Exhibit C.3c Air Carrier Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 3 (cont'd)

	Analysis						Recordkeeping							Totals		
# of Available Sampling Points	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample set)	Report Monitoring Results (hours/sample set)	Report Water System Inventory/Changes (hours/air carrier)	Report Water System Inventory/Changes Burden (hours/year)	Labor Cost ($/hour)	Recordkeeping and Reporting Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	Q	R=Q(D+G+H+I)	S	T	U	V	W	X	Y	Z	AA	AB=((W+X)*(D+H)+Z	AC=AB*AA	AD=K+M+AB	AE=L+P+R+T+AC	AF=V
1	$22.16	16,888	$ 219	$ 717	$ 597	$ 1,956	0.25	0.25	1.00	3.28	$34.27	384	$ 13,171	765	$ 125,734	$ 1,956
2	$22.16	92,196	$ 219	$ 3,917	$ 597	$ 10,677	0.25	0.25	1.00	17.88	$34.27	2,098	$ 71,903	4,178	$ 686,424	$ 10,677
3	$22.16	33,510	$ 219	$ 1,424	$ 597	$ 3,881	0.25	0.25	1.00	6.50	$34.27	763	$ 26,134	1,519	$ 249,489	$ 3,881
4	$22.16	18,661	$ 219	$ 793	$ 597	$ 2,161	0.25	0.25	1.00	3.62	$34.27	425	$ 14,553	846	$ 138,935	$ 2,161
5	$22.16	42,375	$ 219	$ 1,800	$ 597	$ 4,907	0.25	0.25	1.00	8.22	$34.27	964	$ 33,048	1,920	$ 315,491	$ 4,907
6	$22.16	38,607	$ 219	$ 1,640	$ 597	$ 4,471	0.25	0.25	1.00	7.49	$34.27	878	$ 30,109	1,749	$ 287,440	$ 4,471
7	$22.16	13,209	$ 219	$ 561	$ 597	$ 1,530	0.25	0.25	1.00	2.56	$34.27	301	$ 10,302	599	$ 98,344	$ 1,530
8	$22.16	35,859	$ 219	$ 1,523	$ 597	$ 4,153	0.25	0.25	1.00	6.96	$34.27	816	$ 27,966	1,625	$ 266,980	$ 4,153
≥ 9	$22.16	33,465	$ 219	$ 1,422	$ 597	$ 3,876	0.25	0.25	1.00	6.49	$34.27	761	$ 26,099	1,516	$ 249,159	$ 3,876
Total		**$ 324,769**		**$ 13,797**		**$ 37,611**				**63**			**$ 253,286**	**14,717**	**$ 2,417,996**	**$ 37,611**

Exhibit C.3d Agency Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 1

	TC Samples				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/TC+ sample)	Unit Cost ($/TC+ sample)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	6,594	$ 330,665
Review Aircraft Water System Inventory/Changes	$50.14	0.5	$ 25	32	$ 790
Total		**0.5**	**$ 25**	**6,594**	**$ 330,665**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden = unit labor burden * total number of TC+ samples (Exhibit C.3a). Total labor burden for reviewing inventory = unit labor burden * 63 air carriers.

(E) Total cost = unit cost * total number of TC+ samples (Exhibit C.3a). Total cost for reviewing inventory = unit cost * total burden for reviewing inventory.

(F) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule. For modeling purposes, burden associated with reviewing aircraft water system inventory/changes is captured in Year 3 and follows the same schedule as coliform monitoring.

Exhibit C.3e Agency Burden and Cost Estimates for Coliform Monitoring (2008$), Alternative 2

	TC Samples				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/TC+ sample)	Unit Cost ($/TC+ sample)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	264	$ 13,227
Review Aircraft Water System Inventory/Changes	$50.14	0.5	$ 25	32	$ 790
Total		**0.5**	**$ 25**	**264**	**$ 13,227**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden = unit labor burden * total number of TC+ samples (Exhibit C.3b). Total labor burden for reviewing inventory = unit labor burden * 63 air carriers.

(E) Total cost = unit cost * total number of TC+ samples (Exhibit C.3b). Total cost for reviewing inventory = unit cost * total burden for reviewing inventory.

(F) Air carriers must report their water system inventory within 18 months of promulgation of the Final Rule. For modeling purposes, burden associated with reviewing aircraft water system inventory/changes is captured in Year 3 and follows the same schedule as coliform monitoring.

C.4 Residual Monitoring

Exhibit C.4a Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 1

			Disinfectant Residual Samples	Disinfectant Residual Sampling			Analysis						
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Disinfectant Residual (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)
A	B	C=B*A	D=12*B	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M=L*D	N
1	381	381	4,572	0.5	2,286	$ 78,351	0.25	1,143	$ -	-	$2.96	13,533	$ -
2	2,080	4,160	24,960	0.5	12,480	$ 427,741	0.25	6,240	$ -	-	$2.96	73,882	$ -
3	756	2,268	9,072	0.5	4,536	$ 155,468	0.25	2,268	$ -	-	$2.96	26,853	$ -
4	421	1,684	5,052	0.5	2,526	$ 86,577	0.25	1,263	$ -	-	$2.96	14,954	$ -
5	956	4,780	11,472	0.5	5,736	$ 196,597	0.25	2,868	$ -	-	$2.96	33,957	$ -
6	871	5,226	10,452	0.5	5,226	$ 179,117	0.25	2,613	$ -	-	$2.96	30,938	$ -
7	298	2,086	3,576	0.5	1,788	$ 61,282	0.25	894	$ -	-	$2.96	10,585	$ -
8	809	6,472	9,708	0.5	4,854	$ 166,367	0.25	2,427	$ -	-	$2.96	28,736	$ -
> 9	755	9,354	9,060	0.5	4,530	$ 155,262	0.25	2,265	$ -	-	$2.96	26,818	$ -
Total	**7,327**	**36,411**	**87,924**		**43,962**	**$ 1,506,761**		**21,981**		**$ -**		**$ 260,255**	

Notes:

(C) Average number of available sampling points used for > 9 sampling points size category.

(D) Disinfectant residual sample needed for each routine coliform monitoring sample. Disinfectant residual samples collected monthly, at same locations as routine coliform monitoring samples.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Based on EPA estimate.

(J) Assume disinfectant residual samples will be analyzed immediately and will not require shipping.

(L) Cost of disinfectant residual sampling kit (see Exhibit 5.2).

(N) Assume air carrier will replace coolers, gel packs, and thermometers once a year. Unit equipment cost is not incurred by disinfectant residual monitoring, since disinfectant residual monitoring samples are analyzed immediately and will not require shipping or storage.

(P) Assume each air carrier will purchase three new refrigerators. Refrigerator cost is not incurred by disinfectant residual monitoring since residual samples are analyzed immediately and will not require shipping or storage.

(R), (S), (T) Based on EPA estimate. EPA estimates that aircraft will not have significant inventory changes.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(Z) Assumed that if a refrigerator is purchased, it purchased two times (in years years 3 and 13) in the 25-year evaluation period.

Exhibit C.4a Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 1 (cont'd)

	Analysis			Recordkeeping						Totals		
# of Available Sampling Points	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Report Water System Inventory/Changes (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	O	P	Q	R	S	T	U	V=(R+S+T)*D	W=U*V	X=F+I+V	Y=G+K+M+O+W	Z=Q
1	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	2,286	$ 78,351	5,715	$ 170,235	$ -
2	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	12,480	$ 427,741	31,200	$ 929,365	$ -
3	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	4,536	$ 155,468	11,340	$ 337,788	$ -
4	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	2,526	$ 86,577	6,315	$ 188,107	$ -
5	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	5,736	$ 196,597	14,340	$ 427,150	$ -
6	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	5,226	$ 179,117	13,065	$ 389,171	$ -
7	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	1,788	$ 61,282	4,470	$ 133,149	$ -
8	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	4,854	$ 166,367	12,135	$ 361,469	$ -
≥ 9	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	4,530	$ 155,262	11,325	$ 337,341	$ -
Total	**$ -**		**$ -**						**$ 1,506,761**	**109,905**	**$ 3,273,776**	**$ -**

Exhibit C.4b Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 2

			Disinfectant Residual Samples	Disinfectant Residual Sampling			Analysis						
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Disinfectant Residual (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)
A	B	C=B*A	D	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M=L*D	N
1	381	381	762	0.5	381	$ 13,058	0.25	191	$ -	-	$2.96	2,256	$ -
2	2,080	4,160	4,160	0.5	2,080	$ 71,290	0.25	1040	$ -	-	$2.96	12,314	$ -
3	756	2,268	1,512	0.5	756	$ 25,911	0.25	378	$ -	-	$2.96	4,476	$ -
4	421	1,684	842	0.5	421	$ 14,429	0.25	211	$ -	-	$2.96	2,492	$ -
5	956	4,780	1,912	0.5	956	$ 32,766	0.25	478	$ -	-	$2.96	5,660	$ -
6	871	5,226	1,742	0.5	871	$ 29,853	0.25	436	$ -	-	$2.96	5,156	$ -
7	298	2,086	596	0.5	298	$ 10,214	0.25	149	$ -	-	$2.96	1,764	$ -
8	809	6,472	1,618	0.5	809	$ 27,728	0.25	405	$ -	-	$2.96	4,789	$ -
≥ 9	755	9,354	1,510	0.5	755	$ 25,877	0.25	378	$ -	-	$2.96	4,470	$ -
Total	**7,327**	**36,411**	**14,654**		**7,327**	**$ 251,127**		**3664**		**$ -**		**$ 43,376**	

Notes:

(C) Average number of available sampling points used for > 9 sampling points size category.

(D) Disinfectant residual sample collected annually at 1 lavatory and 1 galley on each aircraft.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Based on EPA estimate.

(J) Assume disinfectant residual samples will be analyzed immediately and will not require shipping.

(L) Cost of disinfectant residual sampling kit (see Exhibit 5.2).

(N) Assume air carriers will replace coolers, gel packs, and thermometers once a year. Unit equipment cost is not incurred by disinfectant residual monitoring since disinfectant residual monitoring samples are analyzed immediately and will not require shipping or storage.

(P) Assume air carriers will purchase three new refrigerators. Refrigerator cost is not incurred by disinfectant residual monitoring since disinfectant residual samples are analyzed immediately and will not require shipping or storage.

(R), (S), (T) Based on EPA estimate. EPA estimates that aircraft will not have significant inventory changes.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(Z) Assumed that if a refrigerator is purchased, it purchased two times (in years years 3 and 13) in the 25-year evaluation period.

Exhibit C.4b Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 2 (cont'd)

	Analysis			Recordkeeping						Totals		
# of Available Sampling Points	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Report Water System Inventory/Changes (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	O	P	Q	R	S	T	U	V=(R+S+T)*D	W=U*V	X=F+I+V	Y=G+K+M+O+W	Z=Q
1	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	381	$ 13,058	953	$ 28,372	$ -
2	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	2,080	$ 71,290	5,200	$ 154,894	$ -
3	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	756	$ 25,911	1,890	$ 56,298	$ -
4	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	421	$ 14,429	1,053	$ 31,351	$ -
5	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	956	$ 32,766	2,390	$ 71,192	$ -
6	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	871	$ 29,853	2,178	$ 64,862	$ -
7	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	298	$ 10,214	745	$ 22,192	$ -
8	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	809	$ 27,728	2,023	$ 60,245	$ -
≥ 9	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	755	$ 25,877	1,888	$ 56,224	$ -
Total	**$ -**		**$ -**						**$ 251,127**	**18,318**	**$ 545,629**	**$ -**

Exhibit C.4c Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 3

			Disinfectant Residual Samples	Disinfectant Residual Sampling			Residual Analysis						
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Disinfectant Residual (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Analysis Cost ($/sample)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/air carrier/year)
A	B	C=B*A	D	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M=L*D	N
1	381	381	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
2	2,080	4160	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
3	756	2268	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
4	421	1684	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
5	956	4780	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
6	871	5226	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
7	298	2086	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
8	809	6472	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
≥ 9	755	9354	-	0.5	-	$ -	0.25	0	$ -	-	$2.96	-	$ -
Total	7,327	36,411	0		0	$ -		0		$ -		$ -	

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Disinfectant residual sampling not required under Alt. 3.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Based on EPA estimate.

(J) Shipping costs are not incurred by disinfectant residual monitoring since disinfectant residual monitoring is not required under Alt. 3.

(L) Cost of disinfectant residual sampling kit (see Exhibit 5.2).

(N) Assume air carriers will replace coolers, gel packs, and thermometers once a year. Unit equipment cost is not incurred by disinfectant residual monitoring since disinfectant residual monitoring is not required under Alt. 3.

(P) Assume air carriers will purchase three new refrigerators. Refrigerator cost is not incurred by disinfectant residual monitoring since disinfectant residual monitoring is not required under Alt. 3.

(R), (S), (T) Based on EPA estimate. EPA estimates that aircraft will not have significant inventory changes.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(Z) Assumed that if a refrigerator is purchased, it purchased two times (in years years 3 and 13) in the 25-year evaluation period.

Exhibit C.4c Air Carrier Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 3 (cont'd)

	Residual Analysis			Recordkeeping						Totals		
# of Available Sampling Points	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Total Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Reporty Water System Inventory/Changes (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	O	P	Q	R	S	T	U	V=(R+S+T)*D	W=U*V	X=F+I+V	Y=G+K+M+O+W	Z=Q
1	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
2	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
3	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
4	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
5	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
6	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
7	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
8	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
≥ 9	$ -	$ -	$ -	0.25	0.25	0.00	$34.27	-	$ -	-	$ -	$ -
Total	**$ -**		**$ -**						**$ -**	**0**	**$ -**	**$ -**

Exhibit C.4d Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 1

	Disinfectant Residual Samples				
Compliance Activity	Labor Cost ($/hour) A	Unit labor burden (hours/aircraft) B	Unit Cost ($/aircraft) C=A*B	Total Labor Burden (hours) D=B*7,327	Total Cost ($) E=C*7,327
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	3,664	$ 183,703
Review Aircraft Water System Inventory/Changes	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**3,664**	**$ 183,703**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden = unit labor burden * total number of aircraft subject to ADWR .

(E) Total cost = unit cost * total number of aircraft subject to ADWR .

Exhibit C.4e Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 2

	Disinfectant Residual Samples				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*7,327	E=C*7,327
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	3,664	$ 183,703
Review Aircraft Water System Inventory/Changes	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**3,664**	**$ 183,703**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden = unit labor burden * total number of aircraft subject to ADWR .

(E) Total cost = unit cost * total number of aircraft subject to ADWR .

Exhibit C.4f Agency Burden and Cost Estimates for Disinfectant Residual Monitoring (2008$), Alternative 3

	Disinfectant Residual Samples				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	$ -
Review Aircraft Water System Inventory/Changes	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Disinfectant Residual sampling not required under Alt. 3.

C.5 Turbidity Monitoring

Exhibit C.5a Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 1

			Turbidity Samples	Turbidity Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Turbidity (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Turbidity Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample)	Total Shipping Cost ($/year)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost - Calibration Kit ($/air carrier/year)
A	B	C=B*A	D	E	F=E*D	G=F*T	H	I=H*D	J	K=J*D	L=I*T	M
1	381	381	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
2	2,080	4,160	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
3	756	2,268	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
4	421	1,684	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
5	956	4,780	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
6	871	5,226	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
7	298	2,086	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
8	809	6,472	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
≥ 9	755	9,354	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
Total	**7,327**	**36,411**	**-**		**-**	**$ -**		**-**		**$ -**	**$ -**	

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Turbidity sampling not required under Alt 1.

(E) Assume 7.5 minutes for sample collection and in-house processing and storage of sample.

(H) Based on EPA estimate.

(R), (S) Based on EPA estimate.

(T) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.5a Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 1 (cont'd)

	Analysis				Recordkeeping					Totals		
# of Available Sampling Points	Annual Unit Equipment Cost - Secondary Standards ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N	O	P	Q	R	S	T	U=(R+S)*D	V=T*U	W=F+I+U	X=G+K+L+O+V	Y=Q
1	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
2	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
3	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
4	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
5	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
6	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
7	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
8	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
≥ 9	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
Total		$ -		$ -					$ -	-	$ -	$ -

Exhibit C.5b Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 2

			Turbidity Samples	Turbidity Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Turbidity (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Turbidity Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample)	Total Shipping Cost ($/year)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost - Calibration Kit ($/air carrier/year)
A	B	C=B*A	D	E	F=E*D	G=F*T	H	I=H*D	J	K=J*D	L=I*T	M
1	381	381	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
2	2,080	4,160	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
3	756	2,268	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
4	421	1,684	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
5	956	4,780	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
6	871	5,226	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
7	298	2,086	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
8	809	6,472	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
≥ 9	755	9,354	-	0.13	-	$ -	0.13	-	$ -	-	$ -	$ -
Total	**7,327**	**36,411**	**-**		**-**	**$ -**		**-**		**$ -**	**$ -**	

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Turbidity sampling not required under Alt 2.

(E) Assume 7.5 minutes for sample collection and in-house processing and storage of sample.

(H) Based on EPA estimate.

(R), (S) Based on EPA estimate.

(T) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.5b Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 2 (cont'd)

	Analysis				Recordkeeping					Totals		
# of Available Sampling Points	Annual Unit Equipment Cost - Secondary Standards ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N	O	P	Q	R	S	T	U=(R+S)*D	V=T*U	W=F+I+U	X=G+K+L+O+V	Y=Q
1	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
2	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
3	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
4	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
5	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
6	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
7	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
8	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
≥ 9	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
Total		$ -		$ -					$ -	-	$ -	$ -

Exhibit C.5c Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 3

			Turbidity Samples	Turbidity Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Turbidity (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Turbidity Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/sample)	Total Shipping Cost ($/year)	Total Analysis Cost ($/year)	Annual Unit Equipment Cost - Calibration Kit ($/air carrier/year)
A	B	C=B*A	D=365*B*0.5	E	F=E*D	G=F*T	H	I=H*D	J	K=J*D	L=I*T	M
1	381	381	69,533	0.13	8,692	$ 297,896	0.13	8,692	$ -	-	$ 297,896	$ 97.69
2	2,080	4,160	379,600	0.13	47,450	$ 1,626,309	0.13	47,450	$ -	-	$ 1,626,309	$ 97.69
3	756	2,268	137,970	0.13	17,246	$ 591,101	0.13	17,246	$ -	-	$ 591,101	$ 97.69
4	421	1,684	76,833	0.13	9,604	$ 329,171	0.13	9,604	$ -	-	$ 329,171	$ 97.69
5	956	4,780	174,470	0.13	21,809	$ 747,477	0.13	21,809	$ -	-	$ 747,477	$ 97.69
6	871	5,226	158,958	0.13	19,870	$ 681,017	0.13	19,870	$ -	-	$ 681,017	$ 97.69
7	298	2,086	54,385	0.13	6,798	$ 233,000	0.13	6,798	$ -	-	$ 233,000	$ 97.69
8	809	6,472	147,643	0.13	18,455	$ 632,540	0.13	18,455	$ -	-	$ 632,540	$ 97.69
≥ 9	755	9,354	137,788	0.13	17,223	$ 590,319	0.13	17,223	$ -	-	$ 590,319	$ 97.69
Total	**7,327**	**36,411**	**1,337,178**		**167,147**	**$ 5,728,829**		**167,147**		**$ -**	**$ 5,728,829**	

Notes:

(C) Average number of available sampling points used for≥ 9 sampling points size category.

(D) One turbidity sample collected daily per aircraft not implementing O&M plan. Assuming 50% of aircraft implement O&M plan.

(E) Assume 7.5 minutes for sample collection and in-house processing and storage of sample.

(H) Based on EPA estimate.

(J) Estimated courier fees based on costs from various courier services in major cities. Assumed airport distance of 20-30 miles from lab. Assumed courier would return cooler to air carrier. Courier costs are not incurred by turbidity monitoring since the space taken up by turbidity sample is negligible. 100% of the courier cost is incurred by coliform monitoring.

(M), (N) Assume air carrier will replace calibration kits and secondary standards once a year.

(P) Assume each air carrier will purchase one turbidimeter every five years.

(R), (S) Based on EPA estimate.

(T) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

(U) Assume air carriers perform reporting and recordkeeping activities on a monthly basis for each aircraft.

Exhibit C.5c Air Carrier Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 3 (cont'd)

	Analysis				Recordkeeping					Totals		
# of Available Sampling Points	Annual Unit Equipment Cost - Secondary Standards ($/air carrier/year)	Total Annual Equipment Cost ($/year)	Periodic Equipment Cost ($/air carrier)	Periodic Equipment Cost ($)	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N	O	P	Q	R	S	T	U=(R+S)*B*12	V=T*U	W=F+I+U	X=G+K+L+O+V	Y=Q
1	$ 124	$ 726	$ 858	$ 2,811	0.25	0.25	$34.27	2,286	$ 78,351	19,669	$ 674,869	$ 2,811
2	$ 124	$ 3,965	$ 858	$ 15,345	0.25	0.25	$34.27	12,480	$ 427,741	107,380	$ 3,684,324	$ 15,345
3	$ 124	$ 1,441	$ 858	$ 5,577	0.25	0.25	$34.27	4,536	$ 155,468	39,029	$ 1,339,110	$ 5,577
4	$ 124	$ 802	$ 858	$ 3,106	0.25	0.25	$34.27	2,526	$ 86,577	21,734	$ 745,721	$ 3,106
5	$ 124	$ 1,822	$ 858	$ 7,053	0.25	0.25	$34.27	5,736	$ 196,597	49,354	$ 1,693,372	$ 7,053
6	$ 124	$ 1,660	$ 858	$ 6,426	0.25	0.25	$34.27	5,226	$ 179,117	44,965	$ 1,542,811	$ 6,426
7	$ 124	$ 568	$ 858	$ 2,198	0.25	0.25	$34.27	1,788	$ 61,282	15,384	$ 527,850	$ 2,198
8	$ 124	$ 1,542	$ 858	$ 5,968	0.25	0.25	$34.27	4,854	$ 166,367	41,765	$ 1,432,989	$ 5,968
≥ 9	$ 124	$ 1,439	$ 858	$ 5,570	0.25	0.25	$34.27	4,530	$ 155,262	38,977	$ 1,337,339	$ 5,570
Total		**$ 13,966**		**$ 54,054**					**$ 1,506,761**	**378,256**	**$ 12,978,385**	**$ 54,054**

Exhibit C.5d Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 1

	Turbidity Monitoring				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Turbidity monitoring not required under Alt 1.

Exhibit C.5e Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 2

	Turbidity Monitoring				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Turbidity monitoring not required under Alt 2.

Exhibit C.5f Agency Burden and Cost Estimates for Turbidity Monitoring (2008$), Alternative 3

	Turbidity Monitoring				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*(7,327/2)*12	E=C*(7,327/2)*12
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	21,981	$ 1,102,215
Total		**0.5**	**$ 25**	**21,981**	**$ 1,102,215**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D) Total labor burden = unit labor burden * (total number of aircraft subject to ADWR/2)*12 monthly reports .

(E) Total cost = unit cost * (total number of aircraft subject to ADWR/2)*12 monthly reports .

C.6 Nitrate/Nitrite Monitoring

Exhibit C.6a Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 1

			Nitrate/Nitrite Samples	Nitrate/Nitrite Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Nitrate/Nitrite (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Nitrate/Nitrite Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Nitrate Analysis Cost ($/sample)	Unit Nitrite Analysis Cost ($/sample)
A	B	C=B*A	D	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M
1	381	381	-		-	$ -	0	-	$ -	-	$23.72	$22.69
2	2,080	4,160	-		-	$ -	0	-	$ -	-	$23.72	$22.69
3	756	2,268	-		-	$ -	0	-	$ -	-	$23.72	$22.69
4	421	1,684	-		-	$ -	0	-	$ -	-	$23.72	$22.69
5	956	4,780	-		-	$ -	0	-	$ -	-	$23.72	$22.69
6	871	5,226	-		-	$ -	0	-	$ -	-	$23.72	$22.69
7	298	2,086	-		-	$ -	0	-	$ -	-	$23.72	$22.69
8	809	6,472	1		-	$ -	0	-	$ -	-	$23.72	$22.69
≥ 9	755	9,354	1		-	$ -	0	-	$ -	-	$23.72	$22.69
Total	**7,327**	**36,411**	1 **0**		**0**	**$ -**		**0**		**$ -**		
			1									
			1									
			1									
			1									
			1									
			1									

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Nitrate/nitrite sampling not required under Alt 1.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Assume all analysis conducted by outside lab.

(S), (T) Based on EPA estimate.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.6a Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 1 (cont'd)

	Analysis					Recordkeeping					Totals		
# of Available Sampling Points	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/year)	Total Annual Equipment Cost ($/year)	One-time Equipment Cost ($)	Total One-time Equipment Cost	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N=D*(L+M)	O	P=O*B	Q	R=Q*B	S	T	U	V=(S+T)*D	W=U*V	X=F+H+V	Y=G+K+N+P+W	Z=R
1	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
2	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
3	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
4	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
5	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
6	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
7	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
8	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
≥ 9	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
Total	$ -		$ -		$ -					$ -	0	$ -	$ -

Exhibit C.6b Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 2

			Nitrate/Nitrite Samples	Nitrate/Nitrite Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Nitrate/Nitrite (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Nitrate/Nitrite Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Nitrate Analysis Cost ($/sample)	Unit Nitrite Analysis Cost ($/sample)
A	B	C=B*A	D	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M
1	381	381	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
2	2,080	4,160	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
3	756	2,268	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
4	421	1,684	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
5	956	4,780	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
6	871	5,226	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
7	298	2,086	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
8	809	6,472	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
≥ 9	755	9,354	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
Total	**7,327**	**36,411**	**0**		**0**	**$ -**		**0**		**$ -**		

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Nitrate/nitrite sampling not required under Alt 2.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Assume all analysis conducted by outside lab.

(S), (T) Based on EPA estimate.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.6b Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 2 (cont'd)

	Analysis					Recordkeeping					Totals		
# of Available Sampling Points	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/year)	Total Annual Equipment Cost ($/year)	One-time Equipment Cost ($)	Total One-time Equipment Cost	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N=D*(L+M)	O	P=O*B	Q	R=Q*B	S	T	U	V=(S+T)*D	W=U*V	X=F+H+V	Y=G+K+N+P+W	Z=R
1	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
2	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
3	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
4	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
5	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
6	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
7	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
8	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
≥ 9	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
Total	**$ -**		**$ -**		**$ -**					**$ -**	**0**	**$ -**	**$ -**

Exhibit C.6c Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 3

			Nitrate/Nitrite Samples	Nitrate/Nitrite Sampling			Analysis					
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Nitrate/Nitrite (samples/year)	Sampling Labor Burden (hours/sample)	Total Sampling Burden (hours/year)	Total Nitrate/Nitrite Sampling Cost ($/year)	Analysis Labor Burden (hours/sample)	Total Analysis Burden (hours/year)	Unit Shipping Cost ($/year)	Total Shipping Cost ($/year)	Unit Nitrate Analysis Cost ($/sample)	Unit Nitrite Analysis Cost ($/sample)
A	B	C=B*A	D	E	F=E*D	G	H	I=H*D	J	K=J*D	L	M
1	381	381	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
2	2,080	4,160	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
3	756	2,268	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
4	421	1,684	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
5	956	4,780	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
6	871	5,226	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
7	298	2,086	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
8	809	6,472	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
≥ 9	755	9,354	-	1	-	$ -	0	-	$ -	-	$23.72	$22.69
Total	**7,327**	**36,411**	**0**		**0**	**$ -**		**0**		**$ -**		

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Nitrate/nitrite sampling not required under Alt 3.

(E) Assume one hour for sample collection and for process, storage, and shipping of sample.

(H) Assume all analysis conducted by outside lab.

(S), (T) Based on EPA estimate.

(U) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.6c Air Carrier Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 3 (cont'd)

	Analysis					Recordkeeping					Totals		
# of Available Sampling Points	Total Analysis Cost ($/year)	Annual Unit Equipment Cost ($/year)	Total Annual Equipment Cost ($/year)	One-time Equipment Cost ($)	Total One-time Equipment Cost	Maintain Maintenance Log (hours/sample)	Report Monitoring Results (hours/sample)	Labor Cost ($/hour)	Recordkeeping Labor (hours/year)	Recordkeeping Cost ($/year)	Total Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	N=D*(L+M)	O	P=O*B	Q	R=Q*B	S	T	U	V=(S+T)*D	W=U*V	X=F+H+V	Y=G+K+N+P+W	Z=R
1	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
2	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
3	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
4	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
5	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
6	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
7	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
8	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
≥ 9	-	$ -	$ -	$ -	$ -	0.25	0.25	$34.27	-	$ -	-	$ -	$ -
Total	$ -		$ -		$ -					$ -	0	$ -	$ -

Exhibit C.6d Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 1

	Nitrate&Nitrite Monitoring				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	-
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Nitrate/nitrite monitoring not required under Alt 1.

Exhibit C.6e Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 2

	Nitrate&Nitrite Monitoring				
Compliance Activity	**Labor Cost ($/hour)** **A**	**Unit labor burden (hours/aircraft)** **B**	**Unit Cost ($/aircraft)** **C=A*B**	**Total Labor Burden (hours)** **D**	**Total Cost ($)** **E**
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	-
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Nitrate/nitrite monitoring not required under Alt 2.

Exhibit C.6f Agency Burden and Cost Estimates for Nitrate/Nitrite Sampling (2008$), Alternative 3

	Nitrate&Nitrite Monitoring				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Review Aircraft Monitoring Results	$50.14	0.5	$ 25	-	-
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft monitoring results reflect EPA estimate.

(D), (E) Nitrate/nitrite monitoring not required under Alt 3.

C.7 O&M Plan

Exhibit C.7a Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 1

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Update existing O&M manual and practices with ADWR specific requirements	$42.86	80	$ 3,429	-	$ -
Total		**80**	**$ 3,429**	**-**	**$ -**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing and implementing O&M plan reflect EPA estimate.

(D), (E) O&M plans not required under Alt 1.

Exhibit C.7b Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 2

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E
Update existing O&M manual and practices with ADWR specific requirements	$42.86	80	$ 3,429	-	$ -
Total		**80**	**$ 3,429**	**-**	**$ -**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing and implementing O&M plan reflect EPA estimate.

(D), (E) O&M plans not required under Alt 2.

Exhibit C.7c Air Carrier Burden and Cost Estimates for O&M Plan (2008$), Alternative 3

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*(63/2)	E=C*(63/2)
Update existing O&M manual and practices with ADWR specific requirements	$42.86	80	$ 3,429	2,520	$ 108,002
Total		**80**	**$ 3,429**	**2,520**	**$ 108,002**

Sources:

(A) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(B) Labor hours for developing and implementing O&M plan reflect EPA estimate.

(D), (E) Assume 50% of the 63 U.S. air carriers subject to ADWR will develop O&M plans in lieu of required monitoring. Assumes all air carriers spend equal time developing and implementing O&M plan, regardless of fleet size or aircraft type.

Exhibit C.7d Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 1

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E=C
Review and approve O&M manual and practices	$50.14	10	$ 501	-	$ -
Total		**10**	**$ 501**	**-**	**$ -**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for reviewing and approving O&M plan reflect EPA estimate.
(D), (E) O&M plans not required under Alt 1.

Exhibit C.7e Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 2

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D	E=C
Review and approve O&M manual and practices	$50.14	10	$ 501	-	$ -
Total		**10**	**$ 501**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing and approving O&M plan reflect EPA estimate.

(D), (E) O&M plans not required under Alt 2.

Exhibit C.7f Agency Burden and Cost Estimates for O&M Plan (2008$), Alternative 3

Compliance Activity	Labor Cost ($/hour)	One-time Labor Burden (hours/air carrier)	Unit Cost	Total Labor Burden (hours)	Total Cost ($)
	A	B	C=A*B	D=B*(63/2)	E=C*(63/2)
Review and approve O&M manual and practices	$50.14	10	$ 501	315	$ 15,795
Total		**10**	**$ 501**	**315**	**$ 15,795**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing and approving O&M plan reflect EPA estimate.

(D), (E) Assume 50% of the 63 U.S. air carriers subject to ADWR will develop O&M plans in lieu of required monitoring. Assumes all Regional Agency offices spend equal time reviewing and approving O&M plan, regardless of fleet size or aircraft type.

C.8 Routine Disinfection and Flushing

Exhibit C.8a Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 1

			Routine Disinfection and Flushing							
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Disinfection and Flushing (aircraft/year)	Self-Certification (aircraft/year)	Routine Disinfection and Flushing Labor Burden (hours/aircraft)	Self Certification Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Self-Certification Cost ($/hour)	Unit Chemical Costs ($/application)	Total Routine Disinfection and Flushing Costs ($/year)
A	B	C=B*A	D	E	F	G	H	I	J	K=(D*F*H)+(D*J)
1	381	381	-	-	5	0.5	$20.19	$65.42	$ 1	$0
2	2,080	4,160	-	-	5	0.5	$20.19	$65.42	$ 1	$0
3	756	2,268	-	-	5	0.5	$20.19	$65.42	$ 1	$0
4	421	1,684	-	-	5	0.5	$20.19	$65.42	$ 1	$0
5	956	4,780	-	-	5	0.5	$20.19	$65.42	$ 1	$0
6	871	5,226	-	-	5	0.5	$20.19	$65.42	$ 1	$0
7	298	2,086	-	-	5	0.5	$20.19	$65.42	$ 1	$0
8	809	6,472	-	-	5	0.5	$20.19	$65.42	$ 1	$0
≥ 9	755	9,354	-	-	5	0.5	$20.19	$65.42	$ 1	$0
Total	**7,327**	**36,411**	**-**	**-**						**$0**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Routine disinfection and flushing not required under Alt 1.

(E) Self-certification submittal not required under Alt 1.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Labor hours for self-certification reflects EPA estimate.

(H) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(I) Based on costs for transportation, storage, and distribution managers from Exhibit 5.1.

(J) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(M) Based on EPA estimate.

(O) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.8a Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 1 (cont'd)

	Recordkeeping					Totals		
# of Available Sampling Points	Total Cost for Self Certification ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Routine Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	L=E*G*I	M	N=D*M	O	P=N*O	Q=(D*F)+(E*G) + N	R=K+L+P	S
1	$ -	0.25	-	$34.27	$ -	-	$ -	
2	$ -	0.25	-	$34.27	$ -	-	$ -	
3	$ -	0.25	-	$34.27	$ -	-	$ -	
4	$ -	0.25	-	$34.27	$ -	-	$ -	
5	$ -	0.25	-	$34.27	$ -	-	$ -	
6	$ -	0.25	-	$34.27	$ -	-	$ -	
7	$ -	0.25	-	$34.27	$ -	-	$ -	
8	$ -	0.25	-	$34.27	$ -	-	$ -	
≥ 9	$ -	0.25	-	$34.27	$ -	-	$ -	
Total	$0				$ -	0	$ -	$ -

Exhibit C.8b Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 2

			Routine Disinfection and Flushing							
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Disinfection and Flushing (aircraft/year)	Self-Certification (aircraft/year)	Routine Disinfection and Flushing Burden (hours/aircraft)	Self Certification Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Self-Certification Cost ($/hour)	Unit Chemical Costs ($/application)	Total Routine Disinfection and Flushing Costs ($/year)
A	B	C=B*A	D=B*4	E=B*4	F	G	H	I	J	K=(D*F*H)+(D*J)
1	381	381	1,524	1524	5	0.5	$20.19	$65.42	$ 1	$155,508
2	2,080	4,160	8,320	8320	5	0.5	$20.19	$65.42	$ 1	$848,966
3	756	2,268	3,024	3024	5	0.5	$20.19	$65.42	$ 1	$308,567
4	421	1,684	1,684	1684	5	0.5	$20.19	$65.42	$ 1	$171,834
5	956	4,780	3,824	3824	5	0.5	$20.19	$65.42	$ 1	$390,198
6	871	5,226	3,484	3484	5	0.5	$20.19	$65.42	$ 1	$355,505
7	298	2,086	1,192	1192	5	0.5	$20.19	$65.42	$ 1	$121,631
8	809	6,472	3,236	3236	5	0.5	$20.19	$65.42	$ 1	$330,199
≥ 9	755	9,354	3,020	3020	5	0.5	$20.19	$65.42	$ 1	$308,158
Total	**7,327**	**36,411**	**29,308**	**29,308**						**$2,990,566**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Quarterly routine disinfection and flushing required per aircraft.

(E) Aircraft is required to submit self-certification quarterly.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Labor hours for self-certification reflects EPA estimate.

(H) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(I) Based on costs for transportation, storage, and distribution managers from Exhibit 5.1.

(J) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(M) Based on EPA estimate.

(O) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.8b Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 2 (cont'd)

	Recordkeeping					Totals		
# of Available Sampling Points	Total Cost for Self Certification ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Routine Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	L=E*G*I	M	N=D*M	O	P=N*O	Q=(D*F)+(E*G) + N	R=K+L+P	S
1	$ 49,847	0.25	381	$34.27	$ 13,058	8,763	$ 218,413	
2	$ 272,129	0.25	2,080	$34.27	$ 71,290	47,840	$ 1,192,386	
3	$ 98,909	0.25	756	$34.27	$ 25,911	17,388	$ 433,386	
4	$ 55,080	0.25	421	$34.27	$ 14,429	9,683	$ 241,344	
5	$ 125,075	0.25	956	$34.27	$ 32,766	21,988	$ 548,039	
6	$ 113,954	0.25	871	$34.27	$ 29,853	20,033	$ 499,312	
7	$ 38,988	0.25	298	$34.27	$ 10,214	6,854	$ 170,832	
8	$ 105,843	0.25	809	$34.27	$ 27,728	18,607	$ 463,769	
≥ 9	$ 98,778	0.25	755	$34.27	$ 25,877	17,365	$ 432,813	
Total	**$958,602**				**$ 251,127**	**168,521**	**$ 4,200,295**	**$ -**

Exhibit C.8c Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 3

			Routine Disinfection and Flushing							
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Routine Disinfection and Flushing (aircraft/year)	Self-Certification (aircraft/year)	Routine Disinfection and Flushing Burden (hours/aircraft)	Self Certification Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Self-Certification Cost ($/hour)	Unit Chemical Costs ($/application)	Total Routine Disinfection and Flushing Costs ($/year)
A	B	C=B*A	D = 4*B	E	F	G	H	I	J	K=(D*F*H)+(D*J)
1	381	381	1,524	0	5	0.5	$20.19	$65.42	$ 1	$155,508
2	2,080	4,160	8,320	0	5	0.5	$20.19	$65.42	$ 1	$848,966
3	756	2,268	3,024	0	5	0.5	$20.19	$65.42	$ 1	$308,567
4	421	1,684	1,684	0	5	0.5	$20.19	$65.42	$ 1	$171,834
5	956	4,780	3,824	0	5	0.5	$20.19	$65.42	$ 1	$390,198
6	871	5,226	3,484	0	5	0.5	$20.19	$65.42	$ 1	$355,505
7	298	2,086	1,192	0	5	0.5	$20.19	$65.42	$ 1	$121,631
8	809	6,472	3,236	0	5	0.5	$20.19	$65.42	$ 1	$330,199
≥ 9	755	9,354	3,020	0	5	0.5	$20.19	$65.42	$ 1	$308,158
Total	**7,327**	**36,411**	**29,308**	**0**						**$2,990,566**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Quarterly routine disinfection and flushing per aircraft. Routine disinfection and flushing also required after any aircraft service or repairs. Assume aircraft service and repairs occur in same quarter as required routine disinfection and flushing.

(E) Self-certification submittal not required under Alternative 3.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Labor hours for self-certification reflects EPA estimate.

(H) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(I) Based on costs for transportation, storage, and distribution managers from Exhibit 5.1.

(J) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(M) Based on EPA estimate.

(O) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.8c Air Carrier Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 3 (cont'd)

	Recordkeeping					Totals		
# of Available Sampling Points	Total Cost for Self Certification ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Routine Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	L=E*G*I	M	N=D*M	O	P=N*O	Q=(D*F)+(E*G) + N	R=K+L+P	S
1	$ -	0.25	381	$34.27	$ 13,058	8,001	$ 168,566	
2	$ -	0.25	2,080	$34.27	$ 71,290	43,680	$ 920,257	
3	$ -	0.25	756	$34.27	$ 25,911	15,876	$ 334,478	
4	$ -	0.25	421	$34.27	$ 14,429	8,841	$ 186,263	
5	$ -	0.25	956	$34.27	$ 32,766	20,076	$ 422,964	
6	$ -	0.25	871	$34.27	$ 29,853	18,291	$ 385,357	
7	$ -	0.25	298	$34.27	$ 10,214	6,258	$ 131,844	
8	$ -	0.25	809	$34.27	$ 27,728	16,989	$ 357,927	
≥ 9	$ -	0.25	755	$34.27	$ 25,877	15,855	$ 334,035	
Total	**$0**				**$ 251,127**	**153,867**	**$ 3,241,692**	**$ -**

Exhibit C.8d Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 1

	Routine Disinfection and Flushing				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours/year)	Total Cost ($/year)
	A	B	C=A*B	D	E
Review Aircraft Self-Certification	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for reviewing aircraft self-certification reflect EPA estimate.
(D) Total labor burden = unit labor burden * number of aircraft submitting self-certification (Ex. C8a).
(E) Total cost = unit cost * number of aircraft submitting self-certification (Ex. C8a).

Exhibit C.8e Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 2

	Routine Disinfection and Flushing				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours/year)	Total Cost ($/year)
	A	B	C=A*B	D	E
Review Aircraft Self-Certification	$50.14	0.5	$ 25	14,654	$ 734,810
Total		**0.5**	**$ 25**	**14,654**	**$ 734,810**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for reviewing aircraft self-certification reflect EPA estimate.
(D) Total labor burden = unit labor burden * number of aircraft submitting self-certification (Ex. C8b).
(E) Total cost = unit cost * number of aircraft submitting self-certification (Ex. C8b).

Exhibit C.8f Agency Burden and Cost Estimates for Routine Disinfection and Flushing (2008$), Alternative 3

	Routine Disinfection and Flushing				
Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours/year)	Total Cost ($/year)
	A	B	C=A*B	D	E
Review Aircraft Self-Certification	$50.14	0.5	$ 25	-	$ -
Total		**0.5**	**$ 25**	**-**	**$ -**

Sources:

(A) Agency labor costs from Section 5.2.1.

(B) Labor hours for reviewing aircraft self-certification reflect EPA estimate.

(D) Total labor burden = unit labor burden * number of aircraft submitting self-certification (Ex. C8c).

(E) Total cost = unit cost * number of aircraft submitting self-certification (Ex. 8c).

C.9 Corrective Action
Disinfection and Flushing

Exhibit C.9a Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 1

			Corrective Action Disinfection and Flushing						Recordkeeping				Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Corrective Action Disinfection and Flushing (aircraft/year)	Repeat Disinfection and Flushing (aircraft/year)	Corrective Action Disinfection and Flushing Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Chemical Costs ($/application)	Total Corrective Action Disinfection and Flushing Costs ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Corrective Action Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	D	E	F	G	H	I=((D+E)*(F*G))+(D+E)*H)	J	K=(D+E)*J	L	M=K*L	N=((D+E)*F)+K	O=I+M	P
1	381	381	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
2	2,080	4,160	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
3	756	2,268	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
4	421	1,684	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
5	956	4,780	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
6	871	5,226	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
7	298	2,086	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
8	809	6,472	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
≥ 9	755	9,354	-	-	5	$20.19	$ 1	$0	0.25	-	$34.27	$ -	-	$ -	
Total	**7,327**	**36,411**	**-**	**-**				**$0**					**0**	**$ -**	**$ -**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Corrective action disinfection and flushing not required under Alt 1.

(E) Assumes first flushing/disinfecting is successful.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(H) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(J) Based on EPA estimate.

(L) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.9b Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 2

			Corrective Action Disinfection and Flushing						Recordkeeping				Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Corrective Action Disinfection and Flushing (aircraft/year)	Repeat Disinfection and Flushing (aircraft/year)	Corrective Action Disinfection and Flushing Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Chemical Costs ($/application)	Total Corrective Action Disinfection and Flushing Costs ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Corrective Action Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	D	E	F	G	H	I=((D+E)*(F*G))+(D+E)*H)	J	K=(D+E)*J	L	M=K*L	N=((D+E)*F)+K	O=I+M	P
1	381	381	27	0	5	$20.19	$ 1	$2,799	0.25	7	$34.27	$ 235	144	$ 3,034	
2	2,080	4,160	150	0	5	$20.19	$ 1	$15,281	0.25	37	$34.27	$ 1,283	786	$ 16,565	
3	756	2,268	54	0	5	$20.19	$ 1	$5,554	0.25	14	$34.27	$ 466	286	$ 6,021	
4	421	1,684	30	0	5	$20.19	$ 1	$3,093	0.25	8	$34.27	$ 260	159	$ 3,353	
5	956	4,780	69	0	5	$20.19	$ 1	$7,024	0.25	17	$34.27	$ 590	361	$ 7,613	
6	871	5,226	63	0	5	$20.19	$ 1	$6,399	0.25	16	$34.27	$ 537	329	$ 6,936	
7	298	2,086	21	0	5	$20.19	$ 1	$2,189	0.25	5	$34.27	$ 184	113	$ 2,373	
8	809	6,472	58	0	5	$20.19	$ 1	$5,944	0.25	15	$34.27	$ 499	306	$ 6,443	
≥ 9	755	9,354	54	0	5	$20.19	$ 1	$5,547	0.25	14	$34.27	$ 466	285	$ 6,013	
Total	**7,327**	**36,411**	**528**	**0**				**$53,830**					**2,770**	**$ 58,350**	**$ -**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Corrective action disinfection and flushing required after positive total coliform sample. Assume entire aircraft flushed if either lavatory or galley has a positive total coliform sample. Assume more than one TC+ per aircraft.

(E) Assumes first flushing/disinfecting is successful.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(H) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(J) Based on EPA estimate.

(L) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

Exhibit C.9c Air Carrier Burden and Cost Estimates for Corrective Action Disinfection and Flushing (2008$), Alternative 3

			Corrective Action Disinfection and Flushing						Recordkeeping				Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Corrective Action Disinfection and Flushing (aircraft/year)	Repeat Disinfection and Flushing (aircraft/year)	Corrective Action Disinfection and Flushing Labor Burden (hours/aircraft)	Unit Disinfection and Flushing Cost ($/hour)	Unit Chemical Costs ($/application)	Total Corrective Action Disinfection and Flushing Costs ($/year)	Maintain Maintenance Log for Disinfection Activities Burden (hours/aircraft)	Maintain Maintenance Log for Disinfection Activities Burden (hours/year)	Recordkeeping Labor Cost ($/hour)	Maintain Maintenance Log for Disinfection Activities Costs ($/year)	Total Corrective Action Disinfection/Flushing Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	D	E	F	G	H	I=((D+E)*(F*G))+(D+E)*H)	J	K=(D+E)*J	L	M=K*L	N=((D+E)*F)+K	O=I+M	P
1	381	381	27	0	5	$20.19	$ 1	$2,799	0.25	7	$34.27	$ 235	144	$ 3,034	
2	2,080	4,160	150	0	5	$20.19	$ 1	$15,281	0.25	37	$34.27	$ 1,283	786	$ 16,565	
3	756	2,268	54	0	5	$20.19	$ 1	$5,554	0.25	14	$34.27	$ 466	286	$ 6,021	
4	421	1,684	30	0	5	$20.19	$ 1	$3,093	0.25	8	$34.27	$ 260	159	$ 3,353	
5	956	4,780	69	0	5	$20.19	$ 1	$7,024	0.25	17	$34.27	$ 590	361	$ 7,613	
6	871	5,226	63	0	5	$20.19	$ 1	$6,399	0.25	16	$34.27	$ 537	329	$ 6,936	
7	298	2,086	21	0	5	$20.19	$ 1	$2,189	0.25	5	$34.27	$ 184	113	$ 2,373	
8	809	6,472	58	0	5	$20.19	$ 1	$5,944	0.25	15	$34.27	$ 499	306	$ 6,443	
≥ 9	755	9,354	54	0	5	$20.19	$ 1	$5,547	0.25	14	$34.27	$ 466	285	$ 6,013	
Total	**7,327**	**36,411**	**528**	**0**				**$53,830**					**2,770**	**$ 58,350**	**$ -**

Notes:

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Corrective action disinfection and flushing required after positive total coliform sample. Assume entire aircraft flushed if either lavatory or galley has a positive total coliform sample. Assume no more than one TC+ per aircraft.

(E) Assumes first flushing/disinfecting is successful.

(F) EPA estimate based on observation of flushing and disinfection practices.

(G) Based on costs for cleaners of vehicles and equipment from Exhibit 5.1.

(H) Chemicals used for disinfection cost approximately $1 per application (based on 12.5% chlorine solution from Harcros Chemicals, which costs $12 per 4 gallon jugs).

(J) Based on EPA estimate.

(L) Based on technical labor costs for inspectors, testers, sorters, samplers, and weighers, from Exhibit 5.1.

C.10 Sanitary Survey/ Compliance Audit

Exhibit C.10a Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 1

		Reporting and Recordkeeping costs associated with Sanitary Survey of Aircraft PWS			Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unit Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Total Labor Burden (hours/SS cycle)	Total O&M Cost ($/SS cycle)	Total Capital Cost ($)
A	B	C=B*A	D	E	F=B*E	G=D*F	H
1	381	381	$42.86	0.5	190.50	$ 8,164	$ -
2	2,080	4,160	$42.86	0.5	1,040.00	$ 44,572	$ -
3	756	2,268	$42.86	0.5	378.00	$ 16,200	$ -
4	421	1,684	$42.86	0.5	210.50	$ 9,022	$ -
5	956	4,780	$42.86	0.5	478.00	$ 20,486	$ -
6	871	5,226	$42.86	0.5	435.50	$ 18,665	$ -
7	298	2,086	$42.86	0.5	149.00	$ 6,386	$ -
8	809	6,472	$42.86	0.5	404.50	$ 17,336	$ -
≥ 9	755	9,354	$42.86	0.5	377.50	$ 16,179	$ -
Total	**7,327**	**36,411**			**3,664**	**$ 157,010**	**$ -**

Sources:

(D) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(E) Labor burden reflects EPA estimate for reporting and recordkeeping only. EPA assumes that air carriers already conduct major maintenance checks, which include sanitary survey components, every 5 years for each aircraft. Therefore, with the exception of reporting and recordkeeping burden, no additional costs for sanitary surveys are incurred by air carriers under the ADWR.

(F), (G) All aircraft undergo sanitary surveys once in 5 years.

Exhibit C.10b Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 2

		Reporting and Recordkeeping costs associated with Sanitary Survey of Aircraft PWS			Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unit Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Total Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	D	E	F	G=D*F	H
1	381	381	$42.86	0.5	-	$ -	$ -
2	2,080	4,160	$42.86	0.5	-	$ -	$ -
3	756	2,268	$42.86	0.5	-	$ -	$ -
4	421	1,684	$42.86	0.5	-	$ -	$ -
5	956	4,780	$42.86	0.5	-	$ -	$ -
6	871	5,226	$42.86	0.5	-	$ -	$ -
7	298	2,086	$42.86	0.5	-	$ -	$ -
8	809	6,472	$42.86	0.5	-	$ -	$ -
≥ 9	755	9,354	$42.86	0.5	-	$ -	$ -
Total	**7,327**	**36,411**			**-**	**$ -**	**$ -**

Sources:

(D) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(E) Labor burden reflects EPA estimate for reporting and recordkeeping only. EPA assumes that air carriers already conduct major maintenance checks, which include sanitary survey components, every 5 years for each aircraft. Therefore, with the exception of reporting and recordkeeping burden, no additional costs for sanitary surveys are incurred by air carriers under the ADWR.

(F), (G) Sanitary surveys not specified under Alternative 2. Assume no sanitary surveys conducted.

Exhibit C.10c Air Carrier Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 3

		Reporting and Recordkeeping costs associated with Sanitary Survey of Aircraft PWS			Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unit Labor Cost ($/hour)	Unit labor burden (hours/aircraft)	Total Labor Burden (hours/year)	Total O&M Cost ($/year)	Total Capital Cost ($)
A	B	C=B*A	D	E	F=B*E	G=D*F	H
1	381	381	$42.86	0.5	-	$ -	$ -
2	2,080	4,160	$42.86	0.5	-	$ -	$ -
3	756	2,268	$42.86	0.5	-	$ -	$ -
4	421	1,684	$42.86	0.5	-	$ -	$ -
5	956	4,780	$42.86	0.5	-	$ -	$ -
6	871	5,226	$42.86	0.5	-	$ -	$ -
7	298	2,086	$42.86	0.5	-	$ -	$ -
8	809	6,472	$42.86	0.5	-	$ -	$ -
≥ 9	755	9,354	$42.86	0.5	-	$ -	$ -
Total	**7,327**	**36,411**			**-**	**$ -**	**$ -**

Sources:

(D) Air carrier labor costs from Exhibit 5.1. EPA used the transportation inspector category because it was the highest-paid technical labor category. Transportation inspectors are assumed to have a technical background, as well as some management or oversight responsibility.

(E) Labor burden reflects EPA estimate for reporting and recordkeeping only. EPA assumes that air carriers already conduct major maintenance checks, which include sanitary survey components, every 5 years for each aircraft. Therefore, with the exception of reporting and recordkeeping burden, no additional costs for sanitary surveys are incurred by air carriers under the ADWR.

(F), (G) Sanitary surveys not specified under Alternative 3. Assume no sanitary surveys conducted.

Exhibit C.10d Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 1

				Conducting Sanitary Surveys of Aircraft PWSs							Totals		
# of Available Sampling Points	# of Aircraft	Total # of Available Sampling Points	Unit Labor Cost ($/hour)	Review/Inspect Aircraft Distribution System	Report Documentation/File Review	Report Development	Data Entry	Travel	Unit labor burden (hours/aircraft)	Unit Cost ($/aircraft)	Total Labor Burden (hours/SS cycle)	Total Labor Cost ($/SS cycle)	Total Capital Costs ($)
A	B	C=B*A	D	E	F	G	H	I	J=E+F+G+H+I	K=D*J	L=B*J	M=B*K	N
1	381	381	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	3,772	$ 189,138	
2	2,080	4,160	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	20,592	$ 1,032,565	
3	756	2,268	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	7,484	$ 375,298	
4	421	1,684	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	4,168	$ 208,995	
5	956	4,780	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	9,464	$ 474,583	
6	871	5,226	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	8,623	$ 432,387	
7	298	2,086	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	2,950	$ 147,935	
8	809	6,472	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	8,009	$ 401,608	
≥ 9	755	9,354	$50.14	0.6	1.5	5.2	0.8	1.8	10	$ 496	7,475	$ 374,801	
Total	**7,327**	**36,411**									**72,537**	**$ 3,637,310**	

(C) Average number of available sampling points used for ≥ 9 sampling points size category.

(D) Agency labor costs from Section 5.2.1.

(E)-(I) Labor hours reflect sanitary survey estimates used in Ground Water Rule for transient noncommunity water systems serving less than 500 people.

(L), (M) National totals for Agency to conduct sanitary surveys for 7,327 aircraft subject to ADWR once every 5 years. Assumes Agency spends equal time conducting sanitary surveys of each aircraft, regardless of aircraft type.

Exhibit C.10e Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 2

Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/air carrier)	Unit Cost ($/air carrier)	Total Labor Burden (hours/SS cycle)	Total Labor Cost ($/SS cycle)
	A	B	C=A*B	D	E
Conducting Sanitary Survey of aircraft PWSs	$50.14	16	$ 802	-	$ -
Total		**16**	**$ 802**	**-**	**$ -**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for conducting sanitary survey reflect EPA estimate.
(D), (E) Sanitary survey requirements are not specified for Alt. 2. Assumed no sanitary surveys conducted.

Exhibit C.10f Agency Burden and Cost Estimates for Sanitary Survey (2008$), Alternative 3

Compliance Activity	Labor Cost ($/hour)	Unit labor burden (hours/air carrier)	Unit Cost ($/air carrier)	Total Labor Burden (hours/SS cycle)	Total Labor Cost ($/SS cycle)
	A	B	C=A*B	D	E
Conducting Sanitary Survey of aircraft PWSs	$50.14	16	$ 802	-	$ -
Total		**16**	**$ 802**	**-**	**$ -**

Sources:
(A) Agency labor costs from Section 5.2.1.
(B) Labor hours for conducting sanitary survey reflect EPA estimate.
(D), (E) Sanitary survey requirements are not specified for Alt. 3. Assumed no sanitary surveys conducted.

C.11 Rule Schedule

Exhibit C.11 Rule Schedule

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey/Compliance Audit
1	50%		50%					50%			
2	50%		50%					50%			
3		100%		100%	100%	100%	100%		100%	100%	20%
4		100%		100%	100%	100%	100%		100%	100%	20%
5		100%		100%	100%	100%	100%		100%	100%	20%
6		100%		100%	100%	100%	100%		100%	100%	20%
7		100%		100%	100%	100%	100%		100%	100%	20%
8		100%		100%	100%	100%	100%		100%	100%	20%
9		100%		100%	100%	100%	100%		100%	100%	20%
10		100%		100%	100%	100%	100%		100%	100%	20%
11		100%		100%	100%	100%	100%		100%	100%	20%
12		100%		100%	100%	100%	100%		100%	100%	20%
13		100%		100%	100%	100%	100%		100%	100%	20%
14		100%		100%	100%	100%	100%		100%	100%	20%
15		100%		100%	100%	100%	100%		100%	100%	20%
16		100%		100%	100%	100%	100%		100%	100%	20%
17		100%		100%	100%	100%	100%		100%	100%	20%
18		100%		100%	100%	100%	100%		100%	100%	20%
19		100%		100%	100%	100%	100%		100%	100%	20%
20		100%		100%	100%	100%	100%		100%	100%	20%
21		100%		100%	100%	100%	100%		100%	100%	20%
22		100%		100%	100%	100%	100%		100%	100%	20%
23		100%		100%	100%	100%	100%		100%	100%	20%
24		100%		100%	100%	100%	100%		100%	100%	20%
25		100%		100%	100%	100%	100%		100%	100%	20%

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

C.12 Nominal Costs

Exhibit C.12a Nominal Rule Activity Costs for Alternative 1, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 27.71	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
4	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
5	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
6	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
7	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
8	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
9	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
10	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
11	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
12	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
13	$ -	$ 0.26	$ -	$ 27.71	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
14	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
15	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
16	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
17	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
18	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
19	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
20	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
21	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
22	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
23	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
24	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76
25	$ -	$ 0.26	$ -	$ 27.67	$ 3.46	$ -	$ -	$ -	$ -	$ -	$ 0.76

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12b Nominal Air Carrier Activity Costs for Alternative 1, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 27.38	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
4	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
5	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
6	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
7	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
8	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
9	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
10	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
11	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
12	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
13	$ -	$ -	$ -	$ 27.38	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
14	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
15	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
16	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
17	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
18	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
19	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
20	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
21	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
22	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
23	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
24	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03
25	$ -	$ -	$ -	$ 27.34	$ 3.27	$ -	$ -	$ -	$ -	$ -	$ 0.03

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12c Nominal Agency Activity Costs for Alternative 1, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
4	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
5	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
6	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
7	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
8	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
9	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
10	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
11	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
12	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
13	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
14	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
15	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
16	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
17	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
18	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
19	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
20	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
21	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
22	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
23	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
24	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73
25	$ -	$ 0.26	$ -	$ 0.33	$ 0.18	$ -	$ -	$ -	$ -	$ -	$ 0.73

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12d Nominal Rule Activity Costs for Alternative 2, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 1.85	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
4	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
5	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
6	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
7	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
8	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
9	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
10	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
11	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
12	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
13	$ -	$ 0.26	$ -	$ 1.85	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
14	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
15	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
16	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
17	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
18	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
19	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
20	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
21	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
22	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
23	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
24	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -
25	$ -	$ 0.26	$ -	$ 1.82	$ 0.73	$ -	$ -	$ -	$ 4.94	$ 0.06	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12e Nominal Air Carrier Activity Costs for Alternative 2, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 1.84	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
4	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
5	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
6	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
7	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
8	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
9	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
10	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
11	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
12	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
13	$ -	$ -	$ -	$ 1.84	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
14	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
15	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
16	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
17	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
18	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
19	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
20	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
21	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
22	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
23	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
24	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -
25	$ -	$ -	$ -	$ 1.80	$ 0.55	$ -	$ -	$ -	$ 4.20	$ 0.06	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12f Nominal Agency Activity Costs for Alternative 2, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
4	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
5	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
6	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
7	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
8	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
9	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
10	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
11	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
12	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
13	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
14	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
15	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
16	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
17	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
18	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
19	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
20	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
21	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
22	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
23	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
24	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -
25	$ -	$ 0.26	$ -	$ 0.01	$ 0.18	$ -	$ -	$ -	$ 0.73	$ -	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12g Nominal Rule Activity Costs for Alternative 3, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.06	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.06	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 2.47	$ -	$ 14.13	$ -	$ -	$ 3.24	$ 0.06	$ -
4	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
5	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
6	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
7	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
8	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.13	$ -	$ -	$ 3.24	$ 0.06	$ -
9	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
10	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
11	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
12	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
13	$ -	$ 0.26	$ -	$ 2.47	$ -	$ 14.13	$ -	$ -	$ 3.24	$ 0.06	$ -
14	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
15	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
16	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
17	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
18	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.13	$ -	$ -	$ 3.24	$ 0.06	$ -
19	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
20	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
21	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
22	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
23	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.13	$ -	$ -	$ 3.24	$ 0.06	$ -
24	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -
25	$ -	$ 0.26	$ -	$ 2.43	$ -	$ 14.08	$ -	$ -	$ 3.24	$ 0.06	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12h Nominal Air Carrier Activity Costs for Alternative 3, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 2.46	$ -	$ 13.03	$ -	$ -	$ 3.24	$ 0.06	$ -
4	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
5	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
6	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
7	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
8	$ -	$ -	$ -	$ 2.42	$ -	$ 13.03	$ -	$ -	$ 3.24	$ 0.06	$ -
9	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
10	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
11	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
12	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
13	$ -	$ -	$ -	$ 2.46	$ -	$ 13.03	$ -	$ -	$ 3.24	$ 0.06	$ -
14	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
15	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
16	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
17	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
18	$ -	$ -	$ -	$ 2.42	$ -	$ 13.03	$ -	$ -	$ 3.24	$ 0.06	$ -
19	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
20	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
21	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
22	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
23	$ -	$ -	$ -	$ 2.42	$ -	$ 13.03	$ -	$ -	$ 3.24	$ 0.06	$ -
24	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -
25	$ -	$ -	$ -	$ 2.42	$ -	$ 12.98	$ -	$ -	$ 3.24	$ 0.06	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12i Nominal Agency Activity Costs for Alternative 3, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
4	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
5	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
6	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
7	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
8	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
9	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
10	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
11	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
12	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
13	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
14	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
15	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
16	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
17	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
18	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
19	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
20	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
21	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
22	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
23	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
24	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -
25	$ -	$ 0.26	$ -	$ 0.01	$ -	$ 1.10	$ -	$ -	$ -	$ -	$ -

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12j Nominal Rule Activity Costs for Alternative 4 (Final Rule), by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 5.41	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
4	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
5	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
6	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
7	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
8	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
9	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
10	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
11	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
12	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
13	$ -	$ 0.26	$ -	$ 5.41	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
14	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
15	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
16	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
17	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
18	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
19	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
20	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
21	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
22	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
23	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
24	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02
25	$ -	$ 0.26	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.02

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12k Nominal Air Carrier Activity Costs for Alternative 4 (Final Rule), by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
4	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
5	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
6	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
7	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
8	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
9	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
10	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
11	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
12	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
13	$ -	$ -	$ -	$ 5.37	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
14	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
15	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
16	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
17	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
18	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
19	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
20	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
21	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
22	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
23	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
24	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01
25	$ -	$ -	$ -	$ 5.33	$ -	$ -	$ -	$ -	$ 2.27	$ 0.05	$ 0.01

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.12l Nominal Agency Activity Costs for Alternative 4 (Final Rule), by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
3	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
4	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
5	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
6	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
7	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
8	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
9	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
10	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
11	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
12	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
13	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
14	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
15	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
16	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
17	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
18	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
19	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
20	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
21	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
22	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
23	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
24	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
25	$ -	$ 0.26	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Values in millions of 2008 dollars.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

C.13 Present Value at 3 Percent

Exhibit C.13a Present Value of Rule Activity Costs for Alternative 1 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 26.12	$ 3.26	$ -	$ -	$ -	$ -	$ -	$ 0.72
4	$ -	$ 0.24	$ -	$ 25.32	$ 3.16	$ -	$ -	$ -	$ -	$ -	$ 0.69
5	$ -	$ 0.23	$ -	$ 24.59	$ 3.07	$ -	$ -	$ -	$ -	$ -	$ 0.67
6	$ -	$ 0.22	$ -	$ 23.87	$ 2.98	$ -	$ -	$ -	$ -	$ -	$ 0.65
7	$ -	$ 0.22	$ -	$ 23.18	$ 2.90	$ -	$ -	$ -	$ -	$ -	$ 0.64
8	$ -	$ 0.21	$ -	$ 22.50	$ 2.81	$ -	$ -	$ -	$ -	$ -	$ 0.62
9	$ -	$ 0.20	$ -	$ 21.84	$ 2.73	$ -	$ -	$ -	$ -	$ -	$ 0.60
10	$ -	$ 0.20	$ -	$ 21.21	$ 2.65	$ -	$ -	$ -	$ -	$ -	$ 0.58
11	$ -	$ 0.19	$ -	$ 20.59	$ 2.57	$ -	$ -	$ -	$ -	$ -	$ 0.56
12	$ -	$ 0.19	$ -	$ 19.99	$ 2.50	$ -	$ -	$ -	$ -	$ -	$ 0.55
13	$ -	$ 0.18	$ -	$ 19.44	$ 2.43	$ -	$ -	$ -	$ -	$ -	$ 0.53
14	$ -	$ 0.18	$ -	$ 18.84	$ 2.35	$ -	$ -	$ -	$ -	$ -	$ 0.52
15	$ -	$ 0.17	$ -	$ 18.29	$ 2.29	$ -	$ -	$ -	$ -	$ -	$ 0.50
16	$ -	$ 0.17	$ -	$ 17.76	$ 2.22	$ -	$ -	$ -	$ -	$ -	$ 0.49
17	$ -	$ 0.16	$ -	$ 17.24	$ 2.15	$ -	$ -	$ -	$ -	$ -	$ 0.47
18	$ -	$ 0.16	$ -	$ 16.74	$ 2.09	$ -	$ -	$ -	$ -	$ -	$ 0.46
19	$ -	$ 0.15	$ -	$ 16.25	$ 2.03	$ -	$ -	$ -	$ -	$ -	$ 0.45
20	$ -	$ 0.15	$ -	$ 15.78	$ 1.97	$ -	$ -	$ -	$ -	$ -	$ 0.43
21	$ -	$ 0.14	$ -	$ 15.32	$ 1.91	$ -	$ -	$ -	$ -	$ -	$ 0.42
22	$ -	$ 0.14	$ -	$ 14.88	$ 1.86	$ -	$ -	$ -	$ -	$ -	$ 0.41
23	$ -	$ 0.14	$ -	$ 14.44	$ 1.80	$ -	$ -	$ -	$ -	$ -	$ 0.40
24	$ -	$ 0.13	$ -	$ 14.02	$ 1.75	$ -	$ -	$ -	$ -	$ -	$ 0.38
25	$ -	$ 0.13	$ -	$ 13.61	$ 1.70	$ -	$ -	$ -	$ -	$ -	$ 0.37
Total PV	**$ 0.18**	**$ 4.13**	**$ 0.04**	**$ 441.85**	**$ 55.20**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 12.12**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 25.37**	**$ 3.17**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.70**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13b Present Value of Air Carrier Activity Costs for Alternative 1 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 25.81	$ 3.09	$ -	$ -	$ -	$ -	$ -	$ 0.03
4	$ -	$ -	$ -	$ 25.02	$ 3.00	$ -	$ -	$ -	$ -	$ -	$ 0.03
5	$ -	$ -	$ -	$ 24.29	$ 2.91	$ -	$ -	$ -	$ -	$ -	$ 0.03
6	$ -	$ -	$ -	$ 23.59	$ 2.82	$ -	$ -	$ -	$ -	$ -	$ 0.03
7	$ -	$ -	$ -	$ 22.90	$ 2.74	$ -	$ -	$ -	$ -	$ -	$ 0.03
8	$ -	$ -	$ -	$ 22.23	$ 2.66	$ -	$ -	$ -	$ -	$ -	$ 0.03
9	$ -	$ -	$ -	$ 21.58	$ 2.58	$ -	$ -	$ -	$ -	$ -	$ 0.02
10	$ -	$ -	$ -	$ 20.96	$ 2.51	$ -	$ -	$ -	$ -	$ -	$ 0.02
11	$ -	$ -	$ -	$ 20.34	$ 2.44	$ -	$ -	$ -	$ -	$ -	$ 0.02
12	$ -	$ -	$ -	$ 19.75	$ 2.37	$ -	$ -	$ -	$ -	$ -	$ 0.02
13	$ -	$ -	$ -	$ 19.20	$ 2.30	$ -	$ -	$ -	$ -	$ -	$ 0.02
14	$ -	$ -	$ -	$ 18.62	$ 2.23	$ -	$ -	$ -	$ -	$ -	$ 0.02
15	$ -	$ -	$ -	$ 18.08	$ 2.16	$ -	$ -	$ -	$ -	$ -	$ 0.02
16	$ -	$ -	$ -	$ 17.55	$ 2.10	$ -	$ -	$ -	$ -	$ -	$ 0.02
17	$ -	$ -	$ -	$ 17.04	$ 2.04	$ -	$ -	$ -	$ -	$ -	$ 0.02
18	$ -	$ -	$ -	$ 16.54	$ 1.98	$ -	$ -	$ -	$ -	$ -	$ 0.02
19	$ -	$ -	$ -	$ 16.06	$ 1.92	$ -	$ -	$ -	$ -	$ -	$ 0.02
20	$ -	$ -	$ -	$ 15.59	$ 1.87	$ -	$ -	$ -	$ -	$ -	$ 0.02
21	$ -	$ -	$ -	$ 15.14	$ 1.81	$ -	$ -	$ -	$ -	$ -	$ 0.02
22	$ -	$ -	$ -	$ 14.70	$ 1.76	$ -	$ -	$ -	$ -	$ -	$ 0.02
23	$ -	$ -	$ -	$ 14.27	$ 1.71	$ -	$ -	$ -	$ -	$ -	$ 0.02
24	$ -	$ -	$ -	$ 13.85	$ 1.66	$ -	$ -	$ -	$ -	$ -	$ 0.02
25	$ -	$ -	$ -	$ 13.45	$ 1.61	$ -	$ -	$ -	$ -	$ -	$ 0.02
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 436.57**	**$ 52.26**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.50**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 25.07**	**$ 3.00**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.03**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13c Present Value of Agency Activity Costs for Alternative 1 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 0.31	$ 0.17	$ -	$ -	$ -	$ -	$ -	$ 0.69
4	$ -	$ 0.24	$ -	$ 0.30	$ 0.17	$ -	$ -	$ -	$ -	$ -	$ 0.67
5	$ -	$ 0.23	$ -	$ 0.29	$ 0.16	$ -	$ -	$ -	$ -	$ -	$ 0.65
6	$ -	$ 0.22	$ -	$ 0.29	$ 0.16	$ -	$ -	$ -	$ -	$ -	$ 0.63
7	$ -	$ 0.22	$ -	$ 0.28	$ 0.15	$ -	$ -	$ -	$ -	$ -	$ 0.61
8	$ -	$ 0.21	$ -	$ 0.27	$ 0.15	$ -	$ -	$ -	$ -	$ -	$ 0.59
9	$ -	$ 0.20	$ -	$ 0.26	$ 0.15	$ -	$ -	$ -	$ -	$ -	$ 0.57
10	$ -	$ 0.20	$ -	$ 0.25	$ 0.14	$ -	$ -	$ -	$ -	$ -	$ 0.56
11	$ -	$ 0.19	$ -	$ 0.25	$ 0.14	$ -	$ -	$ -	$ -	$ -	$ 0.54
12	$ -	$ 0.19	$ -	$ 0.24	$ 0.13	$ -	$ -	$ -	$ -	$ -	$ 0.53
13	$ -	$ 0.18	$ -	$ 0.23	$ 0.13	$ -	$ -	$ -	$ -	$ -	$ 0.51
14	$ -	$ 0.18	$ -	$ 0.23	$ 0.13	$ -	$ -	$ -	$ -	$ -	$ 0.50
15	$ -	$ 0.17	$ -	$ 0.22	$ 0.12	$ -	$ -	$ -	$ -	$ -	$ 0.48
16	$ -	$ 0.17	$ -	$ 0.21	$ 0.12	$ -	$ -	$ -	$ -	$ -	$ 0.47
17	$ -	$ 0.16	$ -	$ 0.21	$ 0.11	$ -	$ -	$ -	$ -	$ -	$ 0.45
18	$ -	$ 0.16	$ -	$ 0.20	$ 0.11	$ -	$ -	$ -	$ -	$ -	$ 0.44
19	$ -	$ 0.15	$ -	$ 0.19	$ 0.11	$ -	$ -	$ -	$ -	$ -	$ 0.43
20	$ -	$ 0.15	$ -	$ 0.19	$ 0.10	$ -	$ -	$ -	$ -	$ -	$ 0.41
21	$ -	$ 0.14	$ -	$ 0.18	$ 0.10	$ -	$ -	$ -	$ -	$ -	$ 0.40
22	$ -	$ 0.14	$ -	$ 0.18	$ 0.10	$ -	$ -	$ -	$ -	$ -	$ 0.39
23	$ -	$ 0.14	$ -	$ 0.17	$ 0.10	$ -	$ -	$ -	$ -	$ -	$ 0.38
24	$ -	$ 0.13	$ -	$ 0.17	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.37
25	$ -	$ 0.13	$ -	$ 0.16	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.36
Total PV	**$ 0.14**	**$ 4.13**	**$ 0.02**	**$ 5.28**	**$ 2.93**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 11.61**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 0.30**	**$ 0.17**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.67**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13d Present Value of Rule Activity Costs for Alternative 2 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 1.75	$ 0.69	$ -	$ -	$ -	$ 4.65	$ 0.06	$ -
4	$ -	$ 0.24	$ -	$ 1.66	$ 0.67	$ -	$ -	$ -	$ 4.52	$ 0.05	$ -
5	$ -	$ 0.23	$ -	$ 1.61	$ 0.65	$ -	$ -	$ -	$ 4.38	$ 0.05	$ -
6	$ -	$ 0.22	$ -	$ 1.57	$ 0.63	$ -	$ -	$ -	$ 4.26	$ 0.05	$ -
7	$ -	$ 0.22	$ -	$ 1.52	$ 0.61	$ -	$ -	$ -	$ 4.13	$ 0.05	$ -
8	$ -	$ 0.21	$ -	$ 1.48	$ 0.59	$ -	$ -	$ -	$ 4.01	$ 0.05	$ -
9	$ -	$ 0.20	$ -	$ 1.43	$ 0.58	$ -	$ -	$ -	$ 3.90	$ 0.05	$ -
10	$ -	$ 0.20	$ -	$ 1.39	$ 0.56	$ -	$ -	$ -	$ 3.78	$ 0.04	$ -
11	$ -	$ 0.19	$ -	$ 1.35	$ 0.54	$ -	$ -	$ -	$ 3.67	$ 0.04	$ -
12	$ -	$ 0.19	$ -	$ 1.31	$ 0.53	$ -	$ -	$ -	$ 3.57	$ 0.04	$ -
13	$ -	$ 0.18	$ -	$ 1.30	$ 0.51	$ -	$ -	$ -	$ 3.46	$ 0.04	$ -
14	$ -	$ 0.18	$ -	$ 1.24	$ 0.50	$ -	$ -	$ -	$ 3.36	$ 0.04	$ -
15	$ -	$ 0.17	$ -	$ 1.20	$ 0.48	$ -	$ -	$ -	$ 3.26	$ 0.04	$ -
16	$ -	$ 0.17	$ -	$ 1.17	$ 0.47	$ -	$ -	$ -	$ 3.17	$ 0.04	$ -
17	$ -	$ 0.16	$ -	$ 1.13	$ 0.45	$ -	$ -	$ -	$ 3.08	$ 0.04	$ -
18	$ -	$ 0.16	$ -	$ 1.10	$ 0.44	$ -	$ -	$ -	$ 2.99	$ 0.04	$ -
19	$ -	$ 0.15	$ -	$ 1.07	$ 0.43	$ -	$ -	$ -	$ 2.90	$ 0.03	$ -
20	$ -	$ 0.15	$ -	$ 1.04	$ 0.42	$ -	$ -	$ -	$ 2.81	$ 0.03	$ -
21	$ -	$ 0.14	$ -	$ 1.01	$ 0.40	$ -	$ -	$ -	$ 2.73	$ 0.03	$ -
22	$ -	$ 0.14	$ -	$ 0.98	$ 0.39	$ -	$ -	$ -	$ 2.65	$ 0.03	$ -
23	$ -	$ 0.14	$ -	$ 0.95	$ 0.38	$ -	$ -	$ -	$ 2.58	$ 0.03	$ -
24	$ -	$ 0.13	$ -	$ 0.92	$ 0.37	$ -	$ -	$ -	$ 2.50	$ 0.03	$ -
25	$ -	$ 0.13	$ -	$ 0.89	$ 0.36	$ -	$ -	$ -	$ 2.43	$ 0.03	$ -
Total PV	**$ 0.18**	**$ 4.13**	**$ 0.04**	**$ 29.05**	**$ 11.64**	**$ -**	**$ -**	**$ -**	**$ 78.79**	**$ 0.93**	**$ -**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 1.67**	**$ 0.67**	**$ -**	**$ -**	**$ -**	**$ 4.52**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13e Present Value of Air Carrier Activity Costs for Alternative 2 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 1.73	$ 0.51	$ -	$ -	$ -	$ 3.96	$ 0.06	$ -
4	$ -	$ -	$ -	$ 1.65	$ 0.50	$ -	$ -	$ -	$ 3.84	$ 0.05	$ -
5	$ -	$ -	$ -	$ 1.60	$ 0.48	$ -	$ -	$ -	$ 3.73	$ 0.05	$ -
6	$ -	$ -	$ -	$ 1.55	$ 0.47	$ -	$ -	$ -	$ 3.62	$ 0.05	$ -
7	$ -	$ -	$ -	$ 1.51	$ 0.46	$ -	$ -	$ -	$ 3.52	$ 0.05	$ -
8	$ -	$ -	$ -	$ 1.47	$ 0.44	$ -	$ -	$ -	$ 3.42	$ 0.05	$ -
9	$ -	$ -	$ -	$ 1.42	$ 0.43	$ -	$ -	$ -	$ 3.32	$ 0.05	$ -
10	$ -	$ -	$ -	$ 1.38	$ 0.42	$ -	$ -	$ -	$ 3.22	$ 0.04	$ -
11	$ -	$ -	$ -	$ 1.34	$ 0.41	$ -	$ -	$ -	$ 3.13	$ 0.04	$ -
12	$ -	$ -	$ -	$ 1.30	$ 0.39	$ -	$ -	$ -	$ 3.03	$ 0.04	$ -
13	$ -	$ -	$ -	$ 1.29	$ 0.38	$ -	$ -	$ -	$ 2.95	$ 0.04	$ -
14	$ -	$ -	$ -	$ 1.23	$ 0.37	$ -	$ -	$ -	$ 2.86	$ 0.04	$ -
15	$ -	$ -	$ -	$ 1.19	$ 0.36	$ -	$ -	$ -	$ 2.78	$ 0.04	$ -
16	$ -	$ -	$ -	$ 1.16	$ 0.35	$ -	$ -	$ -	$ 2.70	$ 0.04	$ -
17	$ -	$ -	$ -	$ 1.12	$ 0.34	$ -	$ -	$ -	$ 2.62	$ 0.04	$ -
18	$ -	$ -	$ -	$ 1.09	$ 0.33	$ -	$ -	$ -	$ 2.54	$ 0.04	$ -
19	$ -	$ -	$ -	$ 1.06	$ 0.32	$ -	$ -	$ -	$ 2.47	$ 0.03	$ -
20	$ -	$ -	$ -	$ 1.03	$ 0.31	$ -	$ -	$ -	$ 2.40	$ 0.03	$ -
21	$ -	$ -	$ -	$ 1.00	$ 0.30	$ -	$ -	$ -	$ 2.33	$ 0.03	$ -
22	$ -	$ -	$ -	$ 0.97	$ 0.29	$ -	$ -	$ -	$ 2.26	$ 0.03	$ -
23	$ -	$ -	$ -	$ 0.94	$ 0.28	$ -	$ -	$ -	$ 2.19	$ 0.03	$ -
24	$ -	$ -	$ -	$ 0.91	$ 0.28	$ -	$ -	$ -	$ 2.13	$ 0.03	$ -
25	$ -	$ -	$ -	$ 0.89	$ 0.27	$ -	$ -	$ -	$ 2.07	$ 0.03	$ -
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 28.83**	**$ 8.71**	**$ -**	**$ -**	**$ -**	**$ 67.06**	**$ 0.93**	**$ -**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 1.66**	**$ 0.50**	**$ -**	**$ -**	**$ -**	**$ 3.85**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13f Present Value of Agency Activity Costs for Alternative 2 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 0.01	$ 0.17	$ -	$ -	$ -	$ 0.69	$ -	$ -
4	$ -	$ 0.24	$ -	$ 0.01	$ 0.17	$ -	$ -	$ -	$ 0.67	$ -	$ -
5	$ -	$ 0.23	$ -	$ 0.01	$ 0.16	$ -	$ -	$ -	$ 0.65	$ -	$ -
6	$ -	$ 0.22	$ -	$ 0.01	$ 0.16	$ -	$ -	$ -	$ 0.63	$ -	$ -
7	$ -	$ 0.22	$ -	$ 0.01	$ 0.15	$ -	$ -	$ -	$ 0.62	$ -	$ -
8	$ -	$ 0.21	$ -	$ 0.01	$ 0.15	$ -	$ -	$ -	$ 0.60	$ -	$ -
9	$ -	$ 0.20	$ -	$ 0.01	$ 0.15	$ -	$ -	$ -	$ 0.58	$ -	$ -
10	$ -	$ 0.20	$ -	$ 0.01	$ 0.14	$ -	$ -	$ -	$ 0.56	$ -	$ -
11	$ -	$ 0.19	$ -	$ 0.01	$ 0.14	$ -	$ -	$ -	$ 0.55	$ -	$ -
12	$ -	$ 0.19	$ -	$ 0.01	$ 0.13	$ -	$ -	$ -	$ 0.53	$ -	$ -
13	$ -	$ 0.18	$ -	$ 0.01	$ 0.13	$ -	$ -	$ -	$ 0.52	$ -	$ -
14	$ -	$ 0.18	$ -	$ 0.01	$ 0.13	$ -	$ -	$ -	$ 0.50	$ -	$ -
15	$ -	$ 0.17	$ -	$ 0.01	$ 0.12	$ -	$ -	$ -	$ 0.49	$ -	$ -
16	$ -	$ 0.17	$ -	$ 0.01	$ 0.12	$ -	$ -	$ -	$ 0.47	$ -	$ -
17	$ -	$ 0.16	$ -	$ 0.01	$ 0.11	$ -	$ -	$ -	$ 0.46	$ -	$ -
18	$ -	$ 0.16	$ -	$ 0.01	$ 0.11	$ -	$ -	$ -	$ 0.44	$ -	$ -
19	$ -	$ 0.15	$ -	$ 0.01	$ 0.11	$ -	$ -	$ -	$ 0.43	$ -	$ -
20	$ -	$ 0.15	$ -	$ 0.01	$ 0.10	$ -	$ -	$ -	$ 0.42	$ -	$ -
21	$ -	$ 0.14	$ -	$ 0.01	$ 0.10	$ -	$ -	$ -	$ 0.41	$ -	$ -
22	$ -	$ 0.14	$ -	$ 0.01	$ 0.10	$ -	$ -	$ -	$ 0.39	$ -	$ -
23	$ -	$ 0.14	$ -	$ 0.01	$ 0.10	$ -	$ -	$ -	$ 0.38	$ -	$ -
24	$ -	$ 0.13	$ -	$ 0.01	$ 0.09	$ -	$ -	$ -	$ 0.37	$ -	$ -
25	$ -	$ 0.13	$ -	$ 0.01	$ 0.09	$ -	$ -	$ -	$ 0.36	$ -	$ -
Total PV	**$ 0.14**	**$ 4.13**	**$ 0.02**	**$ 0.21**	**$ 2.93**	**$ -**	**$ -**	**$ -**	**$ 11.73**	**$ -**	**$ -**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 0.01**	**$ 0.17**	**$ -**	**$ -**	**$ -**	**$ 0.67**	**$ -**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13g Present Value of Rule Activity Costs for Alternative 3 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$0.06	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$0.06	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 2.33	$ -	$ 13.32	$ -	$ -	$ 3.06	$ 0.06	$ -
4	$ -	$ 0.24	$ -	$ 2.22	$ -	$ 12.89	$ -	$ -	$ 2.97	$ 0.05	$ -
5	$ -	$ 0.23	$ -	$ 2.16	$ -	$ 12.51	$ -	$ -	$ 2.88	$ 0.05	$ -
6	$ -	$ 0.22	$ -	$ 2.10	$ -	$ 12.15	$ -	$ -	$ 2.80	$ 0.05	$ -
7	$ -	$ 0.22	$ -	$ 2.04	$ -	$ 11.79	$ -	$ -	$ 2.71	$ 0.05	$ -
8	$ -	$ 0.21	$ -	$ 1.98	$ -	$ 11.49	$ -	$ -	$ 2.64	$ 0.05	$ -
9	$ -	$ 0.20	$ -	$ 1.92	$ -	$ 11.12	$ -	$ -	$ 2.56	$ 0.05	$ -
10	$ -	$ 0.20	$ -	$ 1.86	$ -	$ 10.79	$ -	$ -	$ 2.48	$ 0.04	$ -
11	$ -	$ 0.19	$ -	$ 1.81	$ -	$ 10.48	$ -	$ -	$ 2.41	$ 0.04	$ -
12	$ -	$ 0.19	$ -	$ 1.76	$ -	$ 10.17	$ -	$ -	$ 2.34	$ 0.04	$ -
13	$ -	$ 0.18	$ -	$ 1.73	$ -	$ 9.91	$ -	$ -	$ 2.27	$ 0.04	$ -
14	$ -	$ 0.18	$ -	$ 1.66	$ -	$ 9.59	$ -	$ -	$ 2.21	$ 0.04	$ -
15	$ -	$ 0.17	$ -	$ 1.61	$ -	$ 9.31	$ -	$ -	$ 2.14	$ 0.04	$ -
16	$ -	$ 0.17	$ -	$ 1.56	$ -	$ 9.04	$ -	$ -	$ 2.08	$ 0.04	$ -
17	$ -	$ 0.16	$ -	$ 1.52	$ -	$ 8.77	$ -	$ -	$ 2.02	$ 0.04	$ -
18	$ -	$ 0.16	$ -	$ 1.47	$ -	$ 8.55	$ -	$ -	$ 1.96	$ 0.04	$ -
19	$ -	$ 0.15	$ -	$ 1.43	$ -	$ 8.27	$ -	$ -	$ 1.90	$ 0.03	$ -
20	$ -	$ 0.15	$ -	$ 1.39	$ -	$ 8.03	$ -	$ -	$ 1.85	$ 0.03	$ -
21	$ -	$ 0.14	$ -	$ 1.35	$ -	$ 7.80	$ -	$ -	$ 1.79	$ 0.03	$ -
22	$ -	$ 0.14	$ -	$ 1.31	$ -	$ 7.57	$ -	$ -	$ 1.74	$ 0.03	$ -
23	$ -	$ 0.14	$ -	$ 1.27	$ -	$ 7.38	$ -	$ -	$ 1.69	$ 0.03	$ -
24	$ -	$ 0.13	$ -	$ 1.23	$ -	$ 7.13	$ -	$ -	$ 1.64	$ 0.03	$ -
25	$ -	$ 0.13	$ -	$ 1.20	$ -	$ 6.93	$ -	$ -	$ 1.59	$ 0.03	$ -
Total PV	**$ 0.18**	**$ 4.13**	**$ 0.02**	**$ 38.88**	**$ -**	**$ 224.99**	**$ -**	**$0.12**	**$ 51.75**	**$ 0.93**	**$ -**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 2.23**	**$ -**	**$ 12.92**	**$ -**	**$0.01**	**$ 2.97**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13h Present Value of Air Carrier Activity Costs for Alternative 3 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 2.31	$ -	$ 12.28	$ -	$ -	$ 3.06	$ 0.06	$ -
4	$ -	$ -	$ -	$ 2.21	$ -	$ 11.88	$ -	$ -	$ 2.97	$ 0.05	$ -
5	$ -	$ -	$ -	$ 2.15	$ -	$ 11.53	$ -	$ -	$ 2.88	$ 0.05	$ -
6	$ -	$ -	$ -	$ 2.09	$ -	$ 11.20	$ -	$ -	$ 2.80	$ 0.05	$ -
7	$ -	$ -	$ -	$ 2.03	$ -	$ 10.87	$ -	$ -	$ 2.71	$ 0.05	$ -
8	$ -	$ -	$ -	$ 1.97	$ -	$ 10.60	$ -	$ -	$ 2.64	$ 0.05	$ -
9	$ -	$ -	$ -	$ 1.91	$ -	$ 10.25	$ -	$ -	$ 2.56	$ 0.05	$ -
10	$ -	$ -	$ -	$ 1.85	$ -	$ 9.95	$ -	$ -	$ 2.48	$ 0.04	$ -
11	$ -	$ -	$ -	$ 1.80	$ -	$ 9.66	$ -	$ -	$ 2.41	$ 0.04	$ -
12	$ -	$ -	$ -	$ 1.75	$ -	$ 9.38	$ -	$ -	$ 2.34	$ 0.04	$ -
13	$ -	$ -	$ -	$ 1.72	$ -	$ 9.14	$ -	$ -	$ 2.27	$ 0.04	$ -
14	$ -	$ -	$ -	$ 1.65	$ -	$ 8.84	$ -	$ -	$ 2.21	$ 0.04	$ -
15	$ -	$ -	$ -	$ 1.60	$ -	$ 8.58	$ -	$ -	$ 2.14	$ 0.04	$ -
16	$ -	$ -	$ -	$ 1.55	$ -	$ 8.33	$ -	$ -	$ 2.08	$ 0.04	$ -
17	$ -	$ -	$ -	$ 1.51	$ -	$ 8.09	$ -	$ -	$ 2.02	$ 0.04	$ -
18	$ -	$ -	$ -	$ 1.46	$ -	$ 7.88	$ -	$ -	$ 1.96	$ 0.04	$ -
19	$ -	$ -	$ -	$ 1.42	$ -	$ 7.62	$ -	$ -	$ 1.90	$ 0.03	$ -
20	$ -	$ -	$ -	$ 1.38	$ -	$ 7.40	$ -	$ -	$ 1.85	$ 0.03	$ -
21	$ -	$ -	$ -	$ 1.34	$ -	$ 7.19	$ -	$ -	$ 1.79	$ 0.03	$ -
22	$ -	$ -	$ -	$ 1.30	$ -	$ 6.98	$ -	$ -	$ 1.74	$ 0.03	$ -
23	$ -	$ -	$ -	$ 1.26	$ -	$ 6.80	$ -	$ -	$ 1.69	$ 0.03	$ -
24	$ -	$ -	$ -	$ 1.23	$ -	$ 6.58	$ -	$ -	$ 1.64	$ 0.03	$ -
25	$ -	$ -	$ -	$ 1.19	$ -	$ 6.38	$ -	$ -	$ 1.59	$ 0.03	$ -
Total PV	**$ 0.04**	**$ -**	**$ 0.01**	**$ 38.66**	**$ -**	**$ 207.39**	**$ -**	**$ 0.11**	**$ 51.75**	**$ 0.93**	**$ -**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 2.22**	**$ -**	**$ 11.91**	**$ -**	**$ 0.01**	**$ 2.97**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13i Present Value of Agency Activity Costs for Alternative 3 at 3 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 0.01	$ -	$ 1.04	$ -	$ -	$ -	$ -	$ -
4	$ -	$ 0.24	$ -	$ 0.01	$ -	$ 1.01	$ -	$ -	$ -	$ -	$ -
5	$ -	$ 0.23	$ -	$ 0.01	$ -	$ 0.98	$ -	$ -	$ -	$ -	$ -
6	$ -	$ 0.22	$ -	$ 0.01	$ -	$ 0.95	$ -	$ -	$ -	$ -	$ -
7	$ -	$ 0.22	$ -	$ 0.01	$ -	$ 0.92	$ -	$ -	$ -	$ -	$ -
8	$ -	$ 0.21	$ -	$ 0.01	$ -	$ 0.90	$ -	$ -	$ -	$ -	$ -
9	$ -	$ 0.20	$ -	$ 0.01	$ -	$ 0.87	$ -	$ -	$ -	$ -	$ -
10	$ -	$ 0.20	$ -	$ 0.01	$ -	$ 0.84	$ -	$ -	$ -	$ -	$ -
11	$ -	$ 0.19	$ -	$ 0.01	$ -	$ 0.82	$ -	$ -	$ -	$ -	$ -
12	$ -	$ 0.19	$ -	$ 0.01	$ -	$ 0.80	$ -	$ -	$ -	$ -	$ -
13	$ -	$ 0.18	$ -	$ 0.01	$ -	$ 0.77	$ -	$ -	$ -	$ -	$ -
14	$ -	$ 0.18	$ -	$ 0.01	$ -	$ 0.75	$ -	$ -	$ -	$ -	$ -
15	$ -	$ 0.17	$ -	$ 0.01	$ -	$ 0.73	$ -	$ -	$ -	$ -	$ -
16	$ -	$ 0.17	$ -	$ 0.01	$ -	$ 0.71	$ -	$ -	$ -	$ -	$ -
17	$ -	$ 0.16	$ -	$ 0.01	$ -	$ 0.69	$ -	$ -	$ -	$ -	$ -
18	$ -	$ 0.16	$ -	$ 0.01	$ -	$ 0.67	$ -	$ -	$ -	$ -	$ -
19	$ -	$ 0.15	$ -	$ 0.01	$ -	$ 0.65	$ -	$ -	$ -	$ -	$ -
20	$ -	$ 0.15	$ -	$ 0.01	$ -	$ 0.63	$ -	$ -	$ -	$ -	$ -
21	$ -	$ 0.14	$ -	$ 0.01	$ -	$ 0.61	$ -	$ -	$ -	$ -	$ -
22	$ -	$ 0.14	$ -	$ 0.01	$ -	$ 0.59	$ -	$ -	$ -	$ -	$ -
23	$ -	$ 0.14	$ -	$ 0.01	$ -	$ 0.58	$ -	$ -	$ -	$ -	$ -
24	$ -	$ 0.13	$ -	$ 0.01	$ -	$ 0.56	$ -	$ -	$ -	$ -	$ -
25	$ -	$ 0.13	$ -	$ 0.01	$ -	$ 0.54	$ -	$ -	$ -	$ -	$ -
Total PV	**$ 0.14**	**$ 4.13**	**$ 0.01**	**$ 0.21**	**$ -**	**$ 17.60**	**$ -**	**$ 0.02**	**$ -**	**$ -**	**$ -**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 0.01**	**$ -**	**$ 1.01**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13j Present Value of Rule Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 5.10	$ -	$ -	$ -	$ -	$ 2.14	$ 0.05	$ 0.02
4	$ -	$ 0.24	$ -	$ 4.92	$ -	$ -	$ -	$ -	$ 2.08	$ 0.05	$ 0.02
5	$ -	$ 0.23	$ -	$ 4.77	$ -	$ -	$ -	$ -	$ 2.02	$ 0.05	$ 0.02
6	$ -	$ 0.22	$ -	$ 4.63	$ -	$ -	$ -	$ -	$ 1.96	$ 0.04	$ 0.02
7	$ -	$ 0.22	$ -	$ 4.50	$ -	$ -	$ -	$ -	$ 1.90	$ 0.04	$ 0.02
8	$ -	$ 0.21	$ -	$ 4.37	$ -	$ -	$ -	$ -	$ 1.85	$ 0.04	$ 0.02
9	$ -	$ 0.20	$ -	$ 4.24	$ -	$ -	$ -	$ -	$ 1.79	$ 0.04	$ 0.02
10	$ -	$ 0.20	$ -	$ 4.12	$ -	$ -	$ -	$ -	$ 1.74	$ 0.04	$ 0.02
11	$ -	$ 0.19	$ -	$ 4.00	$ -	$ -	$ -	$ -	$ 1.69	$ 0.04	$ 0.02
12	$ -	$ 0.19	$ -	$ 3.88	$ -	$ -	$ -	$ -	$ 1.64	$ 0.04	$ 0.02
13	$ -	$ 0.18	$ -	$ 3.79	$ -	$ -	$ -	$ -	$ 1.59	$ 0.04	$ 0.02
14	$ -	$ 0.18	$ -	$ 3.66	$ -	$ -	$ -	$ -	$ 1.55	$ 0.03	$ 0.02
15	$ -	$ 0.17	$ -	$ 3.55	$ -	$ -	$ -	$ -	$ 1.50	$ 0.03	$ 0.02
16	$ -	$ 0.17	$ -	$ 3.45	$ -	$ -	$ -	$ -	$ 1.46	$ 0.03	$ 0.01
17	$ -	$ 0.16	$ -	$ 3.35	$ -	$ -	$ -	$ -	$ 1.41	$ 0.03	$ 0.01
18	$ -	$ 0.16	$ -	$ 3.25	$ -	$ -	$ -	$ -	$ 1.37	$ 0.03	$ 0.01
19	$ -	$ 0.15	$ -	$ 3.16	$ -	$ -	$ -	$ -	$ 1.33	$ 0.03	$ 0.01
20	$ -	$ 0.15	$ -	$ 3.06	$ -	$ -	$ -	$ -	$ 1.29	$ 0.03	$ 0.01
21	$ -	$ 0.14	$ -	$ 2.97	$ -	$ -	$ -	$ -	$ 1.26	$ 0.03	$ 0.01
22	$ -	$ 0.14	$ -	$ 2.89	$ -	$ -	$ -	$ -	$ 1.22	$ 0.03	$ 0.01
23	$ -	$ 0.14	$ -	$ 2.80	$ -	$ -	$ -	$ -	$ 1.18	$ 0.03	$ 0.01
24	$ -	$ 0.13	$ -	$ 2.72	$ -	$ -	$ -	$ -	$ 1.15	$ 0.03	$ 0.01
25	$ -	$ 0.13	$ -	$ 2.64	$ -	$ -	$ -	$ -	$ 1.12	$ 0.03	$ 0.01
Total PV	**$ 0.18**	**$ 4.13**	**$ 0.04**	**$ 85.84**	**$ -**	**$ -**	**$ -**	**$ 0.21**	**$ 36.23**	**$ 0.81**	**$ 0.37**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 4.93**	**$ -**	**$ -**	**$ -**	**$ 0.01**	**$ 2.08**	**$ 0.05**	**$ 0.02**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13k Present Value of Air Carrier Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.10	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 5.06	$ -	$ -	$ -	$ -	$ 2.14	$ 0.05	$ 0.01
4	$ -	$ -	$ -	$ 4.88	$ -	$ -	$ -	$ -	$ 2.08	$ 0.05	$ 0.01
5	$ -	$ -	$ -	$ 4.73	$ -	$ -	$ -	$ -	$ 2.02	$ 0.05	$ 0.01
6	$ -	$ -	$ -	$ 4.60	$ -	$ -	$ -	$ -	$ 1.96	$ 0.04	$ 0.01
7	$ -	$ -	$ -	$ 4.46	$ -	$ -	$ -	$ -	$ 1.90	$ 0.04	$ 0.01
8	$ -	$ -	$ -	$ 4.33	$ -	$ -	$ -	$ -	$ 1.85	$ 0.04	$ 0.01
9	$ -	$ -	$ -	$ 4.21	$ -	$ -	$ -	$ -	$ 1.79	$ 0.04	$ 0.01
10	$ -	$ -	$ -	$ 4.08	$ -	$ -	$ -	$ -	$ 1.74	$ 0.04	$ 0.01
11	$ -	$ -	$ -	$ 3.96	$ -	$ -	$ -	$ -	$ 1.69	$ 0.04	$ 0.01
12	$ -	$ -	$ -	$ 3.85	$ -	$ -	$ -	$ -	$ 1.64	$ 0.04	$ 0.01
13	$ -	$ -	$ -	$ 3.76	$ -	$ -	$ -	$ -	$ 1.59	$ 0.04	$ 0.01
14	$ -	$ -	$ -	$ 3.63	$ -	$ -	$ -	$ -	$ 1.55	$ 0.03	$ 0.01
15	$ -	$ -	$ -	$ 3.52	$ -	$ -	$ -	$ -	$ 1.50	$ 0.03	$ 0.01
16	$ -	$ -	$ -	$ 3.42	$ -	$ -	$ -	$ -	$ 1.46	$ 0.03	$ 0.01
17	$ -	$ -	$ -	$ 3.32	$ -	$ -	$ -	$ -	$ 1.41	$ 0.03	$ 0.01
18	$ -	$ -	$ -	$ 3.22	$ -	$ -	$ -	$ -	$ 1.37	$ 0.03	$ 0.01
19	$ -	$ -	$ -	$ 3.13	$ -	$ -	$ -	$ -	$ 1.33	$ 0.03	$ 0.01
20	$ -	$ -	$ -	$ 3.04	$ -	$ -	$ -	$ -	$ 1.29	$ 0.03	$ 0.01
21	$ -	$ -	$ -	$ 2.95	$ -	$ -	$ -	$ -	$ 1.26	$ 0.03	$ 0.01
22	$ -	$ -	$ -	$ 2.86	$ -	$ -	$ -	$ -	$ 1.22	$ 0.03	$ 0.01
23	$ -	$ -	$ -	$ 2.78	$ -	$ -	$ -	$ -	$ 1.18	$ 0.03	$ 0.01
24	$ -	$ -	$ -	$ 2.70	$ -	$ -	$ -	$ -	$ 1.15	$ 0.03	$ 0.01
25	$ -	$ -	$ -	$ 2.62	$ -	$ -	$ -	$ -	$ 1.12	$ 0.03	$ 0.01
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 85.13**	**$ -**	**$ -**	**$ -**	**$ 0.21**	**$ 36.23**	**$ 0.81**	**$ 0.21**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 4.89**	**$ -**	**$ -**	**$ -**	**$ 0.01**	**$ 2.08**	**$ 0.05**	**$ 0.01**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.13l Present Value of Agency Activity Costs for Alternative 4 (Final Rule) at 3 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
3	$ -	$ 0.24	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
4	$ -	$ 0.24	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
5	$ -	$ 0.23	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
6	$ -	$ 0.22	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
7	$ -	$ 0.22	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
8	$ -	$ 0.21	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
9	$ -	$ 0.20	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
10	$ -	$ 0.20	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
11	$ -	$ 0.19	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
12	$ -	$ 0.19	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
13	$ -	$ 0.18	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
14	$ -	$ 0.18	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
15	$ -	$ 0.17	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
16	$ -	$ 0.17	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
17	$ -	$ 0.16	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
18	$ -	$ 0.16	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
19	$ -	$ 0.15	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
20	$ -	$ 0.15	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
21	$ -	$ 0.14	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
22	$ -	$ 0.14	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
23	$ -	$ 0.14	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
24	$ -	$ 0.13	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
25	$ -	$ 0.13	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
Total PV	**$ 0.14**	**$ 4.13**	**$ 0.01**	**$ 0.71**	**$ -**	**$ -**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ 0.16**
Annualized	**$ 0.01**	**$ 0.24**	**$ 0.00**	**$ 0.04**	**$ -**	**$ -**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ 0.01**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

C.14 Present Value Costs at 7 Percent

Exhibit C.14a Present Value of Rule Activity Costs for Alternative 1 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 24.20	$ 3.02	$ -	$ -	$ -	$ -	$ -	$ 0.66
4	$ -	$ 0.21	$ -	$ 22.59	$ 2.82	$ -	$ -	$ -	$ -	$ -	$ 0.62
5	$ -	$ 0.20	$ -	$ 21.11	$ 2.64	$ -	$ -	$ -	$ -	$ -	$ 0.58
6	$ -	$ 0.18	$ -	$ 19.73	$ 2.47	$ -	$ -	$ -	$ -	$ -	$ 0.54
7	$ -	$ 0.17	$ -	$ 18.44	$ 2.30	$ -	$ -	$ -	$ -	$ -	$ 0.51
8	$ -	$ 0.16	$ -	$ 17.23	$ 2.15	$ -	$ -	$ -	$ -	$ -	$ 0.47
9	$ -	$ 0.15	$ -	$ 16.11	$ 2.01	$ -	$ -	$ -	$ -	$ -	$ 0.44
10	$ -	$ 0.14	$ -	$ 15.05	$ 1.88	$ -	$ -	$ -	$ -	$ -	$ 0.41
11	$ -	$ 0.13	$ -	$ 14.07	$ 1.76	$ -	$ -	$ -	$ -	$ -	$ 0.39
12	$ -	$ 0.12	$ -	$ 13.15	$ 1.64	$ -	$ -	$ -	$ -	$ -	$ 0.36
13	$ -	$ 0.11	$ -	$ 12.30	$ 1.54	$ -	$ -	$ -	$ -	$ -	$ 0.34
14	$ -	$ 0.11	$ -	$ 11.48	$ 1.43	$ -	$ -	$ -	$ -	$ -	$ 0.31
15	$ -	$ 0.10	$ -	$ 10.73	$ 1.34	$ -	$ -	$ -	$ -	$ -	$ 0.29
16	$ -	$ 0.09	$ -	$ 10.03	$ 1.25	$ -	$ -	$ -	$ -	$ -	$ 0.28
17	$ -	$ 0.09	$ -	$ 9.37	$ 1.17	$ -	$ -	$ -	$ -	$ -	$ 0.26
18	$ -	$ 0.08	$ -	$ 8.76	$ 1.09	$ -	$ -	$ -	$ -	$ -	$ 0.24
19	$ -	$ 0.08	$ -	$ 8.19	$ 1.02	$ -	$ -	$ -	$ -	$ -	$ 0.22
20	$ -	$ 0.07	$ -	$ 7.65	$ 0.96	$ -	$ -	$ -	$ -	$ -	$ 0.21
21	$ -	$ 0.07	$ -	$ 7.15	$ 0.89	$ -	$ -	$ -	$ -	$ -	$ 0.20
22	$ -	$ 0.06	$ -	$ 6.68	$ 0.84	$ -	$ -	$ -	$ -	$ -	$ 0.18
23	$ -	$ 0.06	$ -	$ 6.25	$ 0.78	$ -	$ -	$ -	$ -	$ -	$ 0.17
24	$ -	$ 0.05	$ -	$ 5.84	$ 0.73	$ -	$ -	$ -	$ -	$ -	$ 0.16
25	$ -	$ 0.05	$ -	$ 5.46	$ 0.68	$ -	$ -	$ -	$ -	$ -	$ 0.15
Total PV	**$ 0.18**	**$ 2.73**	**$ 0.04**	**$ 291.57**	**$ 36.42**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 7.99**
Annualized	**$ 0.02**	**$ 0.23**	**$ 0.00**	**$ 25.02**	**$ 3.13**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.69**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14b Present Value of Air Carrier Activity Costs for Alternative 1 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 23.91	$ 2.86	$ -	$ -	$ -	$ -	$ -	$ 0.03
4	$ -	$ -	$ -	$ 22.32	$ 2.67	$ -	$ -	$ -	$ -	$ -	$ 0.03
5	$ -	$ -	$ -	$ 20.86	$ 2.50	$ -	$ -	$ -	$ -	$ -	$ 0.02
6	$ -	$ -	$ -	$ 19.49	$ 2.33	$ -	$ -	$ -	$ -	$ -	$ 0.02
7	$ -	$ -	$ -	$ 18.22	$ 2.18	$ -	$ -	$ -	$ -	$ -	$ 0.02
8	$ -	$ -	$ -	$ 17.03	$ 2.04	$ -	$ -	$ -	$ -	$ -	$ 0.02
9	$ -	$ -	$ -	$ 15.91	$ 1.91	$ -	$ -	$ -	$ -	$ -	$ 0.02
10	$ -	$ -	$ -	$ 14.87	$ 1.78	$ -	$ -	$ -	$ -	$ -	$ 0.02
11	$ -	$ -	$ -	$ 13.90	$ 1.66	$ -	$ -	$ -	$ -	$ -	$ 0.02
12	$ -	$ -	$ -	$ 12.99	$ 1.56	$ -	$ -	$ -	$ -	$ -	$ 0.01
13	$ -	$ -	$ -	$ 12.16	$ 1.45	$ -	$ -	$ -	$ -	$ -	$ 0.01
14	$ -	$ -	$ -	$ 11.35	$ 1.36	$ -	$ -	$ -	$ -	$ -	$ 0.01
15	$ -	$ -	$ -	$ 10.60	$ 1.27	$ -	$ -	$ -	$ -	$ -	$ 0.01
16	$ -	$ -	$ -	$ 9.91	$ 1.19	$ -	$ -	$ -	$ -	$ -	$ 0.01
17	$ -	$ -	$ -	$ 9.26	$ 1.11	$ -	$ -	$ -	$ -	$ -	$ 0.01
18	$ -	$ -	$ -	$ 8.66	$ 1.04	$ -	$ -	$ -	$ -	$ -	$ 0.01
19	$ -	$ -	$ -	$ 8.09	$ 0.97	$ -	$ -	$ -	$ -	$ -	$ 0.01
20	$ -	$ -	$ -	$ 7.56	$ 0.91	$ -	$ -	$ -	$ -	$ -	$ 0.01
21	$ -	$ -	$ -	$ 7.07	$ 0.85	$ -	$ -	$ -	$ -	$ -	$ 0.01
22	$ -	$ -	$ -	$ 6.60	$ 0.79	$ -	$ -	$ -	$ -	$ -	$ 0.01
23	$ -	$ -	$ -	$ 6.17	$ 0.74	$ -	$ -	$ -	$ -	$ -	$ 0.01
24	$ -	$ -	$ -	$ 5.77	$ 0.69	$ -	$ -	$ -	$ -	$ -	$ 0.01
25	$ -	$ -	$ -	$ 5.39	$ 0.65	$ -	$ -	$ -	$ -	$ -	$ 0.01
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 288.09**	**$ 34.49**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.33**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 24.72**	**$ 2.96**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.03**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14c Present Value of Agency Activity Costs for Alternative 1 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 0.29	$ 0.16	$ -	$ -	$ -	$ -	$ -	$ 0.64
4	$ -	$ 0.21	$ -	$ 0.27	$ 0.15	$ -	$ -	$ -	$ -	$ -	$ 0.59
5	$ -	$ 0.20	$ -	$ 0.25	$ 0.14	$ -	$ -	$ -	$ -	$ -	$ 0.55
6	$ -	$ 0.18	$ -	$ 0.24	$ 0.13	$ -	$ -	$ -	$ -	$ -	$ 0.52
7	$ -	$ 0.17	$ -	$ 0.22	$ 0.12	$ -	$ -	$ -	$ -	$ -	$ 0.48
8	$ -	$ 0.16	$ -	$ 0.21	$ 0.11	$ -	$ -	$ -	$ -	$ -	$ 0.45
9	$ -	$ 0.15	$ -	$ 0.19	$ 0.11	$ -	$ -	$ -	$ -	$ -	$ 0.42
10	$ -	$ 0.14	$ -	$ 0.18	$ 0.10	$ -	$ -	$ -	$ -	$ -	$ 0.40
11	$ -	$ 0.13	$ -	$ 0.17	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.37
12	$ -	$ 0.12	$ -	$ 0.16	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.35
13	$ -	$ 0.11	$ -	$ 0.15	$ 0.08	$ -	$ -	$ -	$ -	$ -	$ 0.32
14	$ -	$ 0.11	$ -	$ 0.14	$ 0.08	$ -	$ -	$ -	$ -	$ -	$ 0.30
15	$ -	$ 0.10	$ -	$ 0.13	$ 0.07	$ -	$ -	$ -	$ -	$ -	$ 0.28
16	$ -	$ 0.09	$ -	$ 0.12	$ 0.07	$ -	$ -	$ -	$ -	$ -	$ 0.26
17	$ -	$ 0.09	$ -	$ 0.11	$ 0.06	$ -	$ -	$ -	$ -	$ -	$ 0.25
18	$ -	$ 0.08	$ -	$ 0.10	$ 0.06	$ -	$ -	$ -	$ -	$ -	$ 0.23
19	$ -	$ 0.08	$ -	$ 0.10	$ 0.05	$ -	$ -	$ -	$ -	$ -	$ 0.22
20	$ -	$ 0.07	$ -	$ 0.09	$ 0.05	$ -	$ -	$ -	$ -	$ -	$ 0.20
21	$ -	$ 0.07	$ -	$ 0.09	$ 0.05	$ -	$ -	$ -	$ -	$ -	$ 0.19
22	$ -	$ 0.06	$ -	$ 0.08	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ 0.18
23	$ -	$ 0.06	$ -	$ 0.07	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ 0.16
24	$ -	$ 0.05	$ -	$ 0.07	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ 0.15
25	$ -	$ 0.05	$ -	$ 0.07	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ 0.14
Total PV	**$ 0.14**	**$ 2.73**	**$ 0.02**	**$ 3.48**	**$ 1.94**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 7.66**
Annualized	**$ 0.01**	**$ 0.23**	**$ 0.00**	**$ 0.30**	**$ 0.17**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 0.66**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14d Present Value of Rule Activity Costs for Alternative 2 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 1.62	$ 0.64	$ -	$ -	$ -	$ 4.31	$ 0.05	$ -
4	$ -	$ 0.21	$ -	$ 1.48	$ 0.60	$ -	$ -	$ -	$ 4.03	$ 0.05	$ -
5	$ -	$ 0.20	$ -	$ 1.39	$ 0.56	$ -	$ -	$ -	$ 3.76	$ 0.04	$ -
6	$ -	$ 0.18	$ -	$ 1.29	$ 0.52	$ -	$ -	$ -	$ 3.52	$ 0.04	$ -
7	$ -	$ 0.17	$ -	$ 1.21	$ 0.49	$ -	$ -	$ -	$ 3.29	$ 0.04	$ -
8	$ -	$ 0.16	$ -	$ 1.13	$ 0.45	$ -	$ -	$ -	$ 3.07	$ 0.04	$ -
9	$ -	$ 0.15	$ -	$ 1.06	$ 0.42	$ -	$ -	$ -	$ 2.87	$ 0.03	$ -
10	$ -	$ 0.14	$ -	$ 0.99	$ 0.40	$ -	$ -	$ -	$ 2.68	$ 0.03	$ -
11	$ -	$ 0.13	$ -	$ 0.92	$ 0.37	$ -	$ -	$ -	$ 2.51	$ 0.03	$ -
12	$ -	$ 0.12	$ -	$ 0.86	$ 0.35	$ -	$ -	$ -	$ 2.34	$ 0.03	$ -
13	$ -	$ 0.11	$ -	$ 0.82	$ 0.32	$ -	$ -	$ -	$ 2.19	$ 0.03	$ -
14	$ -	$ 0.11	$ -	$ 0.75	$ 0.30	$ -	$ -	$ -	$ 2.05	$ 0.02	$ -
15	$ -	$ 0.10	$ -	$ 0.70	$ 0.28	$ -	$ -	$ -	$ 1.91	$ 0.02	$ -
16	$ -	$ 0.09	$ -	$ 0.66	$ 0.26	$ -	$ -	$ -	$ 1.79	$ 0.02	$ -
17	$ -	$ 0.09	$ -	$ 0.61	$ 0.25	$ -	$ -	$ -	$ 1.67	$ 0.02	$ -
18	$ -	$ 0.08	$ -	$ 0.57	$ 0.23	$ -	$ -	$ -	$ 1.56	$ 0.02	$ -
19	$ -	$ 0.08	$ -	$ 0.54	$ 0.22	$ -	$ -	$ -	$ 1.46	$ 0.02	$ -
20	$ -	$ 0.07	$ -	$ 0.50	$ 0.20	$ -	$ -	$ -	$ 1.36	$ 0.02	$ -
21	$ -	$ 0.07	$ -	$ 0.47	$ 0.19	$ -	$ -	$ -	$ 1.28	$ 0.02	$ -
22	$ -	$ 0.06	$ -	$ 0.44	$ 0.18	$ -	$ -	$ -	$ 1.19	$ 0.01	$ -
23	$ -	$ 0.06	$ -	$ 0.41	$ 0.16	$ -	$ -	$ -	$ 1.11	$ 0.01	$ -
24	$ -	$ 0.05	$ -	$ 0.38	$ 0.15	$ -	$ -	$ -	$ 1.04	$ 0.01	$ -
25	$ -	$ 0.05	$ -	$ 0.36	$ 0.14	$ -	$ -	$ -	$ 0.97	$ 0.01	$ -
Total PV	**$ 0.18**	**$ 2.73**	**$ 0.04**	**$ 19.18**	**$ 7.68**	**$ -**	**$ -**	**$ -**	**$ 51.99**	**$ 0.61**	**$ -**
Annualized	**$ 0.02**	**$ 0.23**	**$ 0.00**	**$ 1.65**	**$ 0.66**	**$ -**	**$ -**	**$ -**	**$ 4.46**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14e Present Value of Air Carrier Activity Costs for Alternative 2 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 1.61	$ 0.48	$ -	$ -	$ -	$ 3.67	$ 0.05	$ -
4	$ -	$ -	$ -	$ 1.47	$ 0.45	$ -	$ -	$ -	$ 3.43	$ 0.05	$ -
5	$ -	$ -	$ -	$ 1.37	$ 0.42	$ -	$ -	$ -	$ 3.20	$ 0.04	$ -
6	$ -	$ -	$ -	$ 1.28	$ 0.39	$ -	$ -	$ -	$ 2.99	$ 0.04	$ -
7	$ -	$ -	$ -	$ 1.20	$ 0.36	$ -	$ -	$ -	$ 2.80	$ 0.04	$ -
8	$ -	$ -	$ -	$ 1.12	$ 0.34	$ -	$ -	$ -	$ 2.62	$ 0.04	$ -
9	$ -	$ -	$ -	$ 1.05	$ 0.32	$ -	$ -	$ -	$ 2.44	$ 0.03	$ -
10	$ -	$ -	$ -	$ 0.98	$ 0.30	$ -	$ -	$ -	$ 2.28	$ 0.03	$ -
11	$ -	$ -	$ -	$ 0.92	$ 0.28	$ -	$ -	$ -	$ 2.14	$ 0.03	$ -
12	$ -	$ -	$ -	$ 0.86	$ 0.26	$ -	$ -	$ -	$ 2.00	$ 0.03	$ -
13	$ -	$ -	$ -	$ 0.82	$ 0.24	$ -	$ -	$ -	$ 1.86	$ 0.03	$ -
14	$ -	$ -	$ -	$ 0.75	$ 0.23	$ -	$ -	$ -	$ 1.74	$ 0.02	$ -
15	$ -	$ -	$ -	$ 0.70	$ 0.21	$ -	$ -	$ -	$ 1.63	$ 0.02	$ -
16	$ -	$ -	$ -	$ 0.65	$ 0.20	$ -	$ -	$ -	$ 1.52	$ 0.02	$ -
17	$ -	$ -	$ -	$ 0.61	$ 0.18	$ -	$ -	$ -	$ 1.42	$ 0.02	$ -
18	$ -	$ -	$ -	$ 0.57	$ 0.17	$ -	$ -	$ -	$ 1.33	$ 0.02	$ -
19	$ -	$ -	$ -	$ 0.53	$ 0.16	$ -	$ -	$ -	$ 1.24	$ 0.02	$ -
20	$ -	$ -	$ -	$ 0.50	$ 0.15	$ -	$ -	$ -	$ 1.16	$ 0.02	$ -
21	$ -	$ -	$ -	$ 0.47	$ 0.14	$ -	$ -	$ -	$ 1.09	$ 0.02	$ -
22	$ -	$ -	$ -	$ 0.44	$ 0.13	$ -	$ -	$ -	$ 1.01	$ 0.01	$ -
23	$ -	$ -	$ -	$ 0.41	$ 0.12	$ -	$ -	$ -	$ 0.95	$ 0.01	$ -
24	$ -	$ -	$ -	$ 0.38	$ 0.12	$ -	$ -	$ -	$ 0.89	$ 0.01	$ -
25	$ -	$ -	$ -	$ 0.36	$ 0.11	$ -	$ -	$ -	$ 0.83	$ 0.01	$ -
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 19.04**	**$ 5.75**	**$ -**	**$ -**	**$ -**	**$ 44.25**	**$ 0.61**	**$ -**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 1.63**	**$ 0.49**	**$ -**	**$ -**	**$ -**	**$ 3.80**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13`) in the 25-year evaluation period.

Exhibit C.14f Present Value of Agency Activity Costs for Alternative 2 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 0.01	$ 0.16	$ -	$ -	$ -	$ 0.64	$ -	$ -
4	$ -	$ 0.21	$ -	$ 0.01	$ 0.15	$ -	$ -	$ -	$ 0.60	$ -	$ -
5	$ -	$ 0.20	$ -	$ 0.01	$ 0.14	$ -	$ -	$ -	$ 0.56	$ -	$ -
6	$ -	$ 0.18	$ -	$ 0.01	$ 0.13	$ -	$ -	$ -	$ 0.52	$ -	$ -
7	$ -	$ 0.17	$ -	$ 0.01	$ 0.12	$ -	$ -	$ -	$ 0.49	$ -	$ -
8	$ -	$ 0.16	$ -	$ 0.01	$ 0.11	$ -	$ -	$ -	$ 0.46	$ -	$ -
9	$ -	$ 0.15	$ -	$ 0.01	$ 0.11	$ -	$ -	$ -	$ 0.43	$ -	$ -
10	$ -	$ 0.14	$ -	$ 0.01	$ 0.10	$ -	$ -	$ -	$ 0.40	$ -	$ -
11	$ -	$ 0.13	$ -	$ 0.01	$ 0.09	$ -	$ -	$ -	$ 0.37	$ -	$ -
12	$ -	$ 0.12	$ -	$ 0.01	$ 0.09	$ -	$ -	$ -	$ 0.35	$ -	$ -
13	$ -	$ 0.11	$ -	$ 0.01	$ 0.08	$ -	$ -	$ -	$ 0.33	$ -	$ -
14	$ -	$ 0.11	$ -	$ 0.01	$ 0.08	$ -	$ -	$ -	$ 0.30	$ -	$ -
15	$ -	$ 0.10	$ -	$ 0.01	$ 0.07	$ -	$ -	$ -	$ 0.28	$ -	$ -
16	$ -	$ 0.09	$ -	$ 0.00	$ 0.07	$ -	$ -	$ -	$ 0.27	$ -	$ -
17	$ -	$ 0.09	$ -	$ 0.00	$ 0.06	$ -	$ -	$ -	$ 0.25	$ -	$ -
18	$ -	$ 0.08	$ -	$ 0.00	$ 0.06	$ -	$ -	$ -	$ 0.23	$ -	$ -
19	$ -	$ 0.08	$ -	$ 0.00	$ 0.05	$ -	$ -	$ -	$ 0.22	$ -	$ -
20	$ -	$ 0.07	$ -	$ 0.00	$ 0.05	$ -	$ -	$ -	$ 0.20	$ -	$ -
21	$ -	$ 0.07	$ -	$ 0.00	$ 0.05	$ -	$ -	$ -	$ 0.19	$ -	$ -
22	$ -	$ 0.06	$ -	$ 0.00	$ 0.04	$ -	$ -	$ -	$ 0.18	$ -	$ -
23	$ -	$ 0.06	$ -	$ 0.00	$ 0.04	$ -	$ -	$ -	$ 0.17	$ -	$ -
24	$ -	$ 0.05	$ -	$ 0.00	$ 0.04	$ -	$ -	$ -	$ 0.16	$ -	$ -
25	$ -	$ 0.05	$ -	$ 0.00	$ 0.04	$ -	$ -	$ -	$ 0.14	$ -	$ -
Total PV	**$ 0.14**	**$ 2.73**	**$ 0.02**	**$ 0.14**	**$ 1.94**	**$ -**	**$ -**	**$ -**	**$ 7.74**	**$ -**	**$ -**
Annualized	**$ 0.01**	**$ 0.23**	**$ 0.00**	**$ 0.01**	**$ 0.17**	**$ -**	**$ -**	**$ -**	**$ 0.66**	**$ -**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14g Present Value of Rule Activity Costs for Alternative 3 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	
1	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.06	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.06	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 2.16	$ -	$ 12.35	$ -	$ -	$ 2.83	$ 0.05	$ -
4	$ -	$ 0.21	$ -	$ 1.98	$ -	$ 11.49	$ -	$ -	$ 2.65	$ 0.05	$ -
5	$ -	$ 0.20	$ -	$ 1.85	$ -	$ 10.74	$ -	$ -	$ 2.47	$ 0.04	$ -
6	$ -	$ 0.18	$ -	$ 1.73	$ -	$ 10.04	$ -	$ -	$ 2.31	$ 0.04	$ -
7	$ -	$ 0.17	$ -	$ 1.62	$ -	$ 9.38	$ -	$ -	$ 2.16	$ 0.04	$ -
8	$ -	$ 0.16	$ -	$ 1.51	$ -	$ 8.80	$ -	$ -	$ 2.02	$ 0.04	$ -
9	$ -	$ 0.15	$ -	$ 1.41	$ -	$ 8.20	$ -	$ -	$ 1.89	$ 0.03	$ -
10	$ -	$ 0.14	$ -	$ 1.32	$ -	$ 7.66	$ -	$ -	$ 1.76	$ 0.03	$ -
11	$ -	$ 0.13	$ -	$ 1.24	$ -	$ 7.16	$ -	$ -	$ 1.65	$ 0.03	$ -
12	$ -	$ 0.12	$ -	$ 1.16	$ -	$ 6.69	$ -	$ -	$ 1.54	$ 0.03	$ -
13	$ -	$ 0.11	$ -	$ 1.10	$ -	$ 6.28	$ -	$ -	$ 1.44	$ 0.03	$ -
14	$ -	$ 0.11	$ -	$ 1.01	$ -	$ 5.84	$ -	$ -	$ 1.35	$ 0.02	$ -
15	$ -	$ 0.10	$ -	$ 0.94	$ -	$ 5.46	$ -	$ -	$ 1.26	$ 0.02	$ -
16	$ -	$ 0.09	$ -	$ 0.88	$ -	$ 5.10	$ -	$ -	$ 1.17	$ 0.02	$ -
17	$ -	$ 0.09	$ -	$ 0.82	$ -	$ 4.77	$ -	$ -	$ 1.10	$ 0.02	$ -
18	$ -	$ 0.08	$ -	$ 0.77	$ -	$ 4.47	$ -	$ -	$ 1.03	$ 0.02	$ -
19	$ -	$ 0.08	$ -	$ 0.72	$ -	$ 4.17	$ -	$ -	$ 0.96	$ 0.02	$ -
20	$ -	$ 0.07	$ -	$ 0.67	$ -	$ 3.89	$ -	$ -	$ 0.90	$ 0.02	$ -
21	$ -	$ 0.07	$ -	$ 0.63	$ -	$ 3.64	$ -	$ -	$ 0.84	$ 0.02	$ -
22	$ -	$ 0.06	$ -	$ 0.59	$ -	$ 3.40	$ -	$ -	$ 0.78	$ 0.01	$ -
23	$ -	$ 0.06	$ -	$ 0.55	$ -	$ 3.19	$ -	$ -	$ 0.73	$ 0.01	$ -
24	$ -	$ 0.05	$ -	$ 0.51	$ -	$ 2.97	$ -	$ -	$ 0.68	$ 0.01	$ -
25	$ -	$ 0.05	$ -	$ 0.48	$ -	$ 2.78	$ -	$ -	$ 0.64	$ 0.01	$ -
Total PV	**$ 0.18**	**$ 2.73**	**$ 0.02**	**$ 25.66**	**$ -**	**$ 148.47**	**$ -**	**$ 0.12**	**$ 34.15**	**$ 0.61**	**$ -**
Annualized	**$ 0.02**	**$ 0.23**	**$ 0.00**	**$ 2.20**	**$ -**	**$ 12.74**	**$ -**	**$ 0.01**	**$ 2.93**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14h Present Value of Air Carrier Activity Costs for Alternative 3 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.05	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 2.14	$ -	$ 11.38	$ -	$ -	$ 2.83	$ 0.05	$ -
4	$ -	$ -	$ -	$ 1.97	$ -	$ 10.59	$ -	$ -	$ 2.65	$ 0.05	$ -
5	$ -	$ -	$ -	$ 1.84	$ -	$ 9.90	$ -	$ -	$ 2.47	$ 0.04	$ -
6	$ -	$ -	$ -	$ 1.72	$ -	$ 9.25	$ -	$ -	$ 2.31	$ 0.04	$ -
7	$ -	$ -	$ -	$ 1.61	$ -	$ 8.65	$ -	$ -	$ 2.16	$ 0.04	$ -
8	$ -	$ -	$ -	$ 1.51	$ -	$ 8.12	$ -	$ -	$ 2.02	$ 0.04	$ -
9	$ -	$ -	$ -	$ 1.41	$ -	$ 7.55	$ -	$ -	$ 1.89	$ 0.03	$ -
10	$ -	$ -	$ -	$ 1.32	$ -	$ 7.06	$ -	$ -	$ 1.76	$ 0.03	$ -
11	$ -	$ -	$ -	$ 1.23	$ -	$ 6.60	$ -	$ -	$ 1.65	$ 0.03	$ -
12	$ -	$ -	$ -	$ 1.15	$ -	$ 6.17	$ -	$ -	$ 1.54	$ 0.03	$ -
13	$ -	$ -	$ -	$ 1.09	$ -	$ 5.79	$ -	$ -	$ 1.44	$ 0.03	$ -
14	$ -	$ -	$ -	$ 1.00	$ -	$ 5.39	$ -	$ -	$ 1.35	$ 0.02	$ -
15	$ -	$ -	$ -	$ 0.94	$ -	$ 5.03	$ -	$ -	$ 1.26	$ 0.02	$ -
16	$ -	$ -	$ -	$ 0.88	$ -	$ 4.70	$ -	$ -	$ 1.17	$ 0.02	$ -
17	$ -	$ -	$ -	$ 0.82	$ -	$ 4.40	$ -	$ -	$ 1.10	$ 0.02	$ -
18	$ -	$ -	$ -	$ 0.77	$ -	$ 4.13	$ -	$ -	$ 1.03	$ 0.02	$ -
19	$ -	$ -	$ -	$ 0.72	$ -	$ 3.84	$ -	$ -	$ 0.96	$ 0.02	$ -
20	$ -	$ -	$ -	$ 0.67	$ -	$ 3.59	$ -	$ -	$ 0.90	$ 0.02	$ -
21	$ -	$ -	$ -	$ 0.62	$ -	$ 3.35	$ -	$ -	$ 0.84	$ 0.02	$ -
22	$ -	$ -	$ -	$ 0.58	$ -	$ 3.13	$ -	$ -	$ 0.78	$ 0.01	$ -
23	$ -	$ -	$ -	$ 0.55	$ -	$ 2.94	$ -	$ -	$ 0.73	$ 0.01	$ -
24	$ -	$ -	$ -	$ 0.51	$ -	$ 2.74	$ -	$ -	$ 0.68	$ 0.01	$ -
25	$ -	$ -	$ -	$ 0.48	$ -	$ 2.56	$ -	$ -	$ 0.64	$ 0.01	$ -
Total PV	**$ 0.04**	**$ -**	**$ 0.01**	**$ 25.52**	**$ -**	**$ 136.86**	**$ -**	**$ 0.10**	**$ 34.15**	**$ 0.61**	**$ -**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 2.19**	**$ -**	**$ 11.74**	**$ -**	**$ 0.01**	**$ 2.93**	**$ 0.05**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14i Present Value of Agency Activity Costs for Alternative 3 at 7 Percent, by Year

Year	Implementation	Annual Administration	Monitoring Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Sanitary Survey
1	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.00	$ -	$ -	$ -	$ -	$ 0.01	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 0.01	$ -	$ 0.96	$ -	$ -	$ -	$ -	$ -
4	$ -	$ 0.21	$ -	$ 0.01	$ -	$ 0.90	$ -	$ -	$ -	$ -	$ -
5	$ -	$ 0.20	$ -	$ 0.01	$ -	$ 0.84	$ -	$ -	$ -	$ -	$ -
6	$ -	$ 0.18	$ -	$ 0.01	$ -	$ 0.79	$ -	$ -	$ -	$ -	$ -
7	$ -	$ 0.17	$ -	$ 0.01	$ -	$ 0.73	$ -	$ -	$ -	$ -	$ -
8	$ -	$ 0.16	$ -	$ 0.01	$ -	$ 0.69	$ -	$ -	$ -	$ -	$ -
9	$ -	$ 0.15	$ -	$ 0.01	$ -	$ 0.64	$ -	$ -	$ -	$ -	$ -
10	$ -	$ 0.14	$ -	$ 0.01	$ -	$ 0.60	$ -	$ -	$ -	$ -	$ -
11	$ -	$ 0.13	$ -	$ 0.01	$ -	$ 0.56	$ -	$ -	$ -	$ -	$ -
12	$ -	$ 0.12	$ -	$ 0.01	$ -	$ 0.52	$ -	$ -	$ -	$ -	$ -
13	$ -	$ 0.11	$ -	$ 0.01	$ -	$ 0.49	$ -	$ -	$ -	$ -	$ -
14	$ -	$ 0.11	$ -	$ 0.01	$ -	$ 0.46	$ -	$ -	$ -	$ -	$ -
15	$ -	$ 0.10	$ -	$ 0.01	$ -	$ 0.43	$ -	$ -	$ -	$ -	$ -
16	$ -	$ 0.09	$ -	$ 0.00	$ -	$ 0.40	$ -	$ -	$ -	$ -	$ -
17	$ -	$ 0.09	$ -	$ 0.00	$ -	$ 0.37	$ -	$ -	$ -	$ -	$ -
18	$ -	$ 0.08	$ -	$ 0.00	$ -	$ 0.35	$ -	$ -	$ -	$ -	$ -
19	$ -	$ 0.08	$ -	$ 0.00	$ -	$ 0.33	$ -	$ -	$ -	$ -	$ -
20	$ -	$ 0.07	$ -	$ 0.00	$ -	$ 0.30	$ -	$ -	$ -	$ -	$ -
21	$ -	$ 0.07	$ -	$ 0.00	$ -	$ 0.28	$ -	$ -	$ -	$ -	$ -
22	$ -	$ 0.06	$ -	$ 0.00	$ -	$ 0.27	$ -	$ -	$ -	$ -	$ -
23	$ -	$ 0.06	$ -	$ 0.00	$ -	$ 0.25	$ -	$ -	$ -	$ -	$ -
24	$ -	$ 0.05	$ -	$ 0.00	$ -	$ 0.23	$ -	$ -	$ -	$ -	$ -
25	$ -	$ 0.05	$ -	$ 0.00	$ -	$ 0.22	$ -	$ -	$ -	$ -	$ -
Total PV	**$ 0.14**	**$ 2.73**	**$ 0.01**	**$ 0.14**	**$ -**	**$ 11.61**	**$ -**	**$ 0.02**	**$ -**	**$ -**	**$ -**
Annualized	**$ 0.01**	**$ 0.23**	**$ 0.00**	**$ 0.01**	**$ -**	**$ 1.00**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ -**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14j Present Value of Rule Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/ Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ 0.10	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 4.73	$ -	$ -	$ -	$ -	$ 1.98	$ 0.04	$ 0.02
4	$ -	$ 0.21	$ -	$ 4.39	$ -	$ -	$ -	$ -	$ 1.85	$ 0.04	$ 0.02
5	$ -	$ 0.20	$ -	$ 4.10	$ -	$ -	$ -	$ -	$ 1.73	$ 0.04	$ 0.02
6	$ -	$ 0.18	$ -	$ 3.83	$ -	$ -	$ -	$ -	$ 1.62	$ 0.04	$ 0.02
7	$ -	$ 0.17	$ -	$ 3.58	$ -	$ -	$ -	$ -	$ 1.51	$ 0.03	$ 0.02
8	$ -	$ 0.16	$ -	$ 3.35	$ -	$ -	$ -	$ -	$ 1.41	$ 0.03	$ 0.01
9	$ -	$ 0.15	$ -	$ 3.13	$ -	$ -	$ -	$ -	$ 1.32	$ 0.03	$ 0.01
10	$ -	$ 0.14	$ -	$ 2.92	$ -	$ -	$ -	$ -	$ 1.23	$ 0.03	$ 0.01
11	$ -	$ 0.13	$ -	$ 2.73	$ -	$ -	$ -	$ -	$ 1.15	$ 0.03	$ 0.01
12	$ -	$ 0.12	$ -	$ 2.55	$ -	$ -	$ -	$ -	$ 1.08	$ 0.02	$ 0.01
13	$ -	$ 0.11	$ -	$ 2.40	$ -	$ -	$ -	$ -	$ 1.01	$ 0.02	$ 0.01
14	$ -	$ 0.11	$ -	$ 2.23	$ -	$ -	$ -	$ -	$ 0.94	$ 0.02	$ 0.01
15	$ -	$ 0.10	$ -	$ 2.08	$ -	$ -	$ -	$ -	$ 0.88	$ 0.02	$ 0.01
16	$ -	$ 0.09	$ -	$ 1.95	$ -	$ -	$ -	$ -	$ 0.82	$ 0.02	$ 0.01
17	$ -	$ 0.09	$ -	$ 1.82	$ -	$ -	$ -	$ -	$ 0.77	$ 0.02	$ 0.01
18	$ -	$ 0.08	$ -	$ 1.70	$ -	$ -	$ -	$ -	$ 0.72	$ 0.02	$ 0.01
19	$ -	$ 0.08	$ -	$ 1.59	$ -	$ -	$ -	$ -	$ 0.67	$ 0.02	$ 0.01
20	$ -	$ 0.07	$ -	$ 1.49	$ -	$ -	$ -	$ -	$ 0.63	$ 0.01	$ 0.01
21	$ -	$ 0.07	$ -	$ 1.39	$ -	$ -	$ -	$ -	$ 0.59	$ 0.01	$ 0.01
22	$ -	$ 0.06	$ -	$ 1.30	$ -	$ -	$ -	$ -	$ 0.55	$ 0.01	$ 0.01
23	$ -	$ 0.06	$ -	$ 1.21	$ -	$ -	$ -	$ -	$ 0.51	$ 0.01	$ 0.01
24	$ -	$ 0.05	$ -	$ 1.13	$ -	$ -	$ -	$ -	$ 0.48	$ 0.01	$ 0.00
25	$ -	$ 0.05	$ -	$ 1.06	$ -	$ -	$ -	$ -	$ 0.45	$ 0.01	$ 0.00
Total PV	**$ 0.18**	**$ 2.73**	**$ 0.04**	**$ 56.65**	**$ -**	**$ -**	**$ -**	**$ 0.21**	**$ 23.91**	**$ 0.54**	**$ 0.24**
Annualized	**$ 0.02**	**$ 0.23**	**$ 0.00**	**$ 4.86**	**$ -**	**$ -**	**$ -**	**$ 0.02**	**$ 2.05**	**$ 0.05**	**$ 0.02**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14k Present Value of Air Carrier Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.11	$ -	$ -	$ -
2	$ 0.02	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.10	$ -	$ -	$ -
3	$ -	$ -	$ -	$ 4.69	$ -	$ -	$ -	$ -	$ 1.98	$ 0.04	$ 0.01
4	$ -	$ -	$ -	$ 4.35	$ -	$ -	$ -	$ -	$ 1.85	$ 0.04	$ 0.01
5	$ -	$ -	$ -	$ 4.06	$ -	$ -	$ -	$ -	$ 1.73	$ 0.04	$ 0.01
6	$ -	$ -	$ -	$ 3.80	$ -	$ -	$ -	$ -	$ 1.62	$ 0.04	$ 0.01
7	$ -	$ -	$ -	$ 3.55	$ -	$ -	$ -	$ -	$ 1.51	$ 0.03	$ 0.01
8	$ -	$ -	$ -	$ 3.32	$ -	$ -	$ -	$ -	$ 1.41	$ 0.03	$ 0.01
9	$ -	$ -	$ -	$ 3.10	$ -	$ -	$ -	$ -	$ 1.32	$ 0.03	$ 0.01
10	$ -	$ -	$ -	$ 2.90	$ -	$ -	$ -	$ -	$ 1.23	$ 0.03	$ 0.01
11	$ -	$ -	$ -	$ 2.71	$ -	$ -	$ -	$ -	$ 1.15	$ 0.03	$ 0.01
12	$ -	$ -	$ -	$ 2.53	$ -	$ -	$ -	$ -	$ 1.08	$ 0.02	$ 0.01
13	$ -	$ -	$ -	$ 2.38	$ -	$ -	$ -	$ -	$ 1.01	$ 0.02	$ 0.01
14	$ -	$ -	$ -	$ 2.21	$ -	$ -	$ -	$ -	$ 0.94	$ 0.02	$ 0.01
15	$ -	$ -	$ -	$ 2.07	$ -	$ -	$ -	$ -	$ 0.88	$ 0.02	$ 0.01
16	$ -	$ -	$ -	$ 1.93	$ -	$ -	$ -	$ -	$ 0.82	$ 0.02	$ 0.00
17	$ -	$ -	$ -	$ 1.80	$ -	$ -	$ -	$ -	$ 0.77	$ 0.02	$ 0.00
18	$ -	$ -	$ -	$ 1.69	$ -	$ -	$ -	$ -	$ 0.72	$ 0.02	$ 0.00
19	$ -	$ -	$ -	$ 1.58	$ -	$ -	$ -	$ -	$ 0.67	$ 0.02	$ 0.00
20	$ -	$ -	$ -	$ 1.47	$ -	$ -	$ -	$ -	$ 0.63	$ 0.01	$ 0.00
21	$ -	$ -	$ -	$ 1.38	$ -	$ -	$ -	$ -	$ 0.59	$ 0.01	$ 0.00
22	$ -	$ -	$ -	$ 1.29	$ -	$ -	$ -	$ -	$ 0.55	$ 0.01	$ 0.00
23	$ -	$ -	$ -	$ 1.20	$ -	$ -	$ -	$ -	$ 0.51	$ 0.01	$ 0.00
24	$ -	$ -	$ -	$ 1.12	$ -	$ -	$ -	$ -	$ 0.48	$ 0.01	$ 0.00
25	$ -	$ -	$ -	$ 1.05	$ -	$ -	$ -	$ -	$ 0.45	$ 0.01	$ 0.00
Total PV	**$ 0.04**	**$ -**	**$ 0.03**	**$ 56.18**	**$ -**	**$ -**	**$ -**	**$ 0.21**	**$ 23.91**	**$ 0.54**	**$ 0.14**
Annualized	**$ 0.00**	**$ -**	**$ 0.00**	**$ 4.82**	**$ -**	**$ -**	**$ -**	**$ 0.02**	**$ 2.05**	**$ 0.05**	**$ 0.01**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit C.14l Present Value of Agency Activity Costs for Alternative 4 (Final Rule) at 7 Percent, by Year

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit
1	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
2	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -
3	$ -	$ 0.23	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
4	$ -	$ 0.21	$ -	$ 0.04	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
5	$ -	$ 0.20	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
6	$ -	$ 0.18	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
7	$ -	$ 0.17	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
8	$ -	$ 0.16	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
9	$ -	$ 0.15	$ -	$ 0.03	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
10	$ -	$ 0.14	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
11	$ -	$ 0.13	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.01
12	$ -	$ 0.12	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
13	$ -	$ 0.11	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
14	$ -	$ 0.11	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
15	$ -	$ 0.10	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
16	$ -	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
17	$ -	$ 0.09	$ -	$ 0.02	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
18	$ -	$ 0.08	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
19	$ -	$ 0.08	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
20	$ -	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
21	$ -	$ 0.07	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
22	$ -	$ 0.06	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
23	$ -	$ 0.06	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
24	$ -	$ 0.05	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
25	$ -	$ 0.05	$ -	$ 0.01	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.00
Total PV	**$ 0.14**	**$ 2.73**	**$ 0.01**	**$ 0.47**	**$ -**	**$ -**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ 0.11**
Annualized	**$ 0.01**	**$ 0.23**	**$ 0.00**	**$ 0.04**	**$ -**	**$ -**	**$ -**	**$ 0.00**	**$ -**	**$ -**	**$ 0.01**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in millions of 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

C.15 Summary

Exhibit C.15a Summary of Rule Costs (Millions of 2008$)

Summary of Implementation and Annual Administration Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Implementation	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Annual Administration	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.23
Total	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**

Summary of Annualized Monitoring Plan Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Monitoring Plan	0.002	0.002	0.001	0.002	0.004	0.004	0.002	0.003
Total	**0.002**	**0.002**	**0.001**	**0.002**	**0.004**	**0.004**	**0.002**	**0.003**

Summary of Annualized Monitoring Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Coliform Monitoring	25.37	1.67	2.23	4.93	25.02	1.65	2.20	4.86
Total	**25.37**	**1.67**	**2.23**	**4.93**	**25.02**	**1.65**	**2.20**	**4.86**

Summary of Annualized Monitoring Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Disinfectant Residual Monitoring	3.17	0.67	-	-	3.13	0.66	-	-
Total	**3.17**	**0.67**	**-**	**-**	**3.13**	**0.66**	**-**	**-**

Summary of Annualized Turbidity Monitoring Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Turbidity Monitoring	-	-	12.92	-	-	-	12.74	-
Total	**-**	**-**	**12.92**	**-**	**-**	**-**	**12.74**	**-**

Summary of Annualized Nitrate/Nitrite Monitoring Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Nitrate/Nitrite Monitoring	-	-	-	-	-	-	-	-
Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Summary of Annualized O&M Plan Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
O&M Plan	-	-	0.01	0.01	-	-	0.01	0.02
Total	**-**	**-**	**0.01**	**0.01**	**-**	**-**	**0.01**	**0.02**

Exhibit C.15a Summary of Rule Costs (Millions of 2008$)

Summary of Annualized Disinfection and Flushing Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Routine Disinfection and Flushing	-	4.52	2.97	2.08	-	4.46	2.93	2.05
Total	**-**	**4.52**	**2.97**	**2.08**	**-**	**4.46**	**2.93**	**2.05**

Summary of Annualized Disinfection and Flushing Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Corrective Action Disinfection and Flushing	-	0.05	0.05	0.05	-	0.05	0.05	0.05
Total	**-**	**0.05**	**0.05**	**0.05**	**-**	**0.05**	**0.05**	**0.05**

Summary of Annualized Sanitary Survey/Compliance Audit Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Sanitary Survey/ Compliance Audit	0.70	-	-	0.02	0.69	-	-	0.02
Total	**0.70**	**-**	**-**	**0.02**	**0.69**	**-**	**-**	**0.02**

Summary of Annualized ADWR Costs (Millions of 2008$)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 1	Alt 2	Alt 3	Alt 4
	3%				7%			
Total	**29.49**	**7.16**	**18.43**	**7.34**	**29.08**	**7.07**	**18.19**	**7.25**

Exhibit C.15b Summary of Rule Costs (Millions of 2008$), Alternative 1

Summary of Implementation and Annual Administration Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Total	**$ 0.002**	**$ 0.25**	**$ 0.25**	**$ 0.004**	**$ 0.25**	**$ 0.25**

Summary of Annualized Monitoring Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Monitoring Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.004
Total	**$ 0.002**	**$ 0.001**	**$ 0.002**	**$ 0.002**	**$ 0.001**	**$ 0.004**

Summary of Annualized Coliform Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Coliform Monitoring	$ 25.07	$ 0.30	$ 25.37	$ 24.72	$ 0.30	$ 25.02
Total	**$ 25.07**	**$ 0.30**	**$ 25.37**	**$ 24.72**	**$ 0.30**	**$ 25.02**

Summary of Annualized Disinfectant Residual Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Disinfectant Residual Monitoring	$ 3.00	$ 0.17	$ 3.17	$ 2.96	$ 0.17	$ 3.13
Total	**$ 3.00**	**$ 0.17**	**$ 3.17**	**$ 2.96**	**$ 0.17**	**$ 3.13**

Summary of Annualized Turbidity Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Turbidity Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Nitrate/Nitrite Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Nitrate/Nitrite Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized O&M Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
O&M Plan	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Exhibit C.15b Summary of Rule Costs (Millions of 2008$), Alternative 1

Summary of Annualized Routine Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Routine Disinfection and Flushing	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Corrective Action Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Corrective Action Disinfection and Flushing	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Sanitary Survey/Compliance Audit Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Sanitary Survey/ Compliance Audit	$ 0.03	$ 0.67	$ 0.70	$ 0.03	$ 0.66	$ 0.69
Total	**$ 0.03**	**$ 0.67**	**$ 0.70**	**$ 0.03**	**$ 0.66**	**$ 0.69**

Summary of Annualized ADWR Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Total	**$ 28.11**	**$ 1.38**	**$ 29.49**	**$ 27.71**	**$ 1.37**	**$ 29.08**

Exhibit C.15c Summary of Rule Costs (Millions of 2008$), Alternative 2

Summary of Implementation and Annual Administration Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Total	**$ 0.002**	**$ 0.25**	**$ 0.25**	**$ 0.004**	**$ 0.25**	**$ 0.25**

Summary of Annualized Monitoring Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Monitoring Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.004
Total	**$ 0.002**	**$ 0.001**	**$ 0.002**	**$ 0.002**	**$ 0.001**	**$ 0.004**

Summary of Annualized Coliform Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Coliform Monitoring	$ 1.66	$ 0.01	$ 1.67	$ 1.63	$ 0.01	$ 1.65
Total	**$ 1.66**	**$ 0.01**	**$ 1.67**	**$ 1.63**	**$ 0.01**	**$ 1.65**

Summary of Annualized Disinfectant Residual Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Disinfectant Residual Monitoring	$ 0.50	$ 0.17	$ 0.67	$ 0.49	$ 0.17	$ 0.66
Total	**$ 0.50**	**$ 0.17**	**$ 0.67**	**$ 0.49**	**$ 0.17**	**$ 0.66**

Summary of Annualized Turbidity Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Turbidity Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Nitrate/Nitrite Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Nitrate/Nitrite Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized O&M Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
O&M Plan	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Exhibit C.15c Summary of Rule Costs (Millions of 2008$), Alternative 2

Summary of Annualized Routine Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Routine Disinfection and Flushing	$ 3.85	$ 0.67	$ 4.52	$ 3.80	$ 0.66	$ 4.46
Total	**$ 3.85**	**$ 0.67**	**$ 4.52**	**$ 3.80**	**$ 0.66**	**$ 4.46**

Summary of Annualized Corrective Action Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Total	**$ 0.05**	**$ -**	**$ 0.05**	**$ 0.05**	**$ -**	**$ 0.05**

Summary of Annualized Sanitary Survey/Compliance Audit Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Sanitary Survey/ Compliance Audit	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized ADWR Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Total	**$ 6.06**	**$ 1.10**	**$ 7.16**	**$ 5.98**	**$ 1.09**	**$ 7.07**

Exhibit C.15d Summary of Rule Costs (Millions of 2008$), Alternative 3

Summary of Implementation and Annual Administration Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Total	**$ 0.002**	**$ 0.25**	**$ 0.25**	**$ 0.004**	**$ 0.25**	**$ 0.25**

Summary of Annualized Monitoring Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Monitoring Plan	$ 0.001	$ 0.0004	$ 0.001	$ 0.001	$ 0.001	$ 0.002
Total	**$ 0.001**	**$ 0.0004**	**$ 0.001**	**$ 0.001**	**$ 0.001**	**$ 0.002**

Summary of Annualized Coliform Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Coliform Monitoring	$ 2.22	$ 0.01	$ 2.23	$ 2.19	$ 0.01	$ 2.20
Total	**$ 2.22**	**$ 0.01**	**$ 2.23**	**$ 2.19**	**$ 0.01**	**$ 2.20**

Summary of Annualized Disinfectant Residual Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Disinfectant Residual Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Turbidity Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Turbidity Monitoring	$ 11.910	$ 1.01	$ 12.92	$ 11.74	$ 1.00	$ 12.74
Total	**$ 11.91**	**$ 1.01**	**$ 12.92**	**$ 11.74**	**$ 1.00**	**$ 12.74**

Summary of Annualized Nitrate/Nitrite Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Nitrate/Nitrite Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized O&M Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
O&M Plan	$ 0.01	$ 0.001	$ 0.01	$ 0.01	$ 0.001	$ 0.01
Total	**$ 0.01**	**$ 0.001**	**$ 0.01**	**$ 0.01**	**$ 0.001**	**$ 0.01**

Exhibit C.15d Summary of Rule Costs (Millions of 2008$), Alternative 3

Summary of Annualized Routine Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Routine Disinfection and Flushing	$ 2.97	$ -	$ 2.97	$ 2.93	$ -	$ 2.93
Total	**$ 2.97**	**$ -**	**$ 2.97**	**$ 2.93**	**$ -**	**$ 2.93**

Summary of Annualized Corrective Action Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Total	**$ 0.05**	**$ -**	**$ 0.05**	**$ 0.05**	**$ -**	**$ 0.05**

Summary of Annualized Sanitary Survey/Compliance Audit Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Sanitary Survey/ Compliance Audit	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized ADWR Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Total	**$ 17.17**	**$ 1.27**	**$ 18.43**	**$ 16.93**	**$ 1.26**	**$ 18.19**

Exhibit C.15e Summary of Rule Costs (Millions of 2008$), Alternative 4 (Final Rule)

Summary of Implementation and Annual Administration Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Implementation	$ 0.002	$ 0.01	$ 0.01	$ 0.004	$ 0.01	$ 0.02
Annual Administration	$ -	$ 0.24	$ 0.24	$ -	$ 0.23	$ 0.23
Total	**$ 0.002**	**$ 0.25**	**$ 0.25**	**$ 0.004**	**$ 0.25**	**$ 0.25**

Summary of Annualized Sampling Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Sampling Plan	$ 0.002	$ 0.001	$ 0.002	$ 0.002	$ 0.001	$ 0.003
Total	**$ 0.002**	**$ 0.001**	**$ 0.002**	**$ 0.002**	**$ 0.001**	**$ 0.003**

Summary of Annualized Coliform Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Coliform Monitoring	$ 4.89	$ 0.04	$ 4.93	$ 4.82	$ 0.04	$ 4.86
Total	**$ 4.89**	**$ 0.04**	**$ 4.93**	**$ 4.82**	**$ 0.04**	**$ 4.86**

Summary of Annualized Disinfectant Residual Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Disinfectant Residual Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Turbidity Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Turbidity Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized Nitrate/Nitrite Monitoring Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Nitrate/Nitrite Monitoring	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Summary of Annualized O&M Plan Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
O&M Plan	$ 0.01	$ 0.0001	$ 0.01	$ 0.02	$ 0.0001	$ 0.02
Total	**$ 0.01**	**$ 0.0001**	**$ 0.01**	**$ 0.02**	**$ 0.0001**	**$ 0.02**

Exhibit C.15e Summary of Rule Costs (Millions of 2008$), Alternative 4 (Final Rule)

Summary of Annualized Routine Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Routine Disinfection and Flushing	$ 2.08	$ -	$ 2.08	$ 2.05	$ -	$ 2.05
Total	**$ 2.08**	**$ -**	**$ 2.08**	**$ 2.05**	**$ -**	**$ 2.05**

Summary of Annualized Corrective Action Disinfection and Flushing Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Corrective Action Disinfection and Flushing	$ 0.05	$ -	$ 0.05	$ 0.05	$ -	$ 0.05
Total	**$ 0.05**	**$ -**	**$ 0.05**	**$ 0.05**	**$ -**	**$ 0.05**

Summary of Annualized Compliance Audit Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Compliance Audit	$ 0.01	$ 0.01	$ 0.02	$ 0.01	$ 0.01	$ 0.02
Total	**$ 0.01**	**$ 0.01**	**$ 0.02**	**$ 0.01**	**$ 0.01**	**$ 0.02**

Summary of Annualized ADWR Costs (Millions of 2008$)

	Air Carriers	Agency	Total	Air Carriers	Agency	Total
	3%			7%		
Total	**$ 7.04**	**$ 0.30**	**$ 7.34**	**$ 6.95**	**$ 0.30**	**$ 7.25**

Appendix D

Screening Analysis

D.1 Introduction and General Approach

EPA has conducted a screening analysis to consider the economic impact of the final rule on small entities that own or operate air carriers. This analysis has been completed using the methodology described in the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. §601 et seq.).

The remaining sections of this document include the following information:

- Section D.2—Definition of a Small Business
- Section D.3—Screening Analysis of Small Entities
- Section D.4—Baseline Information
- Section D.5—Cost Information
- Section D.6—Revenue Information
- Section D.7—Results of Screening Analysis

D.2 Definition of a Small Business

U.S. aircraft are owned and operated exclusively by businesses. Therefore, the screening analysis for the ADWR uses the following definition for small entities: A "small business" is any firm that is independently owned and operated and is not dominant in its field of operation (Small Business Act, 15 U.S.C. 632). The RFA references this definition of "small business" and defines small entities as including "small businesses," "small governments," and "small organizations" (5 U.S.C. 601).

The Small Business Administration's (SBA) definitions of small businesses use categories are defined by National American Industry Classification System (NAICS) codes. For example, in the manufacturing sector, the SBA generally defines small businesses in terms of number of employees, but in the agriculture, mining, electric, gas, and sanitary services sectors, the SBA generally defines small businesses in terms of number of employees or annual receipts (ranging from $0.5 million for crops to $25 million for certain types of pipelines).

EPA has determined that the following businesses would be affected by the Aircraft Drinking Water Rule (ADWR) based on the NAICS:

- 481111 – Scheduled passenger air transportation
- 481211 – Nonscheduled chartered passenger air transportation

SBA defines a small business for air carriers (NAICS codes 481111 and 481211) as having fewer than 1,500 employees (13 CFR 121.201).

D.3 Screening Analysis of Small Entities

The screening analysis determines whether the ADWR will impose a significant economic impact on a substantial number of small entities. The *Interim Guidance for EPA*

Rulewriters for the RFA as amended by the SBREFA (USEPA 1999) suggests using 1 percent of revenue as a threshold for determining if a cost impact of a regulation is "significant," although additional factors may be considered. If the compliance costs for a new regulation are greater than 1 percent of sales or revenues for 100 or more entities and for more than 20 percent of all affected small entities, then in most cases there would be a significant impact. If more than 100 entities experience economic impacts of 3 percent of their revenues or greater, then in most cases there would be a significant impact. Since there are fewer than 100 entities considered in this analysis, it is more meaningful to consider the percent of costs compared to revenue.

Based on information available on the internet, industries, and from best professional judgment, EPA estimated costs associated with implementing the various components of the ADWR. Chapter 5 of this EA provides details on labor rates and estimated costs to air carriers.

Revenue data (year 2005) for small businesses were obtained from Dun & Bradstreet (D&B) reports, which present an estimate of annual sales. Data were based on individual companies, rather than the parent company, using the conservative assumption that parent companies will not supplement the finances of their subsidiaries.

The revenue of small air carriers does not reflect the low and sometimes negative profits of numerous air carriers in recent years, which may be influenced by a variety of factors. The following air carriers filed for Chapter 11 or Chapter 7 bankruptcy between 2004 and 2006 (Air Transport Association 2006):

- U.S. Airways
- Comair, Independence Air
- Atlas Air
- ERA Aviation
- Delta Airlines
- Florida Coastal Airlines
- Northwest
- Southeast
- Aloha
- TransMeridian
- American Trans Air
- Great Plains
- Mesaba Airlines

Several issues that affect air carrier profitability are summarized below:

- The air carrier industry must accommodate a high tax burden, which can affect the profitability of businesses.
- The air carrier industry is a heavily regulated industry. U.S. Federal Aviation Administration (FAA) requirements cover, among other things, retirement of older aircraft, security measures, collision avoidance systems, airborne windshear avoidance systems, noise abatement and other environmental concerns, commuter

aircraft safety, and increased inspections and maintenance procedures in older aircraft.
- In general, air carriers have limited pricing power due to the substantial price competition in the air carrier industry, especially in domestic markets.
- Although many air carriers continue to cut benefits as labor agreements are renegotiated, benefits of air carrier employees have increased rapidly.
- Crude oil prices have continued to rise dramatically.
- World events (e.g., war, pandemic illnesses, terrorist attacks) and economic health affect numbers of air carrier passengers and, therefore, air carriers' revenue and profit.

In spite of these issues, air carriers have voiced a continuous commitment to ensure that drinking water on aircraft is safe for the public.

D.4 Baseline Information

Air carriers were considered individually, including those owned by a parent company. Air carriers subject to the rule usually operate aircraft serving 30 or more passengers. Aircraft that carry fewer than 30 passengers generally are not capable of taking water onboard, except chartered aircraft.

Of the approximately 63 air carriers that may be subject to the ADWR, 30 are small businesses. These 30 air carriers represent 48 percent of the universe of air carriers subject to the final rule, and all will be subject to the various provisions. Therefore, EPA has determined that a substantial number of small entities will be impacted by the ADWR.

Although each aircraft will be regulated as a separate water system, the economic impact of the rule is considered for air carriers in this analysis. The rationale for using this approach considers that one-time costs (e.g., developing a monitoring plan) will apply to the entire air carrier fleet and that revenue information is only available for air carriers.

D.5 Revenue information

Revenue information for most small air carriers was available from the private database, D&B. Revenue data were obtained from D&B in July 2006 and adjusted to 2008$. When revenue information was not available for a specific air carrier, EPA used the median revenue from air carriers included in this analysis. The average revenue for small air carriers subject to the ADWR is $106.6 million, and the median revenue is $57.2 million. One air carrier is a subsidiary of a large company and provides various services related to private jets. Although the company has fewer than 1,500 employees, it has substantially higher revenues than other small air carriers. Removing this company decreases the average revenue to $84.3 million.

D.6 Cost Information

Because many air carriers have been experiencing financial difficulties in recent years, EPA has made an effort to minimize the impact of the rule on these businesses. Air carriers have the flexibility to choose one of four disinfection/monitoring schedules that can be integrated into their current operations and maintenance (O&M) schedule. In addition, air carriers are only required to monitor for total coliform, similar to other transient noncommunity water systems (TNCWS) that obtain treated water from a parent system (i.e., consecutive systems do not have to monitor for nitrates and turbidity).

As part of the regulatory development process, EPA has identified related existing programs and practices, and has determined how the new regulatory requirements can be integrated with them to avoid duplicative burden (e.g., inspections). Aircraft water systems have many different on-going programs and practices for assessing and correcting deficiencies and risks associated with the drinking water supply and related security and sanitation issues including:

- U.S. Food and Drug Administration's (FDA) regulations for Interstate Conveyance Sanitation (USFDA 2005);
- FAA Airworthiness Standards: Transport Category Airplanes (Airworthiness maintenance and inspection program);
- Vulnerability assessments/security program;
- FDA sanitary surveys of watering points and servicing areas;
- FDA approval and certification of watering points;
- FDA certification of aircraft sanitation systems including potable water, sewage, and galleys.

To estimate costs for small air carriers, EPA followed the same methodology as was used to develop the annualized implementation and incremental costs for the rule overall, as described in Chapter 5 of this EA. Exhibits D.1 and D.2 show present value costs by rule activity, annualized over 25 years using 3 and 7 percent discount rates, respectively. Total annual costs for all small air carriers are estimated to be $524,380 and $521,110, annualized at a 3 and 7 percent discount rate, respectively. Average annual rule costs associated with the 30 individual small air carriers is approximately $17,543 (annualized at 3 percent).

Exhibit D.1 Total Present Value Implementation Costs for Small Air carriers, Annualized at 3 Percent over 25 Years

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit	Total Costs
1	$ 10,286	$ -	$ 6,429	$ -	$ -	$ -	$ -	$ 51,430	$ -	$ -	$ -	**$ 68,144**
2	$ 9,986	$ -	$ 6,241	$ -	$ -	$ -	$ -	$ 49,932	$ -	$ -	$ -	**$ 66,160**
3	$ -	$ -	$ -	$ 383,523	$ -	$ -	$ -	$ -	$ 153,552	$ 3,446	$ 5,817	**$ 546,338**
4	$ -	$ -	$ -	$ 355,962	$ -	$ -	$ -	$ -	$ 149,079	$ 3,345	$ 5,648	**$ 514,035**
5	$ -	$ -	$ -	$ 345,595	$ -	$ -	$ -	$ -	$ 144,737	$ 3,248	$ 5,483	**$ 499,063**
6	$ -	$ -	$ -	$ 335,529	$ -	$ -	$ -	$ -	$ 140,522	$ 3,153	$ 5,324	**$ 484,527**
7	$ -	$ -	$ -	$ 325,756	$ -	$ -	$ -	$ -	$ 136,429	$ 3,061	$ 5,169	**$ 470,415**
8	$ -	$ -	$ -	$ 316,268	$ -	$ -	$ -	$ -	$ 132,455	$ 2,972	$ 5,018	**$ 456,713**
9	$ -	$ -	$ -	$ 307,056	$ -	$ -	$ -	$ -	$ 128,597	$ 2,886	$ 4,872	**$ 443,411**
10	$ -	$ -	$ -	$ 298,113	$ -	$ -	$ -	$ -	$ 124,852	$ 2,802	$ 4,730	**$ 430,496**
11	$ -	$ -	$ -	$ 289,430	$ -	$ -	$ -	$ -	$ 121,215	$ 2,720	$ 4,592	**$ 417,957**
12	$ -	$ -	$ -	$ 281,000	$ -	$ -	$ -	$ -	$ 117,685	$ 2,641	$ 4,458	**$ 405,784**
13	$ -	$ -	$ -	$ 285,377	$ -	$ -	$ -	$ -	$ 114,257	$ 2,564	$ 4,329	**$ 406,527**
14	$ -	$ -	$ -	$ 264,869	$ -	$ -	$ -	$ -	$ 110,929	$ 2,489	$ 4,203	**$ 382,490**
15	$ -	$ -	$ -	$ 257,155	$ -	$ -	$ -	$ -	$ 107,698	$ 2,417	$ 4,080	**$ 371,350**
16	$ -	$ -	$ -	$ 249,665	$ -	$ -	$ -	$ -	$ 104,561	$ 2,346	$ 3,961	**$ 360,534**
17	$ -	$ -	$ -	$ 242,393	$ -	$ -	$ -	$ -	$ 101,516	$ 2,278	$ 3,846	**$ 350,033**
18	$ -	$ -	$ -	$ 235,333	$ -	$ -	$ -	$ -	$ 98,559	$ 2,212	$ 3,734	**$ 339,838**
19	$ -	$ -	$ -	$ 228,479	$ -	$ -	$ -	$ -	$ 95,688	$ 2,147	$ 3,625	**$ 329,939**
20	$ -	$ -	$ -	$ 221,824	$ -	$ -	$ -	$ -	$ 92,901	$ 2,085	$ 3,520	**$ 320,330**
21	$ -	$ -	$ -	$ 215,363	$ -	$ -	$ -	$ -	$ 90,196	$ 2,024	$ 3,417	**$ 311,000**
22	$ -	$ -	$ -	$ 209,090	$ -	$ -	$ -	$ -	$ 87,568	$ 1,965	$ 3,318	**$ 301,941**
23	$ -	$ -	$ -	$ 203,000	$ -	$ -	$ -	$ -	$ 85,018	$ 1,908	$ 3,221	**$ 293,147**
24	$ -	$ -	$ -	$ 197,088	$ -	$ -	$ -	$ -	$ 82,542	$ 1,852	$ 3,127	**$ 284,609**
25	$ -	$ -	$ -	$ 191,347	$ -	$ -	$ -	$ -	$ 80,138	$ 1,798	$ 3,036	**$ 276,319**
Total PV	**$ 20,272**	**$ -**	**$ 12,670**	**$ 6,239,216**	**$ -**	**$ -**	**$ -**	**$ 101,361**	**$ 2,600,694**	**$ 58,357**	**$ 98,527**	**$ 9,131,098**
Annualized	**$ 1,164**	**$ -**	**$ 728**	**$ 358,305**	**$ -**	**$ -**	**$ -**	**$ 5,821**	**$ 149,352**	**$ 3,351**	**$ 5,658**	**$ 524,380**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

Exhibit D.2 Total Present Value Implementation Costs for Small Air carriers, Annualized at 7 Percent over 25 Years

Year	Implementation	Annual Administration	Sampling Plan	Monitoring - TC	Monitoring - Disinfectant Residual	Turbidity Monitoring	Nitrate/Nitrite Monitoring	O&M Plan	Routine Disinfection & Flushing	CA Disinfection & Flushing	Compliance Audit	Total Costs
1	$ 10,286	$ -	$ 6,429	$ -	$ -	$ -	$ -	$ 51,430	$ -	$ -	$ -	**$ 68,144**
2	$ 9,613	$ -	$ 6,008	$ -	$ -	$ -	$ -	$ 48,065	$ -	$ -	$ -	**$ 63,686**
3	$ -	$ -	$ -	$ 355,384	$ -	$ -	$ -	$ -	$ 142,286	$ 3,193	$ 5,390	**$ 506,254**
4	$ -	$ -	$ -	$ 317,515	$ -	$ -	$ -	$ -	$ 132,977	$ 2,984	$ 5,038	**$ 458,514**
5	$ -	$ -	$ -	$ 296,743	$ -	$ -	$ -	$ -	$ 124,278	$ 2,789	$ 4,708	**$ 428,518**
6	$ -	$ -	$ -	$ 277,330	$ -	$ -	$ -	$ -	$ 116,148	$ 2,606	$ 4,400	**$ 400,484**
7	$ -	$ -	$ -	$ 259,187	$ -	$ -	$ -	$ -	$ 108,549	$ 2,436	$ 4,112	**$ 374,284**
8	$ -	$ -	$ -	$ 242,231	$ -	$ -	$ -	$ -	$ 101,448	$ 2,276	$ 3,843	**$ 349,798**
9	$ -	$ -	$ -	$ 226,384	$ -	$ -	$ -	$ -	$ 94,811	$ 2,127	$ 3,592	**$ 326,914**
10	$ -	$ -	$ -	$ 211,574	$ -	$ -	$ -	$ -	$ 88,609	$ 1,988	$ 3,357	**$ 305,527**
11	$ -	$ -	$ -	$ 197,732	$ -	$ -	$ -	$ -	$ 82,812	$ 1,858	$ 3,137	**$ 285,540**
12	$ -	$ -	$ -	$ 184,797	$ -	$ -	$ -	$ -	$ 77,394	$ 1,737	$ 2,932	**$ 266,860**
13	$ -	$ -	$ -	$ 180,659	$ -	$ -	$ -	$ -	$ 72,331	$ 1,623	$ 2,740	**$ 257,354**
14	$ -	$ -	$ -	$ 161,409	$ -	$ -	$ -	$ -	$ 67,599	$ 1,517	$ 2,561	**$ 233,085**
15	$ -	$ -	$ -	$ 150,849	$ -	$ -	$ -	$ -	$ 63,177	$ 1,418	$ 2,393	**$ 217,837**
16	$ -	$ -	$ -	$ 140,981	$ -	$ -	$ -	$ -	$ 59,044	$ 1,325	$ 2,237	**$ 203,586**
17	$ -	$ -	$ -	$ 131,757	$ -	$ -	$ -	$ -	$ 55,181	$ 1,238	$ 2,091	**$ 190,267**
18	$ -	$ -	$ -	$ 123,138	$ -	$ -	$ -	$ -	$ 51,571	$ 1,157	$ 1,954	**$ 177,820**
19	$ -	$ -	$ -	$ 115,082	$ -	$ -	$ -	$ -	$ 48,197	$ 1,081	$ 1,826	**$ 166,187**
20	$ -	$ -	$ -	$ 107,553	$ -	$ -	$ -	$ -	$ 45,044	$ 1,011	$ 1,706	**$ 155,315**
21	$ -	$ -	$ -	$ 100,517	$ -	$ -	$ -	$ -	$ 42,097	$ 945	$ 1,595	**$ 145,154**
22	$ -	$ -	$ -	$ 93,941	$ -	$ -	$ -	$ -	$ 39,343	$ 883	$ 1,491	**$ 135,658**
23	$ -	$ -	$ -	$ 87,796	$ -	$ -	$ -	$ -	$ 36,769	$ 825	$ 1,393	**$ 126,783**
24	$ -	$ -	$ -	$ 82,052	$ -	$ -	$ -	$ -	$ 34,364	$ 771	$ 1,302	**$ 118,489**
25	$ -	$ -	$ -	$ 76,684	$ -	$ -	$ -	$ -	$ 32,116	$ 721	$ 1,217	**$ 110,737**
Total PV	**$ 19,899**	**$ -**	**$ 12,437**	**$ 4,121,296**	**$ -**	**$ -**	**$ -**	**$ 99,495**	**$ 1,716,144**	**$ 38,509**	**$ 65,016**	**$ 6,072,795**
Annualized	**$ 1,708**	**$ -**	**$ 1,067**	**$ 353,651**	**$ -**	**$ -**	**$ -**	**$ 8,538**	**$ 147,263**	**$ 3,304**	**$ 5,579**	**$ 521,110**

Notes:

1) Public notification is not covered under ADWR, but is covered under PNR.

2) Present values in 2008 dollars, discounted to Y1.

3) Assume refrigerators are purchased two times (in years 3 and 13) in the 25-year evaluation period.

EPA estimates that the average annual incremental rule cost (the difference between the final rule and Alternative 1, compliance with the existing NPDWRs), is a *reduction* in cost of $258,599 at a 3 percent discount rate, and the average annual incremental rule costs between the final rule and Alternative 2, compliance with requirements similar to the Administrative Orders on Consent (AOCs), is a *reduction* in cost of $32,188 at a 3 percent discount rate. These results, shown in Exhibit D.3, demonstrate a cost savings for small entities by choosing the final rule over compliance with either the existing NPDWRs or compliance with requirements similar to the AOCs, which are the first two alternatives, respectively.

Exhibit D3: Results of the Screening Analysis for Alternatives 1, 2, and 4

Total Number of Aircraft Owned by Small Air Carriers	514
Total Number of Small Air Carriers	30
Average Revenues for Small Air Carriers	$106,576,591

	Alt 1 (Existing NPDWRs)	Alt 2 (Similar to AOCs)	Alt 4 (Final ADWR)	Alt 4 - Alt1	Alt4 - Alt2
Average Rule Costs for Small Air Carriers	$276,142	$49,731	$17,543	$(258,599)	$(32,188)
Average Cost/Revenue	0.26%	0.05%	0.02%		
Small Air Carriers Experiencing Costs ≥1% of their Revenues					
Number				-	-
Percent				0.00%	0.00%
Small Air Carriers Experiencing Costs ≥3% of their Revenues					
Number				-	-
Percent				0.00%	0.00%

Source: Derived from the ADWR Cost Model. Average rule costs in 2008$.
Note: Average revenue for small air carriers based on 2005 data.

Recognizing the variation of sized companies within this group, EPA has estimated the average annual incremental cost for small air carriers with fewer than 500 employees and for small air carriers with 500 or more employees. The number of employees was taken from the baseline and from 2006 Bureau of Transportation Statistics (BTS) data[1]. For air carriers with fewer than 500 employees, the incremental cost between the final rule and Alternative 1 is a *reduction* of $78,042 at a 3 percent discount rate, and the incremental average rule cost between the final rule and Alternative 2 is a *reduction* of $7,781 at a 3 percent discount rate (Exhibit D4). For air carriers with 500 or more employees, the incremental cost between the final rule and Alternative 1 is a *reduction* of $230,712 at a 3 percent discount rate, and the incremental average rule cost between the final rule and Alternative 2 is a *reduction* of $20,104 at a 3 percent discount rate (Exhibit D5).

[1] Employee data from ATA Execujet was not available from any source. Since the air carrier only has one aircraft, EPA assumed that ATA Execujet has fewer than 500 employees.

Exhibit D4: Results of the Screening Analysis for Small Air Carriers with Fewer than 500 Employees

Total Number of Aircraft Owned by Small Air Carriers w/< 500 employees	129
Total Number of Small Air Carriers w/< 500 employees	17
Average Revenues for Small Air Carriers w/< 500 employees	$72,903,528

	Alt 1 (Existing NPDWRs)	Alt 2 (Similar to AOCs)	Alt 4 (Final ADWR)	Alt 4 - Alt1	Alt4 - Alt2
Average Rule Costs for Small Air Carriers w/< 500 employees	$86,751	$16,490	$8,709	$(78,042)	$(7,781)
Average Cost/Revenue	0.12%	0.02%	0.01%		
Small Air Carriers w/< 500 employees Experiencing Costs ≥1% of their Revenues					
Number				-	-
Percent				0.00%	0.00%
Small Air Carriers w/< 500 employees Experiencing Costs ≥3% of their Revenues					
Number				-	-
Percent				0.00%	0.00%

Source: Derived from the ADWR Cost Model. Average rule costs in 2008$ at 3% discount rate.
Note: Average revenue for small air carriers based on 2005 data.

Exhibit D5: Results of the Screening Analysis for Small Air Carriers with 500 or More Employees

Total Number of Aircraft Owned by Small Air Carriers w/ >500 Employees	385
Total Number of Small Air Carriers w/ >500 Employees	13
Average Revenues for Small Air Carriers w/ >500 Employees	$151,063,274

	Alt 1 (Existing NPDWRs)	Alt 2 (Similar to AOCs)	Alt 4 (Final ADWR)	Alt 4 - Alt1	Alt4 - Alt2
Average Rule Costs for Small Air Carriers w/ ≥500 Employees	$259,752	$49,144	$29,040	$(230,712)	$(20,104)
Average Cost/Revenue	0.17%	0.03%	0.02%		
Small Air Carriers w/ ≥500 Employees Experiencing Costs ≥1% of their Revenues					
Number				-	-
Percent				0.00%	0.00%
Small Air Carriers w/ ≥500 Employees Experiencing Costs ≥3% of their Revenues					
Number				-	-
Percent				0.00%	0.00%

Source: Derived from the ADWR Cost Model. Average rule costs in 2008$ at 3% discount rate.
Note: Average revenue for small air carriers based on 2005 data.