EIA Technical Review Guidelines: Tourism-Related Projects

Volume II Appendices

Regional Document prepared under the CAFTA DR Environmental Cooperation Program to Strengthen Environmental Impact Assessment (EIA) Review

Prepared by CAFTA-DR and U.S. Country EIA and Tourism Experts with support from:

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This document is the result of a regional collaboration under the environmental cooperation agreements undertaken as part of the Central America and Dominican Republic Free Trade Agreements with the United States. Regional experts participated in the preparation of this document; however, the guidelines do not necessarily represent the policies, practices or requirements of their governments or organizations.

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The EIA Technical Review Guidelines for Tourism-Related Projects were developed as part of a regional collaboration to better ensure proposed tourism-related projects undergoing review by government officials, non-governmental organizations and the general public successfully identify, avoid, prevent and/or mitigate potential adverse impacts and enhance potential beneficial impacts throughout the life of the projects. The guidelines are part of a broader program to strengthen environmental impact assessment (EIA) review under environmental cooperation agreements associated with the "CAFTA-DR" free trade agreement between the United States and five countries in Central America and the Dominican Republic.

The guidelines and example terms of reference were prepared by regional experts from the CAFTA-DR countries and the United States in government organizations responsible for the environment and tourism and leading academic institutions, designated by the respective Ministers, supported by the U.S. Agency for International Development (USAID) contract for the Environment and Labor Excellence Program and a grant with the Central America Commission for Environment and Development (CCAD). The guidelines draw upon existing materials from CAFTA-DR countries, other countries outside the region, and international organizations. The guidelines do not represent the policies or practices of any one country or organization.

The guidelines are available in English and Spanish on the international websites of the U.S. Environmental Protection Agency (U.S. EPA), the International Network for Environmental Compliance and Enforcement (INECE), and the Central American Commission on Environment and Development (CCAD): www.epa.gov/oita/ www.inece.org/ www.sica.int/ccad/ Volume 1 contains the guidelines with a glossary and references which track with internationally recognized elements of environmental impact assessment; Volume 2 contains Appendices with detailed information on tourism, requirements and standards, predictive tools, and international codes; and Volume 1, part 2 contains example Terms of Reference cross-linked to Volumes 1 and 2 for resort/hotel/condo developments, concessions, and coastal and marine projects respectively for use by the countries as they prepare their own EIA program requirements.

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APPENDIX A. WHAT IS TOURISM?

1 TYPES OF TOURISM

The World Travel and Tourism Council (WTTC), the World Tourism Organization (WTO), and the Earth Council agree on the following definition of tourism, which is also widely accepted internationally:

> Tourism comprises activities of people who travel or who stay in places far from their usual environment for no more than one consecutive year, for pleasure, business, or other purposes.

This definition of tourism can be further divided into four categories: leisure, business, academic and medical.

1.1 Leisure Tourism

Leisure tourism is elective travel for leisure purposes. It may be done to visit family or friends, to enjoy a natural or cultural resource, to experience something different or unique, or a combination of all three. Leisure tourism may be divided into several subcategories:

- Coastal and Marine Tourism - all tourism to beaches, islands, estuarine areas, coral reefs, and oceans, including boating and diving.
- Inland Natural Area Tourism - non-coastal, dispersed tourism directed toward enjoying wildlife or other natural or cultural/archaeological features.
- Cultural Heritage Tourism - travel to experience, and learn from a new culture.
- Urban Cultural Tourism - travel to cities for sightseeing, museum visiting, and historical touring.
- Sports Tourism – travel to play or watch a certain sport (e.g., professional teams, tournaments, the Olympic Games, World Cup,).
- Health Tourism –travel with the purpose of feeling better at the end of the trip (e.g., go to a spa, practice yoga, and/or simply travel to relax).

Ecotourism can be a subset of the first three categories. The International Ecotourism Society defines ecotourism as: "responsible travel to natural areas that conserves the environment and improves the well-being of local people." So ecotourism combines nature tourism with cultural tourism and when properly executed protects and promotes both natural systems and living cultures.

1.2 Other Forms of Tourism

Business tourism involves travel to do business or attend a business-related convention. Although the main reason for travel is business, many business tourists also engage in some leisure tourism activities during their business trip.

Academic Tourism involves travel with the purpose of learning or teaching something. It includes students, researchers, and teachers. It also includes individuals who travel to a country to learn a language. As with business tourism, most academic tourists spend at least some time during their trip to participate in leisure tourism activities.

Medicinal Tourism is travelling for the purpose of receiving medical treatment. It differs from health tourism in that it involves curing a specific illness or injury, rather than just general improvement of health.

2 COMPONENTS OF TOURISM

All types of tourism have certain common components. These include transport, accommodation and activities. Providing these components creates the potential for environmental impacts, and hence the need for environmental impact assessment.

By definition, tourism requires people to travel to "places far from their usual environment." Therefore, tourism involves transporting people from their "usual environment" or home to the place where they will participate in activities. Transport may be needed via air, land or water. It may rely upon existing routes and means of transport, an expansion of existing routes and means of transport, or the development of new routes and means of transport.

Tourists of all types require accommodations. Accommodation includes both lodging and food. Lodging can run the gamut from tents to condominiums and everything in between (e.g., home stays, hostels, hotels, resorts, apartments). Food is most often provided by restaurants, but may also be provided by local households, caterers or camping concessionaires. In some cases, the tourists may have access to cooking facilities and will buy raw food and prepare it themselves. Some of the more common forms of accommodations are hotels, resorts and mixed development, all of which often offer both lodging and food.

- **Hotels** always provide basic amenities such as rooms and toilet facilities (either in private rooms or shared facilities). Often they also have other amenities such as, bars, restaurants, tennis courts and swimming pools. They may be located in urban areas with existing services such as water, electricity and sewers or located in a more remote location requiring provision of on-site services.
- **Resorts** are full-service hotels (i.e., hotels with bars, restaurants and swimming pools) with additional amenities such as golf facilities, shopping areas, spas, boating, recreational facilities and developed beaches. Whereas a hotel is be a place where tourists base themselves to participate in activities outside of the hotel, many tourists visit a resort with the notion of participating only in activities at the resort. Often Resorts require the provision of at least some onsite services (water, electricity, sewers, wastewater treatment, etc.).
- **Mixed Development**, which encompasses larger area development including multiple hotels and/or resorts plus commercial development, such as residences, shopping centers and recreational facilities (golf facilities, boating, beach access, marinas, etc.).

The heart of the tourist experience is the activities that attract tourists to a location. Activities vary with each type of tourism. They may be active such as hiking, swimming, snorkeling, diving, competitive sports and walking tours. Or they may be passive such as "taking the sun", spa treatments, "drinking in the views" and bus tours. Some activities require the provision of facilities such as golf courses, tennis courts, convention centers and shopping malls. Others may be based on natural resources, but often facilities are needed to access and enjoy those resources, such as trails, campgrounds, beaches, and docks. Some nature based activities can also be enhanced by the provision of services such as guides, horses, boats and motor vehicles. These facilities and services are often provided by hotels or resorts located on or near the resources or by concessionaires.

APPENDIX B. TOURISM ACTIVITIES IN CAFTA-DR COUNTRIES

1 INTRODUCTION

This appendix presents a brief overview of the tourism sector in CAFTA-DR countries and how trends and pressures for tourism related development are taking shape. It is divided into two sections. The first section presents issues relevant to the sector on a regional basis, including regional economic importance of tourism, regional resources affected by tourism, and regional tourism institutions and initiatives. The second section is a brief overview of the tourism sector in each of the six CAFTA-DR countries.

2 REGIONAL OVERVIEW

2.1 Economic Importance of Tourism

The travel and tourism sector contributes strongly to gross domestic product (GDP) of CAFTA-DR countries. The significance of tourism to the economies of each CAFTA-DR country in 2010 is shown in the Table B-1.

Table B- 1: Economic contribution of tourism and travel in CAFTA-DR countries, 2010

Country	Tourism and Travel Contribution to Gross Domestic Product (GDP)		Total Tourism and Travel Employment	
	2011 US$ bn	% of GDP	Employees (1,000s)	% of Total Employment
Costa Rica	4.522	12.9	241.4	11.9
Dominican Republic	9.027	17.5	652.6	16.1
El Salvador	1.404	6.3	137.6	5.7
Guatemala	3.369	8.0	342.1	7.1
Honduras	2.391	14.8	368.4	13.0
Nicaragua	0.663	10.2	195.6	8.9
REGION	21.376	12.3	1,937.7	10.6

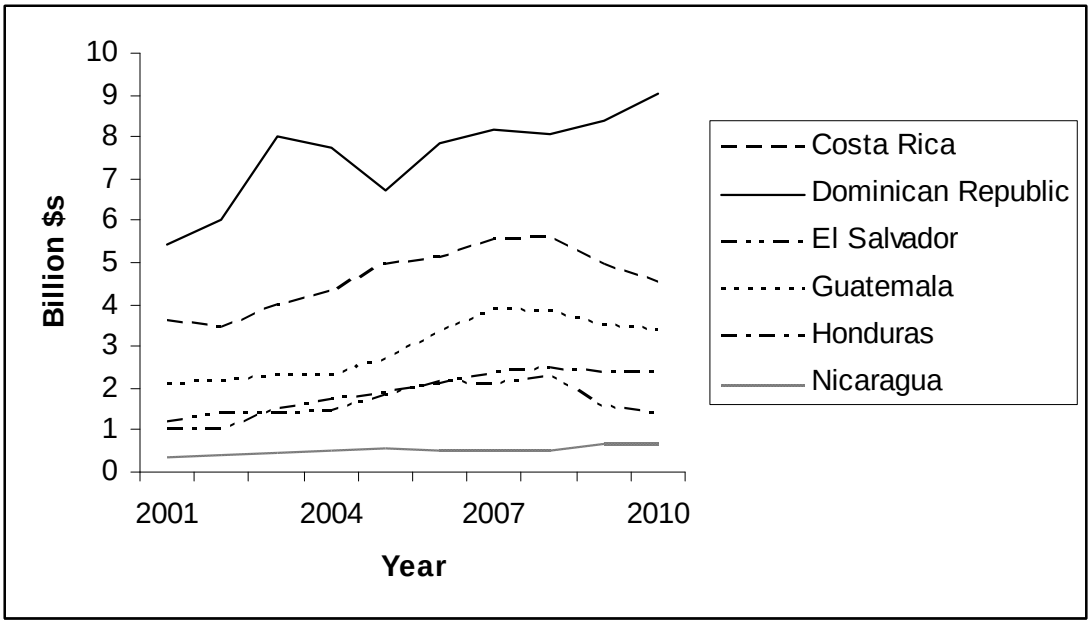
Source: World Travel & Tourism Council (WTTC), http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool, accessed on May 12, 2011.

The data in Table B-1 was generated by the World Travel and Tourism Council (WTTC). The WTTC uses the TSA: RMF 2008[1] framework for estimating the economic contributions of travel and tourism. As such, it defines travel and tourism as "the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not remunerated from within the place visited." In estimating the economic contribution of travel and tourism, it includes all personal consumption before, during and after a trip, which is directly associated with the trip (e.g., travel, lodging, meals and other purchases made for the trip or during the trip) as well as expenses incurred by friends, relatives and business associates on the travelers behalf.

[1] 2008 Tourism Satellite Account: Recommended Methodological Framework (TSA: RMF 2008), a joint publication of the United Nations Statistics Division (UNSD), the Statistical Office of the European Communities (EUROSTAT), the Organisation for Economic Co-operation and Development (OECD) and the World Tourism Organization (UNWTO)

In the CAFTA DR region as a whole, travel and tourism accounts for more than 12 percent of GDP and nearly 11 percent of employment. In four of the six CAFTA-DR countries, travel and tourism accounts for more than 10 percent of the GDP. Travel and tourism's contribution to GDP has generally grown in all of the countries over the past 10 years (Figure B-1). All of the countries except the Dominican Republic and Nicaragua experienced negative economic growth in tourism during 2009 as a result of the worldwide economic downturn. Guatemala and Honduras returned to positive growth in 2010 and the WTTC projects that both Costa Rica and El Salvador will see positive growth return in 2011.

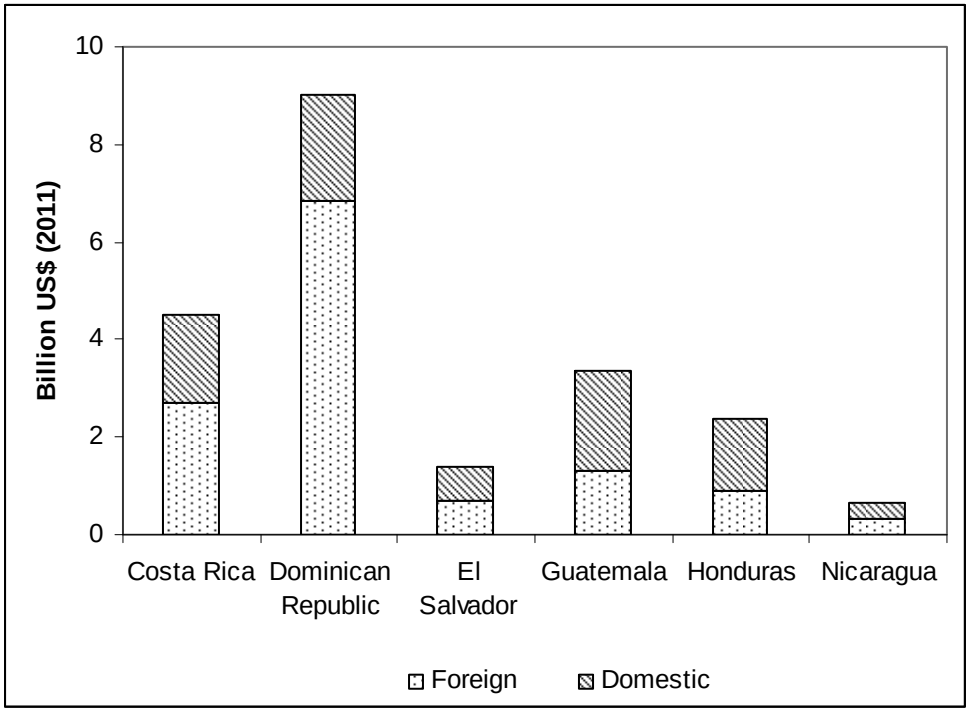
Figure B- 1: Travel and tourism total contribution to GDP



Source: World Travel & Tourism Council (WTTC), http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool, accessed on May 12, 2011.

Foreign visitors play an important role in travel and tourism in all of the CAFTA-DR countries, accounting for from 38 to 76 percent of total travel and tourism contribution to GDP (Figure B-2). International visitor arrivals have generally grown over the past 10 years (Figure B-3), although there was a slowdown in 2001 associated with a worldwide slowdown in air transportation after the 9/11 incident and a drop in 2009 in response to the worldwide economic downturn. Tourism in the region recovered from the 2001 slowdown by 2003, at which point the countries again began to see a rather steady annual growth in international visitor arrivals. International arrivals rebounded for most of the CAFTA-DR in 2010 and WTTC estimates that all of the countries would have international arrivals above the 2009 levels (WTTC Travel & Tourism Economic Impact 2011 Country Reports for each of the CAFTA countries).

Figure B- 2: Foreign and domestic travel contribution to GDP

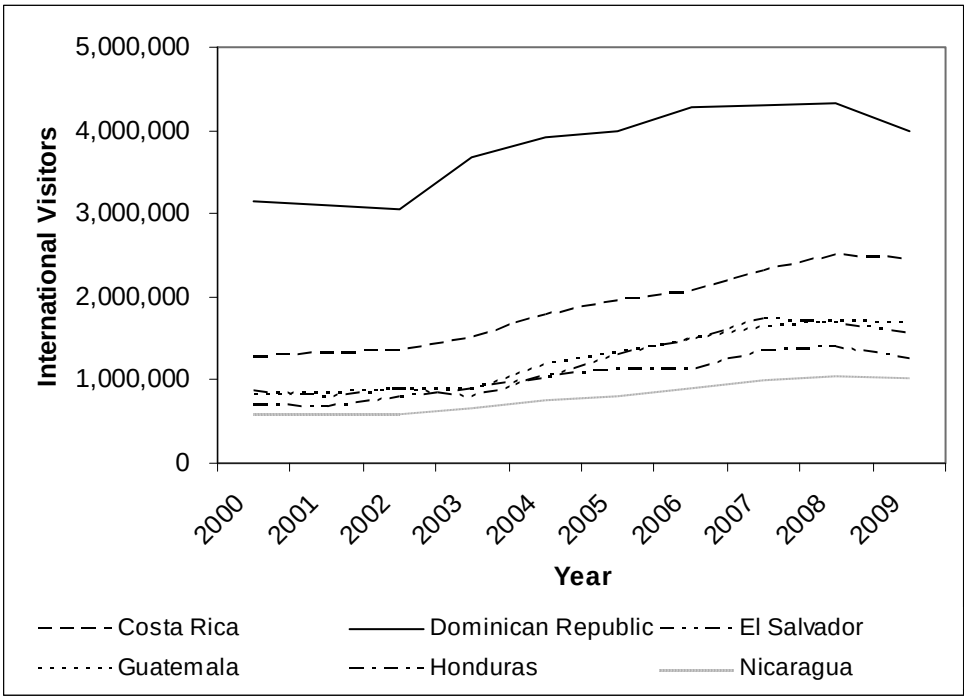


Source: World Travel & Tourism Council (WTTC), http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool, accessed on May 12, 2011
Travel & Tourism Economic Impact 2011 Reports for each of the CAFTA countries, http://www.wttc.org/eng/Tourism_Research/Economic_Research/Country_Reports/

2.2 Tourism and the Environment

According to WTTC, the percentage of the GDP generated by leisure travel and tourism in the CAFTA-DR countries ranges from 53 to 94 percent (El Salvador 53%, Honduras 54%, Guatemala 67%, Nicaragua 72%, Costa Rica 79% and Dominican Republic 94%). Much of the leisure travel and tourism is associated with the natural resources in the region (Table B-2), including beaches, mangroves and other wetlands, lakes and rivers, coral reefs, primary forests (rainforests, cloud forests, and dry forests), and active volcanoes. Cultural attractions are another draw for tourism in the region, include living cultures such as traditional communities, indigenous markets and artisanal fishing and farming; archeological sites and colonial cities.

Figure B- 3: International visitor arrivals, 2000-2009



Source: WTTC, http://www.wttc.org/eng/Tourism_Research/Tourism_Impact_Data_and_Forecast_Tool/ accessed on January 18, 2010

Table B- 2: Natural resource and cultural attractions in CAFTA-DR countries

	Total Area ($km^{2)}$	Coast-line (km)	UNESCO World Heritage Sites	# of Protected Areas	Percent of Total Area in Protected Areas	# of Flowering Plant Species	# of Bird Species	# of Mammal Species
Costa Rica	51,100	2,069	4	127	21	11,000	838	232
Dominican Republic	48,730	1,612	2	44	25	5,000	224	36
El Salvador	21,040	756	1	74	1	2,500	434	137
Guatemala	108,890	445	3	157	32	8,000	684	193
Honduras	112,090	1,878	2	58	19	5,000	699	201
Nicaragua	123,000	1,915	1	69	16	7,000	632	181

Source: World Resource Institute, EarthTrends, http://earthtrends.wri.org/searchable_db/index.php?action=select_theme&theme=1, accessed on June 27, 2011

Although some tourist activities in the region take place in areas of low environmental and social vulnerability, such as cities, many of the tourist attractions are located in areas that are vulnerable in an environmental and socio-cultural sense. Many are located in poverty-stricken areas with little or no development including basic infrastructure such as water and sewer systems and solid waste management. Some particularly vulnerable natural and cultural resources are:

- Coral reefs
- Bodies of fresh water
- Tropical rainforests

- Dry forests
- Cloud forests in the highlands
- High, treeless plains or paramos on top of hills and volcanoes
- Mangroves
- Turtle nesting beaches
- Natural protected areas
- Limited scope ecosystems out of protected areas (e.g., the coastline mountain range in southern Costa Rica)
- Islands, because of their water scarcity and sparse natural habitats
- Endemic areas (where species unique to the area are found)
- Traditional indigenous communities
- Archeological sites
- Historic sites – e.g., the colonial cities

2.3 Regional Institutions

The Convention Establishing the Association of Caribbean States (ACS) was signed on 24 July 1994 in Cartagena de Indias, Colombia, with the aim of promoting consultation, cooperation and concerted action among all the countries of the Caribbean, comprising 25 Member States and three Associate Members. Eight other non-independent Caribbean countries are eligible for associate membership. All CAFTA-DR countries are members of the ACS.

The Convention on the Sustainable Tourism Zone of the Caribbean (STZC) was signed at the 3rd ACS Summit in December 2001 in Margarita, Venezuela; and the Protocol to the Convention, in February 2004. There are five Special Committees of the ACS, one of which is the Special Committee on Sustainable Tourism. The Convention is seen as an essential step in the region's efforts to develop tourism. It covers topics such as cooperation among members and definition of the different types of tourism products available. It also seeks to establish criteria for sustainable tourism destinations. The Special Committee on Sustainable Tourism aims to ensure that destinations can attract visitors but, at the same time, do so in a way that will not harm the physical environment or the communities that surround them.

At the Fourth Summit of Heads of State and/or Government of the ACS, held in Panama City on July 29, 2005, regional leaders issued the Declaration of Panama where they recognized the tourism sector as "one of the most important sources of foreign direct investment and foreign exchange earnings, and a significant provider of employment in the region."

Hosted by the Republic of Cuba, the First Meeting of Ministers of Tourism of the Greater Caribbean (TMM-1) took place in Havana on October 19, 2006. The mandates of this first forum of regional tourism leaders were compiled in the Declaration of Havana on Tourism in the Greater Caribbean. Among the points the Declaration called for are:

- Ratification of the Convention Establishing the STZC and its Protocol, as well as active participation in the STZC
- Multi-Destination Tourism as a significant component of stakeholders' marketing strategies
- Review of decisions taken on cruise tourism impact on land-based tourism and yacht tourism
- Tourism development objectives to focus on increasing tourism earnings and employment and not only on maximizing visitor arrivals
- Support a study to evaluate the economic impact of cruise tourism in the Greater Caribbean

- Consider the possibility of establishing an Association of Caribbean Cruise Ship Destinations

On January 27, 2007, at its 12th Ordinary Meeting held in Guatemala City, the ACS Ministerial Council approved Agreement No 11/07 "Institutionalizing the Declaration of Havana Emanating from the 1st ACS Tourism Ministerial Meeting, Havana, Cuba, 19 October 2006." This Agreement established the Declaration of Havana as the ACS Sustainable Tourism institutional framework and instructed the Special Committee on Sustainable Tourism to apply the Declaration as the benchmark for the attainment of the region's sustainable tourism goals, to monitor its implementation, and to keep the ACS Ministerial Council informed.

In addition to the Special Committee on Sustainable Tourism, the five Central American CAFTA-DR countries are members of the Central American Tourism Council (Consejo Centroamericano de Turismo [CCT]), formed in 1965. CCT is an inter-governmental organization with a board of directors composed of representatives from the ministries of tourism from each member country. Its mission is to facilitate and encourage the development of tourism throughout Central American and promote integrated and sustainable tourism. The work of CCT is supported by the Central American Tourism Integration Secretariat (Secretaría de Integración Turística Centroamericana [SITCA]) which maintains a permanent staff and office in San Salvador, El Salvador.

The Caribbean Tourism Organization, to which the Dominican Republic is a member country, is similar in structure and purpose to the CCT, with a focus on the Caribbean region instead of Central America. Like the CCT, it has a Secretariat (based in Barbados) that oversees policy and program implementation.

Federation of Chambers of Tourism of Central America (FEDECATUR) was incorporated on February 4, 2004 as a regional non-governmental organization comprised of the national private sector tourism associations of the member states of CCT. Its mission is to represent the interests of the private tourism sector in Central America in efforts to achieve regional integration and sustainable development of tourism. FEDECATUR works closely with CCT.

In the Caribbean region, the CTO has private sector affiliate members from the tourism industry, so that to some extent it fulfills the functions of FEDECATUR for that region. There is the Caribbean Hotel Association (CHA), a sister organization to the CTO, which has private sector members from all of the member countries of CTO. CHA works closely with CTO in policy and program implementation.

3 CAFTA-DR COUNTRY OVERVIEWS

3.1 Costa Rica

Economics. Costa Rica has the largest tourism sector in Central America and is second only to the Dominican Republic among the CAFTA-DR countries. Tourism is one of Costa Rica's most important economic sectors. Between 2001 and 2010 travel and tourism contributed from 3.4 to 5.6 billion US dollars per year to the economy, accounting for from 13 to 17 percent of the GDP (Figure B-4). International arrivals grew from 1.3 million in 2000 to 2.5 million in 2008. Although the number of international arrivals declined in 2009, the decline was relatively small (approximately 50,000 less arrivals than in 2008) and it appears that the arrivals in 2010 have exceeded those in 2008.

Tourist Origins. In 2009, 69 percent of the international arrivals arrived via air, 31 percent via land and less than one percent via sea. Forty-eight percent of the international arrivals came from North America. The second largest cohort (31 percent) arrived from Central America, some of whom may have been international tourists from other regions, but arrived to Costa Rica after visiting another Central American country. Thirteen percent arrived from Europe and six percent from European countries. Most of the international arrivals (77 percent) stated that the purpose of their trip was vacations.

Dominant Types of Tourism. Costa Rica has successfully positioned itself as a pre-eminent destination for nature-based adventure tourism. The country's main tourism attraction is its nature. Costa Rica has lovely beaches and a well managed national protected area system offering easy access and a very wide variety of experiences. Twenty-one percent of the country's land mass is in protected areas. Costa Rica's tourism has also benefited from the country's long-term political and economic stability.

Economic Impacts of Tourism. Costa Rica began promoting ecotourism in the mid-1980s as a way to stop deforestation and to generate needed foreign exchange. Since that time it has developed one of the world's most successful ecotourism industries and has been praised for its attention to conservation. Ecotourism has boosted Costa Rica's overall economic development and has brought employment opportunities to previously disadvantaged, rural populations. Rural community-based tourism is another popular tourism sub-segment in Costa Rica. A significant amount of these two sectors is small-scale projects that can be funded by local residents.

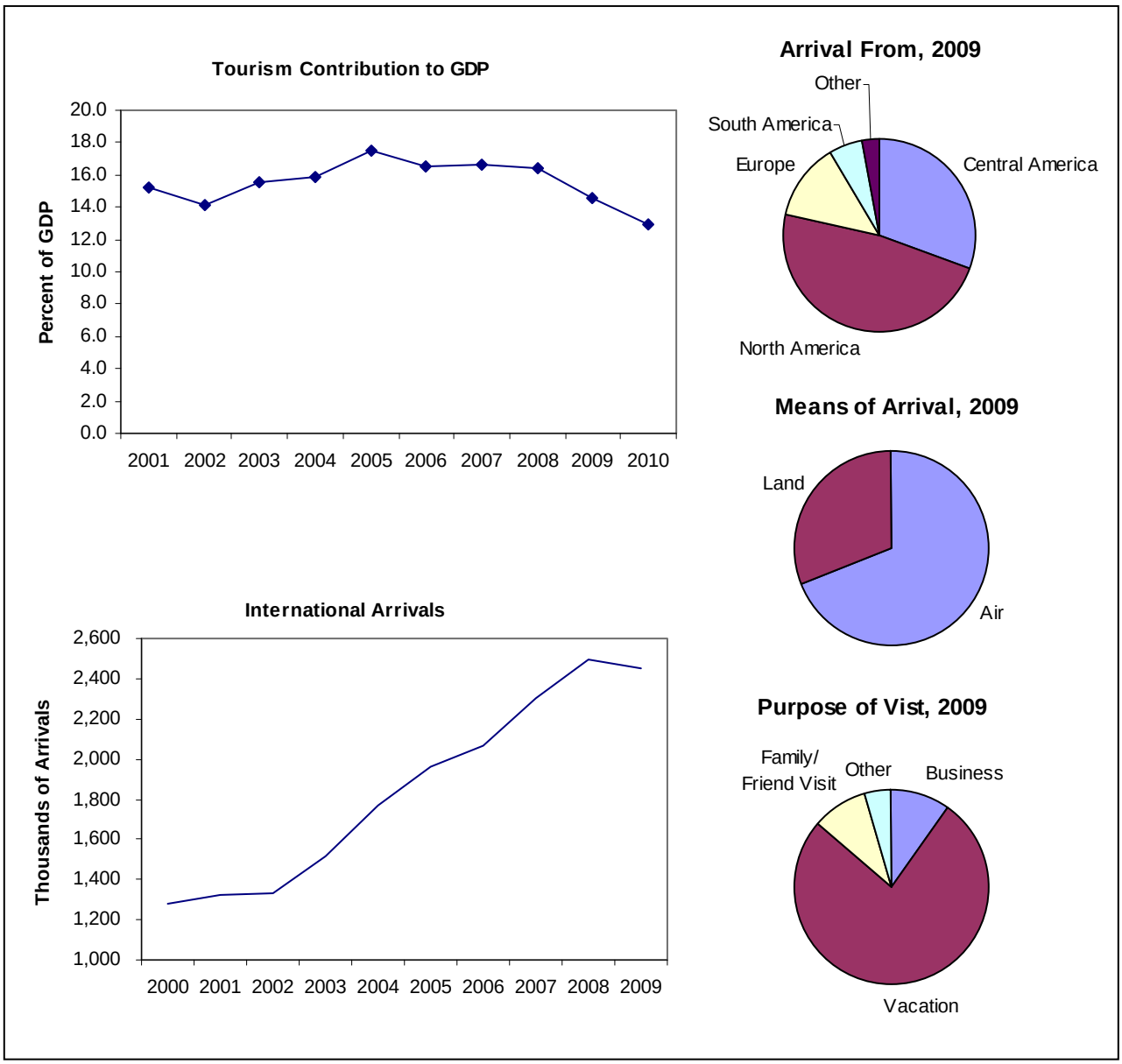
Tourism Institutions. The main Costa Rican institutions involved in tourism development and promotion are:

- The Costa Rican Tourism Board (Instituto Costarricense de Turismo [ICT]) was created in 1955 as an autonomous institution of the State, funded primarily by taxes on tourism. It is responsible for tourism development and regulation in Costa Rica, including such issues as transportation, infrastructure, foreign investment, promotion/advertising, and zoning.
- The Ministry of the Environment (Ministerio de Ambiente, Energía y Telecomunicaciones [MINAET]) is responsible for managing the protected areas system of the country. SINAC (Servicio Nacional de Areas de Conservacion), a dependency of the MINAET was created to manage more than one hundred protected areas that are divided into 11 Conservation Areas. They include all the national territory in addition to the protected areas, so that conservation is integrated into land use development and planning.
- The private sector counterpart to ICT is the National Chamber of Tourism (CANATUR), which represents the interests of the private tourism sector. Politically, it is the most powerful private

institution dealing with tourism, and observers claim that it tends to be oriented to the interests of hoteliers inclined towards mass tourism.

Other private sector institutions include the National Chamber of Tourist Micro-entrepreneurs (CANAMET), which promotes to small firms in the tourism sector the concept of environmentally friendly business practices and the Costa Rican Network of Private Preserves.

Figure B- 4: Tourism data for Costa Rica



Sources: WTTC and CCT

3.2 Dominican Republic

Economics. Dominican Republic has the largest tourism sector in the CAFTA-DR region. Between 2001 and 2010 travel and tourism contributed from 5.4 to 9.0 billion US dollars per year to the economy, accounting for from 16.9 to 23.5 percent of the GDP (Figure B-5). International arrivals were at 3.2 million in 2000, dropped to 3.1 million by 2002 but grew steadily to 4.3 million by 2008. Although the number of international arrivals declined in 2009, the decline was relatively small (less than an 8% drop) and 2008-2010 arrival data reported by CTO indicate that 2010 arrivals exceeded those in 2008.

Tourist Origins. In 2009, 87 percent of the international arrivals arrived via air and 13 percent arrived by sea, on cruise ships. The Dominican Republic is the only country in the CAFTA-DR region that has a significant portion of their arrivals coming via cruise ships. Forty-five percent of the international arrivals came from North America, 31 percent from Europe and 24 percent from other countries. Almost all of the international arrivals (95 percent) stated that the purpose of their trip was vacations, with only five percent identifying business or other as their purpose for traveling.

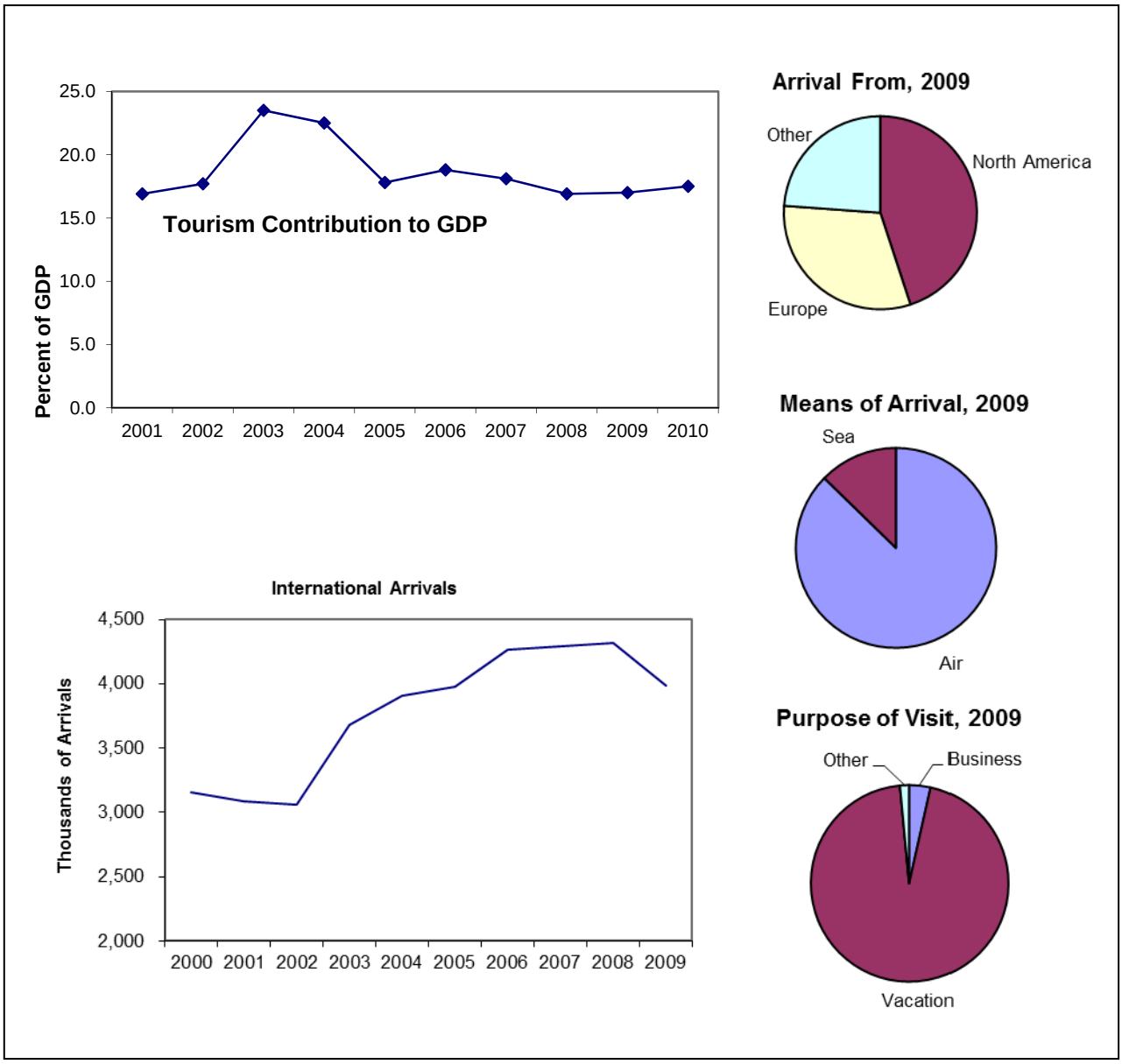
Dominant Types of Tourism. The Dominican Republic promotes six regions for tourism activities:

- The Central region is promoted for adventure holidays.
- The North Coast is one of the most diverse areas of the country, and is promoted for beach and coastal activities.
- The Northeast Coast, the Samana Bay region, is promoted as an ecotourism destination, famous for whales, rainforests, mountains, and waterfalls.
- The East Coast, Punta Cana/Bavaro, is the fastest growing tourist destination and is the location of Parque del Este, an important national park.
- The South Central region is the location of Santo Domingo and includes cultural and urban tourism opportunities.
- The Southwest region is high in biodiversity, especially of birds and reptiles. This is also the location of Barahona National Park and Pedernales, a small fishing village.

Tourism Institutions. The main Dominican Republic institutions involved in tourism development and promotion are:

- The Ministry of Tourism is the primary government entity responsible for tourism. Its mission is to promote sustainable tourism development in the Dominican Republic, through the development and regulation of policies, strategies and measures to stimulate investment in tourism, ensure the quality of management and promote community involvement in the actions of the sector.
- The Dominican Republic Tourist Board is responsible for promoting tourism to the DR and has offices in Miami, New York, and London.
- The Dominican Republic Sustainable Tourism Alliance's (DSTA) goal is to better equip and strengthen local small, medium-sized, and community-based tourism enterprises, and relevant tourism entities to independently sustain efforts. The DSTA focuses on public-private collaboration and outreach to new development partners at national, regional, and global levels.
- The Development Corporation of the Hotel Industry and Tourism Development (CORPHOTEL) conduct national activities aimed at developing the hotel industry.

Figure B- 5: Tourism data for Dominican Republic



Sources: WTTC and CCT

3.3 El Salvador

Economics. The economic importance of tourism in El Salvador is similar to that of Guatemala and Nicaragua. Between 2001 and 2010 travel and tourism contributed from 1.2 to 2.3 billion US dollars per year to the economy, accounting for from 6.3 to 10 percent of the GDP (Figure B-6). International arrivals fluctuated between 800 thousand and 889 thousand between 2000 and 2003, and then steadily grew to 1.72 million by 2007. The country experienced declines in international arrivals in 2008 and again in 2009, but recent data from WTTC indicate that the arrivals in 2010 returned to 2007 levels.

Tourist Origins. In 2009, only 39 percent of the international arrivals came via air, with 61 percent coming via land. There were no arrivals reported by sea. Sixty-two percent of the international arrivals came from other Central American Countries, which may explain the relatively high percentage of overland arrivals. El Salvador is a popular shopping destination for Central Americans. The second largest cohort of international arrivals came from North America (34 percent), with only four percent coming from other regions of the world.

Forty-two percent of the international arrivals stated that the purpose of their trip was to visit family and friends, the highest percentage for this purpose in the CAFTA-DR region. Thirty-eight percent identified vacations as the purpose of their trip. The remaining 20 percent identified business (15 percent) and other (5 percent) as the purposes of their trips.

Dominant Types of Tourism. El Salvador is promoting tourism in five broad areas:

- Sun and Beaches, promoting its 300 kilometers of Pacific coastline, with some areas of world class surfing.
- Archeology, exploring several Mayan and pre-Mayan archeological sites.
- Nature and Adventure, taking advantage of the forests, mountains and volcanos.
- Colonial History, with the Camino Real and 400 year-old Spanish Colonial architecture.

El Salvador is also a major shopping vacation destination for Central Americans. *Many of these tourists are e*xcursionists (visits that do not include an overnight stay). In 2006 222,000 excursionists visited El Salvador, a 24 percent increase over the previous year.

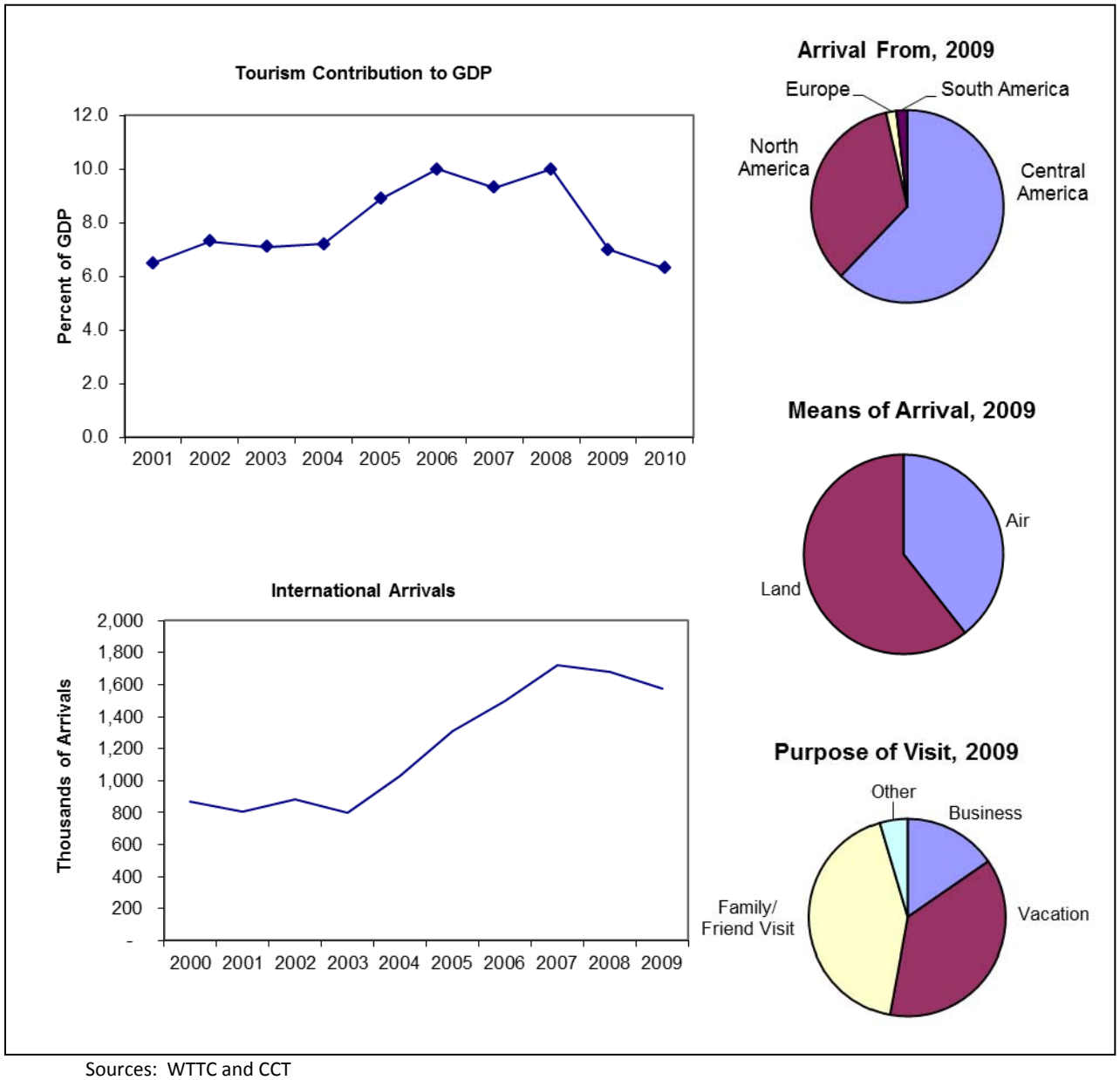
Local Tourism Promotion. The main El Salvador institutions involved in tourism development and promotion are:

- The Ministry of Tourism was formed in 2004. Its vision is that by 2014, tourism will be:
  - an instrument for revival and social well-being of all Salvadorans,
  - a force for conservation of natural resources, and
  - a major contributor to the economy and employment possibilities in the country.

  The ministry pursues this mission through implementation of the tourism law that includes incentives for investors.
- The Salvadoran Corporation of Tourism (CORSATUR), formed on July 25, 1996, is a government corporation attached to the Ministry of Tourism that coordinates inter-sector efforts that contribute to the transformation of the tourism sector into one of the main generating sources of employment and revenues. CORSATUR supports other institutions, public and private, in the promotion of the conservation of the natural, cultural, and historical values of the country with the purpose of transforming them into tourist attractions.
- The Salvadoran Chamber of Tourism (CASATUR) was founded in 1978 in support of tourism development in the country and to encourage and promote tourism to and within El Salvador.

He vision of the Chamber of Commerce is to make the tourism sector a major contributor to the national economy and to make El Salvador a world class tourism destination. It is a membership organization. Its members are private businesses in the tourism sector as well as several small tourism business associations.

Figure B- 6: Tourism data for El Salvador



Sources: WTTC and CCT

3.4 Guatemala

Economics. The economic importance of tourism in Guatemala is similar to that in El Salvador and Nicaragua. Between 2001 and 2010 travel and tourism contributed from 2.1 to 3.9 billion US dollars per year to the economy, which is more than that generated in El Salvador. But it accounts for a similar percentage of the GDP as in El Salvador, from 6.6 to 9.8 percent between 2001 and 2010 (Figure B-7). International arrivals grew steadily from 826 thousand in 2000 to 1.7 million in 2008. Like the other CAFTA-DR countries, it experienced a decline in 2009, but the decline was less than two percent, and arrivals appear to have recovered to 2008 levels in 2010.

Tourist Origins. In 2009, most international arrivals in the country came via land (66 percent). Twenty-nine percent came via air and only four percent via sea. Fifty percent of the international arrivals came from other Central American Countries, which may explain the relatively high percentage of overland arrivals, although clearly some overland arrivals are also international tourists that are arriving to Guatemala via land after visiting other Central American countries. The second largest cohort of international arrivals came from North America (34 percent), followed by Europe with 10 percent.

Only 37 percent of the international arrivals identified vacations as the purpose of their visit. The next most frequently stated purpose for travel was to visit family and friends (27 percent). Business was the stated purpose of 25 percent of the international visitors.

Dominant Types of Tourism. Tourists are attracted to Guatemala by the abundant biodiversity coupled with historical colonial cities, 28 registered Mayan sites, and 28 ethnic and indigenous communities that co-exist together. The Republic of Guatemala has a small Caribbean coast and a longer Pacific coast—both major focal points of the tourism industry. Guatemala promotes itself as a destination for wildlife/eco-tourism, cultural tourism/archaeology, adventure tourism, health tourism, coffee tours, religious tourism, beach and coastal activities, and fishing.

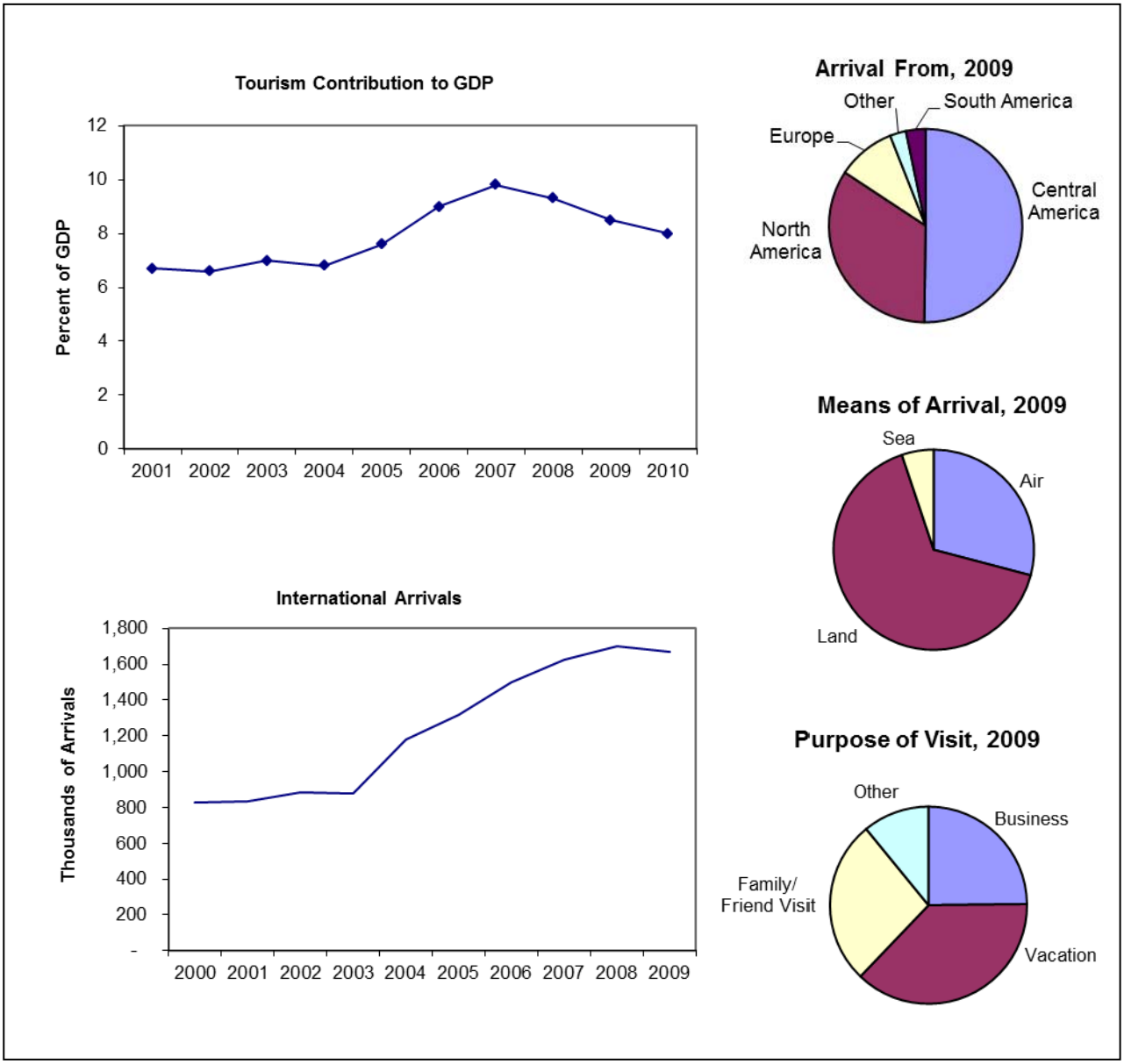
Local Tourism Promotion. Institutions involved in the tourism sector include:

- The Guatemalan Tourism Institute (INGUAT): A government institution in charge of promoting the development of the tourist industry in the country. Among its activities are the investigation, planning, promotion, protection, coordination, and control of tourism.
- The Chamber of Tourism (CAMTUR): A non-profit entity dedicated to the formation and training of human resources for tourism; organizing and furthering promotional activities; providing information on the industry and its affiliates; providing a network of national and international contacts; and representing the private tourism sector in national and foreign forums.
- Foundation for the Development of Guatemala (FUNDESA): A non-profit, private sector entity. Its purpose is to generate and implement development programs and projects. The Foundation created the Tourism Business Center (CETS) network that seeks to strengthen tourism as a sustainable economic and social development platform for Guatemala. These offices operate as business centers for small and medium-size tourism businesses and offer human resource training.
- Sustainable Tourism Commission (COMITURS): A commission established within the Guatemalan Non-Traditional Products Exporters' Association (AGEXPRONT) with the involvement of hotel entrepreneurs, NGOs managing tourism projects, the protected areas and reserve administrators, tourism operators, specialized consultants, and others. It facilitates the development of non-traditional, sustainable tourism projects based on the needs of

entrepreneurs and other groups. The Commission is in charge of co-managing the national and international cooperation funds and directing them towards tourism business projects.

- Invest in Guatemala: Guatemala's foreign investment promotion agency, which encourages investment in tourism development projects in Guatemala.

Figure B- 7: Tourism data for Guatemala



Sources: WTTC and CCT

3.5 Honduras

Economics. Tourism is a source of over ten percent of the GDP in Honduras. Between 2001 and 2010 travel and tourism contributed from 1.0 to 2.5 billion US dollars per year to the economy, accounting for from 8.9 to 15.3 of total GDP (Figure B-8). International arrivals doubled from 690 thousand in 2000 to 1.4 million in 2008. Like the other CAFTA-DR countries, it experienced a decline in 2009. In Honduras the decline was nearly 10 percent. Indications are that it is rebounding, but it is not clear if it has fully recovered to 2008 levels.

Tourist Origins. In 2009, international arrivals were relatively evenly distributed between air (45 percent) and land (51 percent with only 4 percent arriving via sea. Forty-six percent of the international arrivals came from other Central American Countries. The second largest cohort of international arrivals came from North America (39 percent), followed by Europe with 10 percent. Only 35 percent of the international arrivals identified vacations as the purpose of their visit, with nearly as many travelers reporting business as their purpose (32 percent). Twenty-eight percent of international arrivals reported the purpose of their trip as to visit family and friends.

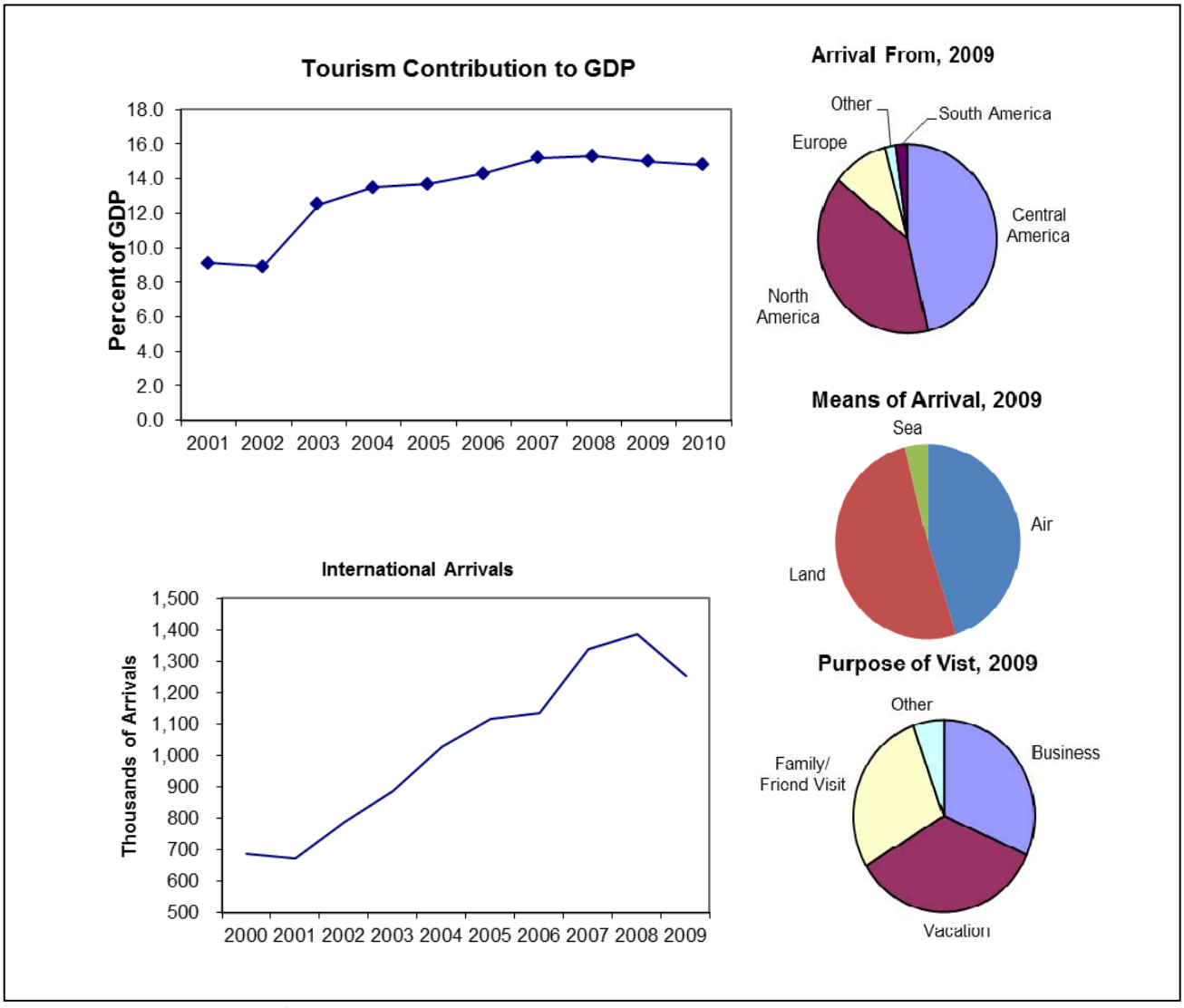
Dominant Types of Tourism. Honduras attracts tourists with a combination of spectacular nature, living culture and archaeological sites. Beautiful beaches, protected coral reefs, and a world heritage biosphere reserve are among the top tourist attractions. Honduras's major tourism activities and destinations include:

- Archaeology – The Mayan ruins of Copán are considered to be among the most impressive examples of pre-Columbian art in the world. One of the great centers of Mayan civilization, Copán was named a UNESCO heritage site in 1980.
- Beaches and Diving – The Bay Islands (Roatán, Guanaja, and Utila) in the Caribbean share access to the MBRS, as well as white-sand beaches, jungle canopy tours, pirate cave exploration, nature hikes, and visits to indigenous communities. Diving and snorkeling are popular tourist activities in this area.
- Nature and Adventure – Honduras has declared 107 nature reserves and these are meant to be eco-tourism destinations. Major national parks include Celaque National Park, Cuero y Salado Wildlife Reserve, Pico Bonito Cloud Forest, and La Mosquitia. The Biosphere of the Platano River is a UNESCO World Heritage Site. Cayos Cochinos Marine Preserve is a network of islands and small keys in the Caribbean. Activities include white-water rafting (class IV rapids), kayaking, hiking in rain forests, birding, boat trips through mango swamps, rivers and wetlands.
- Colonial Heritage – Honduras's Spanish colonial past can be seen in the churches of Tegucigalpa, in the historical town center of Comayagua (a former capital) and in the mountain towns of Gracias and Santa Rosa de Copan.
- Living Cultures – The Garifunas, an ethnic group that has preserved its own language and culture, can be visited in their villages along the Atlantic Coast and the Bay Islands, where visitors experience their cuisine, dances and music.
- Cruise Lines Service – Cruise lines are investing in Honduras. Royal Caribbean spent $20 million to expand the cruise terminal at Coxen Hole, Roatán's main town, including a shopping mall and a two-berth Terminal. The terminal opened in 2008. Carnival invested approximately $50 million for a two-berth, mega-ship terminal on Roatán, with a welcome center including retail shops, restaurants, bars, a lagoon, and nature trails.

Local Tourism Promotion The institutional framework for tourism includes:

- The Secretary of Tourism (SETUR) was created in 1998. SETUR is the official government entity responsible for establishing and implementing tourism policy at a national level. Outside of the office of the Secretary, however, SETUR has not staff. It implements its programs through the Honduran Institute of Tourism (IHT), which was established in 1993 as a public, autonomous agency to stimulate and promote tourism development. SETUR and IHT formulate, evaluate and implement policies to promote tourism in the country.
- The National Chamber of Tourism in Honduras (Cámara Nacional de Turismo de Honduras [CANATURH]) was established in 1996. It is a private sector association that promotes tourism development in the private sector and represent private sector tourism operators in national, regional and international programs to promote tourism. CANATURH serves as a private counterpart to SETUR and IHT. It is a membership organization and has several departmental chapters that actively promote tourism at the local level.

Figure B- 8: Tourism data for Honduras



Sources: WTTC and CCT

3.6 Nicaragua

Economics. Nicaragua has the lowest level of income from tourism in the CAFTA-DR region. Nonetheless, tourism is an important sector in the economy. Between 2001 and 2010 travel and tourism contributed from 0.3 to 0.7 billion US dollars per year to the economy. Although this income is less than in other countries, it still accounted for from 6.5 to 10.4 percent of total GDP (Figure B-9), similar to the levels in El Salvador and Guatemala. International arrivals hovered at around 580 thousand from 2000 through 2002, but then steadily grew to 1 million by 2008. The decline in 2009 was less than two percent, and it appears that the arrivals have recovered to 2008 levels in 2010.

Tourist Origins. Most international arrivals came overland in 2009 (59 percent). Thirty-eight percent came via air and only three percent via sea. As in El Salvador, most of the international arrivals in Nicaragua came from other Central American Countries (61 percent). The second largest cohort of international arrivals came from North America (27 percent), followed by Europe with 7 percent. Fifty-two percent of the international arrivals identified vacations as the purpose of their visit. The second most common purpose was to visit family and friends (28 percent), followed by business travel (15 percent).

Dominant Types of Tourism. Nicaragua has three main eco-regions: Pacific, Central, and Atlantic. The Pacific region is home to volcanoes, lakes, tropical forests, beaches and mangrove systems. The Central region is home to mountains, rivers and agricultural areas. The Atlantic region contains rainforests, marine lagoons, mangrove systems and coral reefs. Nicaragua's main attractions include:

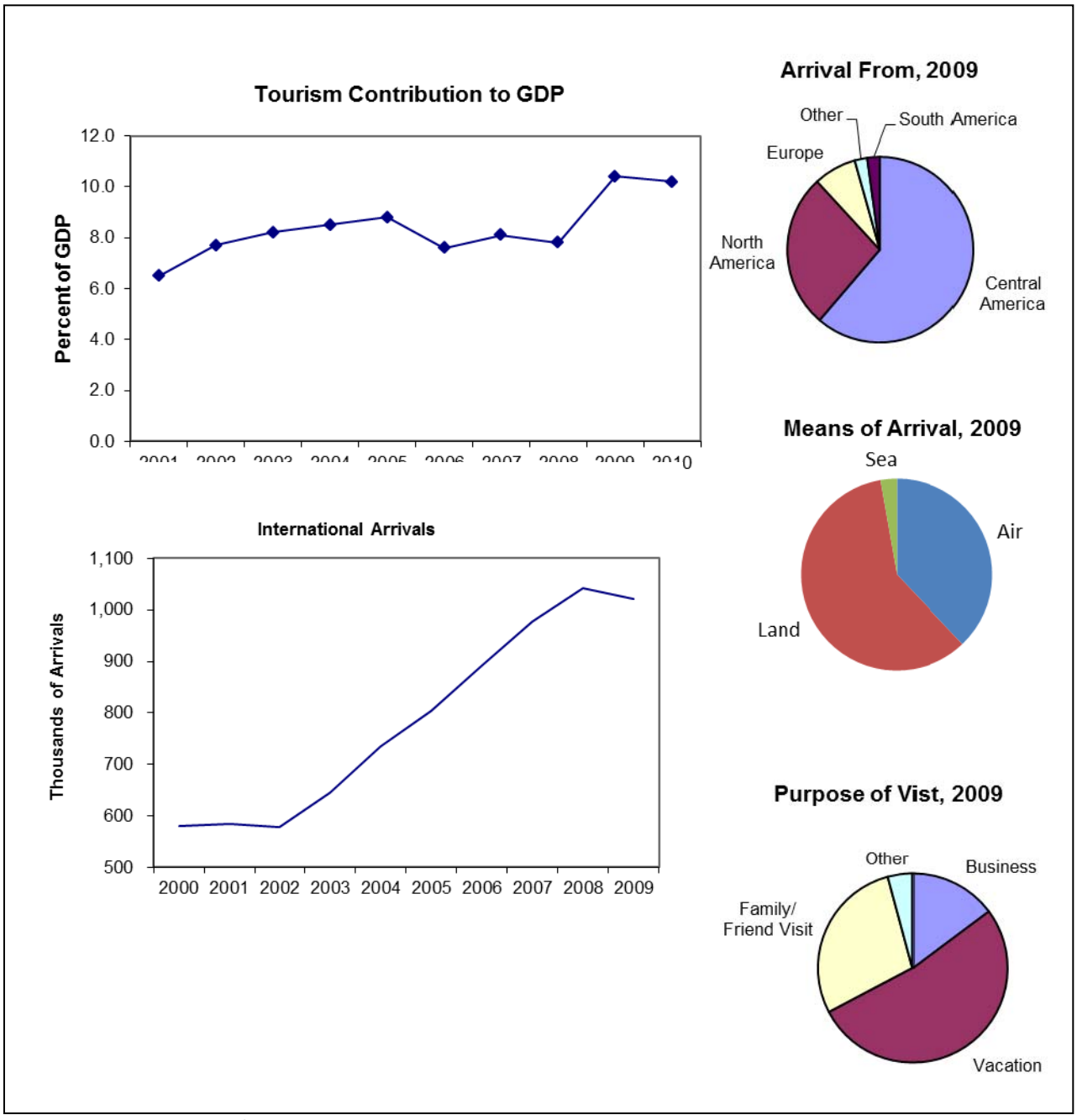
- Seventy-one protected areas, including three national parks, sanctuaries for wildlife and endangered species, and abundant biodiversity resources. Coastal Resorts and Islands – Masachapa, Pochomil, Montelimar, Bluefields, Corn Islands (Islas del Maiz) El Coco, Marsella, Ocotal, San Juan del Sur and many others.
- Volcanoes and Lakes – Nicaragua is known as "the land of lakes and volcanoes." Many of the volcanoes are popular tourist destinations and offer hiking, climbing, camping, and swimming.
- Watersports -Beaches on the Pacific coast and Caribbean coasts offer, bathing & surfing.
- Rural/community-based tourism - offers tourists the opportunity to visit a coffee farm, learn about coffee making, and to stay overnight on the farm and explore the area with a community guide.
- Other tourism activities - Fishing, Baseball, Hiking in the Mombacho volcano Natural Reserve, Kayaking in Ometepe Island, andHot air balloon rides over the volcanic craters. Archipelago of 365 islands knows as the Islets of Granada, that were formed when the Mombacho volcano erupted.

Local Tourism Promotion. The institutional framework for tourism includes:

- The Nicaraguan Tourism Institute (Instituto Nicaraguense de Turismo [INTUR]) was created in 1998. Its mission is to promote sustainable development in tourism as a priority sector in the economy of Nicaragua. It does this by balancing the human, environmental and economic performance; increasing the flow of tourists; increasing the competitiveness of enterprises, with special emphasis on small and medium enterprises tourism. All of these activities contribute to reducing poverty and improving the quality of life of Nicaraguans.
- The National Nicaraguan Chamber of Tourism (Cámara Nacional de Turismo de Nicaragua [CANATUR]) was established in 1976 to promote tourism as an important source of economic development. CANATUR is a membership organization representing private companies in all

facets of the tourism sector in Nicaragua. Its mission is to represent the interests of the private sector in the promotion of sustainable tourism.

Figure B- 9: Tourism data for Nicaragua



Sources: WTTC and CCT

APPENDIX C. REQUIREMENTS AND STANDARDS: CAFTA-DR COUNTRIES, OTHER COUNTRIES AND INTERNATIONAL ORGANIZATIONS

This Appendix summarizes a range of quantitative benchmarks for specific environmental requirements of new tourism projects beyond the requirement to develop an EIA and mitigate and avoid adverse environmental impacts. It does not attempt to capture non-quantitative practice standards. The benchmark standards contained within this Appendix include ambient quality and sector-specific performance standards from CAFTA-DR countries, the United States, other foreign governments, and international organizations. CAFTA-DR country EIA reviewers and preparers might use this information in the absence of such standards or to assess the validity and the significance of impacts described within EIAs.

The Appendix includes:

1. Introduction to Environmental Laws, Standards, and Requirements
2. Ambient Standards for Air and Water Quality
3. Hotel and Resort Performance Standards
   - 3.1 Water Discharge/Effluent Limits
   - 3.2 Storm Water Runoff
   - 3.3 Air Emission Limits
   - 3.4 Solid and/or Hazardous Waste
4. Marine and Other Vessel Performance Standards
   - 4.1 Water Discharge/Effluent Limits
   - 4.2 Air Emission Limits
   - 4.3 Solid and/or Hazardous Waste
   - 4.4 Ballast Water
5. Biodiversity and Ecosystems
   - 5.1 Coral Reefs
   - 5.2 Specially Protected Areas
   - 5.3 Invasive Species
6. International Treaties and Agreements Ratified/Signed
7. Website References

Section 1 provides a general introduction on the role of environmental regulatory approaches to reduce or prevent pollution directly or indirectly. Section 2 summarizes ambient freshwater, drinking water, salt water/marine water quality and air quality standards for the CAFTA-DR countries. Sections 3/4/5 provide an overview of performance standards applicable to tourism-related projects for hotels/resorts, coastal and marine projects and for related activities and concessions respectively, summarizing in turn, water discharge/effluent limits; supplemental information about water discharge/effluent limits in the United States; storm water runoff / discharge effluent limits; air emission limits; and solid waste and/or hazardous waste disposal. Section 6 summarizes international treaties and agreements ratified or signed by CAFTA DR Countries and Section 7 provides links to relevant websites. To the extent possible, footnotes provide necessary caveats but it is strongly recommended that if this information is used, the reviewer or preparer confirm it is up to date and appropriate for the circumstances.

1 INTRODUCTION TO ENVIRONMENTAL LAWS, STANDARDS, AND REQUIREMENTS

There are many approaches to managing environmental problems (see Figure C-1). Some approaches are purely voluntary – that is, they encourage and assist change but do not require it. Other approaches are regulatory – that is, they require change or specific performance expectations. At the heart of regulatory approaches are environmental requirements-specific practices and procedures required by law to directly or indirectly reduce or prevent pollution. Figure C-2 lists some examples of the types of requirements and standards typically used for environmental management, including:

- Ambient Standards
- Performance Standards (Emissions and Effluents).
- Technology Standards
- Practice Standards
- Information Requirements
- Product or Use Bans

While wholly regulatory (command-and-control) approaches generally have the most extensive requirements of all the management options, most of the other options, including market-based economic incentive, labeling, and liability-based approaches, introduce some form of requirements.

Requirements may be general or facility/activity specific. General requirements are most frequently implemented in the form of (1) laws, (2) regulations, or (3) general permits or licenses that apply to a specific class of facilities. General requirements may apply directly to a group of facilities or they may serve as a basis for developing facility-specific requirements. Facility-specific requirements are usually implemented in the form of permits or licenses, or, in the case of environmental impact assessment, may become legally binding commitments if they are a) within the environmental impact assessment itself, b) within a separate environmental management plan or monitoring/mitigation plan, or c) incorporated into a separate contract.

Appendix C benchmarks only quantitative limits in a highly summarized format as a useful point of reference. For additional background on enforceable requirements, see the International Network for Environmental Compliance and Enforcement Website: http://www.inece.org and specifically the resource library www.inece.org/library/principles.html. Others references for more details behind the limits summarized in the Appendix are provided in the last section.

Figure C- 1: Approaches to environmental management

Voluntary Approaches

Voluntary approaches encourage or assist, but do not require, change. Voluntary approaches include public education, technical assistance, and the promotion of environmental leadership by industry and nongovernment organizations. Voluntary approaches may also include some management of natural resources (e.g., lakes, natural areas, ground water) to maintain environmental quality.

Regulatory (Command-and-Control) Approaches

In command-and-control approaches, the government prescribes the desired changes through detailed requirements and then promotes and enforces compliance with these requirements. Figure C-2 describes types of requirements typically used in command-and-control approaches.

Market-based/Economic Incentive Approaches

Market-based/economic incentive approaches use market forces to achieve desired behavior changes. These approaches can be independent of or build upon and supplement command-and-control approaches. For example, introducing market forces into a command-and-control approach can encourage greater pollution prevention and more economic solutions to problems. Market-based/economic incentive approaches include:

- Fee systems. In this approach, the government taxes emissions, effluents, and other environmental releases.
- Tradeable permits. In this approach, companies trade permitted emission rights with other companies.
- Offset approaches. These approaches allow a facility to propose various approaches to meeting an environmental goal. For example, a facility may be allowed to emit greater quantities of a substance from one of its operations if the facility offsets this increase by reducing emissions at another of its operations.
- Auctions. In this approach, the government auctions limited rights to produce or release certain environmental pollutants.
- Environmental labeling/public disclosure. In this approach, manufacturers are required to label products so that consumers can be aware of the environmental impacts of the products. Consumers can then choose which products to purchase based on the products' environmental performance.

Risk-based Approaches

Risk-based approaches to environmental management are relatively new. These approaches establish priorities for change based on the potential for reducing the risks posed to public health and/or the environment.

Pollution Prevention

The goal of pollution prevention approaches is to prevent pollution by reducing or eliminating generation of pollution at the source. The changes needed to prevent pollution can be required, e.g., as part of a command-and-control approach, or encouraged as voluntary actions.

Liability

Some environmental management approaches are based on laws that make individuals or businesses liable for the results of certain actions or for damages they cause to another individual or business or to their property. Liability systems do not have explicit requirements. However, implicit requirements often develop as cases are brought to court and patterns are established about what activities justify which consequences. To be effective, liability systems generally need some enforcement by the government, nongovernment organizations, or individuals to gather evidence and develop legal cases. Examples of liability-based environmental management systems include nuisance laws, laws requiring compensation for victims of environmental damage, and laws requiring correction of environmental problems caused by improper disposal of hazardous waste. Liability systems reduce or prevent pollution only to the extent that individuals or facilities fear the consequences of potential legal action against them.

Source: Wasserman, Cheryl et. al., Principles of Environmental Enforcement, U.S. Environmental Protection Agency, February 19, 1992.

Figure C- 2: Examples of environmental requirements

Ambient Standards

Ambient standards (also called media quality standards) are goals for the quality of the ambient environment (e.g., air, water). Ambient standards are usually written in units of concentration (e.g., the level of nitrogen dioxide in the air cannot exceed 0.053 parts per million). In the U.S., ambient standards are used as environmental quality goals and to plan the level of emissions from individual sources that can be accommodated while still meeting the area wide goal. Ambient standards may also be used as triggers, e.g., when the standard is exceeded, monitoring or enforcement efforts are increased. Enforcement of ambient standards usually requires relating an ambient measurement to emissions or activities at a specific facility. This can be difficult.

Performance Standards (Emissions and Effluents)

These standards are widely used for regulations, permits, and monitoring requirements. Performance standards limit the amount or rate of particular chemicals or discharges that a facility or vessel can release into the environment in a given period of time. Performance standards provide flexibility because they allow sources to choose which technologies they will use to meet the standards. Often such standards are based on the output that can be achieved using the best available control technology. Some requirements introduce additional flexibility by allowing a source with multiple emissions to vary its emissions from each stack as long as the total sum of the emissions does not exceed the permitted total. Compliance with emission standards is measured by sampling and monitoring. Depending on the kind of instruments required, compliance can be difficult and/or expensive to monitor.

Technology Standards

These standards require the regulated community to use a particular type of technology (e.g., the "best available technology") to control and/or monitor emissions. Technology standards are particularly appropriate when the equipment is known to perform well under the range of conditions generally experienced by sources in the community. It is relatively easy for inspectors to determine whether sources are in compliance with technology standards: the approved equipment must be in place and operating properly. It may be difficult, however, to ensure that the equipment is operating properly over a long period of time. Technology standards can inhibit technological innovation and pollution prevention. In the U.S. many air performance standards are based on the performance of a particular technology or technologies, but sources are not required to actually use that technology to meet the performance standards.

Practice Standards

These standards require or prohibit certain work activities that have significant environmental impacts. For example, a standard might prohibit carrying hazardous liquids in uncovered buckets. Like technology standards, it is easy for program officials to inspect for compliance and take action against noncomplying sources, but difficult to ensure ongoing compliance.

Information Requirements

These requirements are different from the standards described above in that they require a source of potential pollution (e.g., a pesticide manufacturer or facilities involved in generating, transporting, storing, treating, and disposing of hazardous waste) to develop and submit information to the government. Sources generating pollution may be required to monitor, report on, and maintain records of the level of pollution generated and whether or not it exceeds performance standards. Information requirements are often used when the potential pollution source is a product such as a new chemical or pesticide, rather than a waste. For example, a manufacturer may be required to test and report on a product's potential to cause harm if released into the environment.

Product or Use Bans

A ban may prohibit a product outright (e.g., ban the manufacture, sale, and/or use of a product) or may prohibit particular uses of a product.

Source: Wasserman, Cheryl et. al., Principles of Environmental Enforcement, U.S. Environmental Protection Agency, February 19, 1992.

2 AMBIENT STANDARDS FOR AIR AND WATER QUALITY

The following Tables summarize and compare standards across countries and institutions for:

- Freshwater Quality Guidelines and Standards, Table C-1
- Drinking Water Quality Guidelines and Standards, Table C-2
- Salt Water Quality Guidelines and Standards, Table C-3
- Water Quality Benchmarks for Aquatic Life and Sediment, Table C-4
- Water Quality Standards for Puerto Rico and Central America, Table C-5
- Ambient Air Quality Guidelines and Standards, Table C-6

Ambient standards are limits for concentrations of pollutants in the air, water or land which defined to protect public and ecosystem health and welfare (i.e. productivity/sustainability). Ambient standards serve both as goals for managing these resources, but also as requirements for what level of impact may be allowed or judged to be significant. Usually sources of air pollution cannot exceed ambient standards at their fence line. In the case of water discharges there is a limited area or volume called a mixing zone within which water quality standards may be exceeded –so long as acutely toxic conditions are prevented. These mixing zones define where initial (but rapid and complete) dilution of a discharge may take place. Water quality criteria must be met at the edge of a mixing zone.

Table C-1: Freshwater quality guidelines and standards

Pollutant	United States		European Union	
	National Recommended Water Quality Criteria[2]		Annual Average Value (Inland surface Waters) (µg/l)	Max Allowable Concentration (Inland surface Waters) (µg/l)
	Maximum Concentration (CMC) (µg/l)	Continuous Concentration (CCC) (µg/l)		
Alachlor			0.3	0.7
Anthracene			0.1	0.4
Arsenic	340	150		
Atrazine			0.6	2.0
Benzene			10	50
Benzo(a)pyrene			0.05	0.1
Brominated diphenylether			0.0005	N/A
Cadmium	2	0.25	≤ 0.08 (Class 1)[3] 0.08 (Class 2) 0.09 (Class 3) 0.15 (Class 4) 0.25 (Class 5)	≤ 0.45 (Class 1) 0.45 (Class 2) 0.09 (Class 3) 0.15 (Class 4) 0.25 (Class 5)
C 10-13 Chloralkanes			0.4	1.4
Chlordane	2.4	0.0043		
Chlorfenvinphos			0.1	0.3
Chloride	860,000	230,000		
Chromium (III)	570	74		
Chromium (VI)	16	11		
Chlorpyrifos (Chlorpyrifos-ethyl)			0.03	0.1
Cyanide	22	5.2		
DDT total			0.025	N/A
Para-para-DDT			0.01	N/A
1,2-Dichloroethane			10	N/A
Dichloromethane			20	N/A
Dieldrin	0.24	0.056	∑=0.01 [4]	N/A
Di(2-ethylexyl)-phthalate (DEPH)			1.3	N/A
Diuron			0.2	1.8
alpha-Endosulfan	0.22	0.056	0.005	0.01
beta-Endosulfan	0.22	0.056	0.005	0.01
Endrin	0.086	0.036	∑=0.01[5]	N/A
Fluoranthene			20	N/A
Heptachlor	0.52	0.0038		

[2] In the United States, the federal government prepares recommended water quality criteria to provide for the protection and propagation of fish, shellfish, and wildlife and for recreation in and on the water but it is up to the states, in the first instance, to adopt binding water quality criteria based on use categories.
[3] For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/l,Class 2: 40 to < 50 mg CaCO3/l, Class 3: 50 to < 100 mg CaCO3/l, Class 4: 100 to < 200 mg CaCO3/l and Class 5: ≥ 200 mg CaCO3/l).
[4] Sum for cyclodiene pesticides which include: Aldrin, Dieldrin, Endrin, Isodrin
[5] Sum for cyclodiene pesticides which include: Aldrin, Dieldrin, Endrin, Isodrin

Pollutant	United States		European Union	
	National Recommended Water Quality Criteria[2]		Annual Average Value (Inland surface Waters) (µg/l)	Max Allowable Concentration (Inland surface Waters) (µg/l)
	Maximum Concentration (CMC) (µg/l)	Continuous Concentration (CCC) (µg/l)		
Heptachlor Epoxide	0.52	0.0038		
Hexachloro-benzene			0.01	0.05
Hexachloro-butadiene			0.1	0.6
Hexachloro-cyclohexane			0.02	0.04
Isoproturon			0.3	1.0
Lead	65	2.5	7.2	N/A
Mercury	1.4	0.77	0.05	0.07
Naphthalene			2.4	N/A
Nickel	470	52	20	N/A
Nonylphenol (4-Nonylphenol)			0.3	2.0
Octylphenol			0.1	N/A
Pentachloro-benzene			0.007	N/A
Pentachlorophenol	19	15	0.4	1.0
Polychlorinated Biphenyls (PCBs)		0.014		
Selenium		5		
Simazine			1.0	4.0
Silver	3.2			
Sulphate			129.75 mg/l	4,200 mg/l
Tetrachloroethylene			10.0	N/A
Trichloroethylene			10	N/A
Toxaphene	0.73	0.0002		
Tributyltin compounds			0.0002	0.0015
Trichloro-benzenes			0.4	N/A
Trichloro-methane			2.5	N/A
Trifluralin			0.03	N/A
Zinc	120	120		

Sources: US: http://www.epa.gov/waterscience/criteria/wqctable/index.html#cmc
EU: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:348:0084:0097:EN:PDF

Table C- 2: Drinking water quality guidelines and standards

Pollutant	United States		Canada	European Community	Czech Republic	World Health Organization
	Maximum Contaminant Level Goal	Maximum Contaminant Level	Maximum Acceptable Concentration	Parametric Value	Parametric Value	Guideline Value
Acrylamide				0.1 µg/l	0.1 µg/l	
Ammonium				0.50 mg/l	0.50 mg/l	
Aluminum			0.1/0.2 mg/l (100-200 µg/l)	200 µg/l	200 µg/l	
Antimony	0.006 mg/l (6 µg/l)	0.006 mg/l	0.006 (6 µg/l)	5.0 µg/l	5.0 µg/l	
Arsenic	0	0.01 mg/l	0.1 mg/l (10 µg/l)	10 µg/l	10 µg/l	10 µg/l
Asbestos	7 million fibers/liter	7 million fibers/liter				
Barium	3 mg/l (2000 µg/l)	2 mg/l (2000 µg/l)	1 mg/l (1000 µg/l)			
Benzene			0.005 mg/l (5 µg/l)	1.0 µg/l	1.0 µg/l	
Benzo(a)pyrene			0.00001 mg/l (0.01 µg/l)	0.010 µg/l	0.010 µg/l	
Beryllium	0.004 mg/l (4 µg/l)	0.004 mg/l (4 µg/l)				
Boron			5 mg/l (5000 µg/l)	1.0 mg/l	1.0 mg/l	
Bromate	0	0.010 mg/l (10 µg/l)	0.01 mg/l 0.02 (10 µg/l)	10 µg/l	10 µg/l	
Bromodichloro-methane (BDCM)			0.016 mg/l (16 µg/l)	100 µg/l[6]		0.06 mg/l (60 µg/l)
Cadmium	0.005 mg/l (5 µg/l)	0.005 mg/l (5 µg/l)	0.005 mg/l (5 µg/l)	5.0 µg/l	5.0 µg/l	
Chlorate			1 mg/l (1000 µg/l)			
Chloride				250 mg/l	100 mg/l	
Clostridium perfringens				0 number/ 100 ml	0 number/ 100 ml	
Conductivity				2 500 µS cm-1 at 20 C	2 500 µS cm-1 at 20 C	
Chlorite	0.8 mg/l (800 µg/l)	1.0 mg/l (1000 µg/l)	1 mg/l (1000 µg/l)		200 µg/l	
Chromium (total)	0.1 mg/l 0.2 (100 µg/l)	0.1 mg/l (100 µg/l)	0.05 mg/l (50 µg/l)	50 µg/l	50 µg/l	0.05 mg/l (50 µg/l)
Copper	1.3 mg/l	1.3 mg/l		2.0 mg/l	1,0 mg/l	2.0 mg/l
Cyanide (as free	0.2 mg/l	0.2 mg/l	0.2 mg/l	50 µg/l	50 µg/l	

[6] Sum of concentrations of specified compounds: chloroform, bromoform, dibromochloromethane, bromodichloromethane

Pollutant	United States		Canada	European Community	Czech Republic	World Health Organization
	Maximum Contaminant Level Goal	Maximum Contaminant Level	Maximum Acceptable Concentration	Parametric Value	Parametric Value	Guideline Value
cyanide)	(200 µg/l)	(200 µg/l)	(200 µg/l)			
Cyanobacterial toxins -- microcystin-LR			0.0015 mg/l (1.5 µg/l)		1 µg/l	
1,2-dichloroethane				3.0 µg/l	3.0 µg/l	
Epichlorohydrin				0.10 µg/l	0.10 µg/	
Fluoride	4 mg/l	4 mg/l	1.5 mg/l	1.5 mg/l	1.5 mg/l	1.5 mg/l
Iron				200 µg/l	200 µg/l	
Lead	0	0.015 mg/l (15 µg/l)	0.01 mg/l (10 µg/l)	10 µg/l	10 µg/l	
Manganese				50 µg/l	50 µg/l	
Mercury (inorganic)	0.03 mg/l 0.04 (2 µg/l)	0.002 mg/l (2 µg/l)	0.01 mg/l (1 µg/l)	1.0 µg/l	1.0 µg/l	
Nickel				20 µg/l	20 µg/l	0.07 mg/l (70 µg/l)
Nitrate (measured as Nitrogen)	10 mg/l	10 mg/l	45 mg/l	50 mg/l	50 mg/l	50 mg/l
Nitrite (measured as Nitrogen)	1 mg/l	1 mg/l	3.2 mg/l	0.50 mg/l	0.50 mg/l	0.2 mg/l
Pesticides				0.10 µg/l	0.10 µg/l	
Pesticides - Total				0.50 µg/l	0.50 µg/l	
Polycyclic aromatic hydrocarbons				0.10 µg/l	0.10 µg/l	
Selenium	0.05 mg/l (50 µg/l)	0.05 mg/l (50 µg/l)	0.01 mg/l (10 µg/l)	10 µg/l	10 µg/l	0.01 mg/l (10 µg/l)
Sulfate				250 mg/l	250 mg/l	
Sodium				200 mg/l	200 mg/l	
Tetrachloroethene and Trichloroethene				10 µg/l	10 µg/l	0.07 mg/l (70 µg/l)
Thallium	0.0005 mg/l (0.5 µg/l)	0.002 mg/l (2 µg/l)				
Trihalomethanes (total)	N/A	0.080 mg/l (80 µg/l)		100 µg/l	100 µg/l	
Vinyl Chloride				0.50 µg/l	0.50 µg/l	
pH			6.5-8.5	6.5-9.5	6.5-9.5	

Sources: US Drinking Water Standards: http://www.epa.gov/ogwdw000/contaminants/index.html
WHO Guidelines for Drinking-Water Quality p.186, http://www.who.int/water_sanitation_health/dwq/fulltext.pdf

Table C- 3: Salt water quality guidelines and standards

Pollutant	United States	
	Maximum Concentration (CMC) (µg/l)	Continuous Concentration (CCC) (µg/l)
Alachlor		
Aldrin	1.3	
Anthracene		
Arsenic	69	36
Atrazine		
Benzene		
Benzo(a)pyrene		
Brominated diphenylether		
Cadmium	40	8.8
C 10-13 Chloralkanes		
Chlordane	.09	.004
Chlorfenvinphos		
Chloride		
Chromium (III)		
Chromium (VI)	1100	50
Copper	4.8	3.1
Cyanide	1	1
4, 4- DDT	.13	.001
Para-para-DDT		
1,2-Dichloroethane		
Dichloromethane		
Dieldrin	.71	.0019
Di(2-ethylexyl)-phthalate (DEPH)		
Diuron		
alpha-Endosulfan	.034	.0087
beta-Endosulfan	.034	.0087
Endrin	.037	.0023
Fluoranthene		
Gamma-BHC (Lindane)	.16	
Heptachlor	.053	.0036
Heptachlor Epoxide	.053	.0036
Hexachloro-benzene		
Hexachloro-butadiene		
Hexachloro-cyclohexane		
Isoproturon		
Lead	210	8.1
Mercury	1.8	.94
Naphthalene		
Nickel	74	8.2
Nonylphenol (4-Nonylphenol)		
Octylphenol		
Pentachloro-benzene		
Pentachlorophenol	13	7.9
Polychlorinated Biphenyls (PCBs)		.03

Pollutant	United States	
	Maximum Concentration (CMC) (µg/l)	Continuous Concentration (CCC) (µg/l)
Selenium	290	71
Simazine		
Silver	1.9	
Sulphate		
Tetrachloroethylene		
Trichloroethylene		
Toxaphene	.21	.0002
Tributyltin compounds		
Trichloro-benzenes		
Trichloro-methane		
Trifluralin		
Zinc	90	81

Source: US Salt Water Quality Standards http://water.epa.gov/scitech/swguidance/standards/current/upload/nrwqc-2009.pdf

Table C- 4: United States water quality benchmarks for aquatic life and sediment

	Aquatic Life		Sediment	
Chemical	**Acute Benchmark (µg/L)**	**Chronic Benchmark (µg/L)**	**Acute Benchmark (µg/L)**	**Chronic Benchmark (µg/L)**
Metals, µg/L				
Nickel	74	8.2	51.6	20.9
Vanadium		50	--	57
Mixtures, µg/L				
Total Petroleum Hydrocarbons GRO	None	None	None	None
Total Petroleum Hydrocarbons DRO	None	None	None	None
Oil Range Organics ORO	None	None	None	None
PAH Mixtures (Oil-Related Organic Compounds), µg/L**				
PAH Mixtures	see NOTE	see NOTE	See NOTE	See NOTE
Benzene	27,000	5,300	3,360,000	660,000
Cyclohexane	1,900	374	4,000,000	786,000
Ethylbenzene	4,020	790	4,930,000	970,000
Isopropylbenzene	2,140	420	5,750,000	1,130,000
Total xylene	3,560	700	4,980,000	980,000
Methylcyclohexane	463	91.0	4,960,000	976,000
Toluene	8,140	1,600	4,120,000	810,000
Naphthalene	803	193	1,600,000	385,000
C1-Naphthalenes	340	81.7	1,850,000	444,000
C2-Naphthalenes	126	30.2	2,120,000	510,000
C3-Naphthalenes	46.1	11.1	2,420,000	581,000
C4-Naphthalenes	16.9	4.05	2,730,000	657,000
Acenaphthylene	1,280	307	1,880,000	452,000
Acenaphthene	232	55.8	2,040,000	491,000
Fluorene	164	39.3	2,240,000	538,000
C1-Fluorenes	58.1	14.0	2,540,000	611,000
C2-Fluorenes	22.0	5.30	2,850,000	686,000
C3-Fluorenes	7.99	1.92	3,200,000	769,000
Phenanthrene	79.7	19.1	2,480,000	596,000
Anthracene	86.1	20.7	2,470,000	594,000
C1-Phenanthrenes#	31.0	7.44	2,790,000	670,000
C2-Phenanthrenes#	13.3	3.20	3,100,000	746,000
C3-Phenanthrenes#	5.24	1.26	3,450,000	829,000
C4-Phenanthrenes#	2.33	0.559	3,790,000	912,000
Fluoranthene	29.6	7.11	2,940,000	707,000
PAH Mixtures (Oil-Related Organic Compounds), µg/L**				
Pyrene	42.0	10.1	2,900,000	697,000
C1-pyrene/fluoran-thenes	20.3	4.89	3,200,000	770,000
Benz(a)anthracene	9.28	2.23	3,500,000	841,000

	Aquatic Life		Sediment	
Chemical	**Acute Benchmark (µg/L)**	**Chronic Benchmark (µg/L)**	**Acute Benchmark (µg/L)**	**Chronic Benchmark (µg/L)**
Chrysene	8.49	2.04	3,510,000	844,000
C1-Chrysenes^	3.56	0.856	3,870,000	929,000
C2-Chrysenes^	2.01	0.483	4,200,000	1,010,000
C3-Chrysenes^	0.699	0.168	4,620,000	1,110,000
C4-Chrysenes^	0.294	0.0706	5,030,000	1,210,000
Perylene	3.75	0.901	4,020,000	967,000
Benzo(b)fluoranthene	2.82	0.677	4,070,000	979,000
Benzo(k)fluoranthene	2.67	0.642	4,080,000	981,000
Benzo(e)pyrene	3.75	0.901	4,020,000	967,000
Benzo(a)pyrene	3.98	0.957	4,020,000	965,000
Indeno(1,2,3-cd)pyrene	1.14	0.275	4,620,000	1,110,000
Dibenz(a,h) anthracene	1.17	0.282	4,660,000	1,120,000
Benzo(g,h,i)perylene	1.83	0.439	4,540,000	1,090,000

+ This includes m-, o-, and p-xylenes
These include phenanthrene/anthracenes
^ These include benzanthracene/chrysenes

****NOTE:** Oil Related Organic Compounds are assessed jointly through a mixture approach because they all have the same type of effect on aquatic organisms. Potency divisors are not chemical-specific benchmarks, but are intermediates used in calculating the aggregate toxicity of the mixture. To assess the potential hazard to aquatic organisms, the sum of the calculated values is compared to a hazard index of 1. A value greater than 1 (>1) indicates that the sample has the potential to cause an acute or chronic effect on aquatic life like fish, crabs, and clams.

Sources: "Water Quality Benchmarks for Aquatic Life," http://www.epa.gov/bpspill/water-benchmarks.html
"Sediment Benchmarks for Aquatic Life," http://www.epa.gov/bpspill/sediment-benchmarks.html

Table C- 5: Water quality standards for Puerto Rico

Chemical	Coastal and estuarine waters r (µg/L)	Surface water (µg/L)	Ground water a (µg/L)
Inorganic Substances			
Antimony	640	5.6	5.6
Arsenic	36	10	10
Cadmium	8.85	Note 1	5.0
Cyanide	1.0	5.2	200
Copper	3.73	Note 3	1,300
Chromium III	—	Note 2	—
Chromium IV	50.35	11.43	—
Chromium	—	—	100
Fluoride	—	4,000	4,000
Mercury	0.051	0.050	0.050
Nickel	8.28	Note 4	610
Nitrate + Nitrite	—	10,000	10,000
Nitrite	—	—	1,000
Nitrogen	5,000	—	—
Silver	2.24	Note 5	—
Lead	8.52	Note 6	15.0
Selenium	71.14	5.0	50.0
Sulfide	2.0	2.0	—
Thallium	0.47	0.24	0.24
Zinc	85.62	Note 7	—
Organochlorides and Other Persistent Pesticides			
Aldrin	0.0005	0.00049	0.00049
alpha-BHC	0.049	0.026	0.026
beta-BHC	0.17	0.091	0.091
Chlordane	0.004	0.0043	0.0080
4, 4'- DDT and Metabolites	0.001	0.001	0.0022
Dieldrin	0.00054	0.00052	0.00052
Endosulfan	0.0087	0.056	62
Endosulfan Sulfate	89	62	62
Endrin	0.0023	0.036	0.059
Endrin Aldehyde	0.30	0.29	0.29
Heptachlor	0.00079	0.00079	0.00079
Heptachlor Epoxide	0.0036	0.0038	0.2
Lindane (Gamma BHC)	0.16	0.2	0.2
Methoxychlor	0.03	0.03	40.0
Mirex	0.001	0.001	—
Pentachlorophenol	7.9	1.0	1.0
Toxaphene	0.0002	0.0002	0.0028
Sulfurous Organothiophosphorus and Other Non-Persistent Pesticides			
2, 4, 5 – TP (Silvex)	—	10.0	10.0

Chemical	Coastal and estuarine waters r (µg/L)	Surface water (µg/L)	Ground water a (µg/L)
2, 4, - D	—	70	70
Azinphos – Methyl	0.01	0.01	—
Chloropyrifos	0.0056	0.041	—
Coumaphos	0.010	0.010	—
Demeton	0.10	0.10	—
Fenthion	0.40	0.40	—
Malathion	0.10	0.10	—
Naled	0.40	0.40	—
Parathion	—	0.013	—
Non-Pesticide Organic Substances and Carbon Tetrachloride			
1, 1-Dichloroethylene	7,100	7.0	7.0
1, 1, 1-Trichloroethane	—	200.0	200.0
1, 2-Dichlorobenzene	1,300	420	420
1, 2-Dichloroethane	370	3.8	3.8
1, 3-Dichlorobenzene	960	320	320
1, 4-Dichlorobenzene	190	63	63
2, 3, 7, 8-TCDD	5.1×10^{-8}	5.0×10^{-8}	5.0×10^{-8}
2, 4, 6-Trichlorophenol	24	14	14
2, 4-Dichlorophenol	290	77	77
2, 4-Dimethylphenol	850	380	380
2-Chlorophenol	150	81	81
2-Methyl-4, 6-Dinitrophenol	280	13	13
2, 4-Dinitrophenol	5,300	69	69
Carbon Tetrachloride	16	2.3	2.3
Phenol	1,700,000	21,000	21,000
Polychlorinated Biphenyls	0.00064	0.00064	0.00064
Tetrachloroethylene	33	5.0	5.0
Trichloroethylene	300	5.0	5.0
Vinyl Chloride	24	0.25	0.25
Volatile Organic Substances			
1, 1, 2-Trichloroethane	160	5.0	5.0
1, 1, 2, 2-Tetrachloroethane	40	1.7	1.7
1, 2, 4-Trichlorobenzene	70	35	35
1, 2-Dichloropropane	150	5.0	5.0
1, 3-Dichloropropylene	210	3.4	3.4
Acrylonitrile	2.5	0.51	0.51
Acrolein	290	190	190
Benzene	510	5.0	5.0
Bromoform	1,400	43	43
Chlorobenzene	1,600	100	100
Chlorodibromomethane	130	4.0	4.0
Chloroform	4,700	57	57
Dichlorobromomethane	170	5.5	5.5

Chemical	Coastal and estuarine waters r (µg/L)	Surface water (µg/L)	Ground water a (µg/L)
Ethylbenzene	2,100	530	530
Methyl Bromide	1,500	47	47
Methylene Chloride	5,900	46	46
Semi-Volatile Organic Substances			
1, 2-Diphenylhydrazie	2.0	0.36	0.36
1, 2-Trans-Dichloroethylene	10,000	100	100
2-Chloronapthalene	1,600	1,000	1,000
2, 4-Dinitrotoluene	34	1.1	1.1
3, 3-Dichlorobenzidine	0.28	0.21	0.21
Acenapthene	990	670	670
Anthracene	40,000	8,300	8,300
Benzidine	0.0020	0.00086	0.00086
Benzo(a)Anthracene	0.18	0.038	0.038
Benzo(a)Pyrene	0.18	0.038	0.038
Benzo(b)Fluoranthene	0.18	0.038	0.038
Benzo(k)Fluoranthene	0.18	0.038	0.038
Bis(2-Chloroethyl)Ether	5.3	0.30	0.30
Bis(2-Chloroisopropyl)Ether	65,000	1,400	1,400
Bis(2-Ethylhexyl)Phthalate[X]	22	12	12
Butylbenzyl Phthalate[W]	1,900	1,500	1,500
Chrysene	0.18	0.038	0.038
Dibenzo(a, h)Anthracene	0.18	0.038	0.038
Diethyl Phthalate[W]	44,000	17,000	17,000
Dimethyl Phthalate[W]	1,100,000	270,000	270,000
Di-n Buthyl Phthalate[W]	4,500	2,000	2,000
Fluoranthane	140	130	130
Fluorene	5,300	1,100	1,100
Hexachlorobenzene	0.0029	0.0028	0.0028
Hexachlorobutadiene	180	4.4	4.4
Hexachlorocyclopentadiene	1,100	40	40
Hexachloroethane	33	14	14
Ideno(1, 2, 3-cd)Pyrene	0.18	0.038	0.038
Isophorone	9,600	350	350
N-Nitrosodimethylamine	30	0.0069	0.0069
N-Nitrosodi-n-Propylamine	5.1	0.050	0.050
N-Nitrosodiphenylamine	60	33	33
Nitrobenzene	690	17	17
Pyrene	4,000	830	830
Toluene	15,000	1,000	1,000

Notes:

1 Concentration µg/L must not exceed the numerical value given by $e^{(0.7409\ [\text{n } \textit{Hardness} - 4.719])}$

2 Concentration µg/L must not exceed the numerical value given by $e^{(0.8190\ [\text{n } \textit{Hardness} + 0.6848])}$

3 Concentration µg/L must not exceed the numerical value given by $e^{(0.8545\ [\text{n } \textit{Hardness} - 1.702])}$

4 Concentration µg/L must not exceed the numerical value given by $e^{(0.8460\ [\text{n } Hardness\ +\ 0.0584])}$
5 Concentration µg/L must not exceed the numerical value given by $e^{(1.72\ [\text{n } Hardness\ -\ 6.59])}$
6 Concentration µg/L must not exceed the numerical value given by $e^{(1.273\ [\text{n } Hardness\ -\ 4.705])}$
7 Concentration µg/L must not exceed the numerical value given by $e^{(0.8473\ [\text{n } Hardness\ +\ 0.884])}$
8 Hardness (as CaCO3 in mg/L) of the water body.

Source: "Puerto Rico Water Quality Standards Regulation," http://www.gobierno.pr/NR/rdonlyres/B1978466-1AA0-4E48-899A-48D50311D7DF/0/Water_Quality_Standards_Reg_2010.pdf

Table C- 6: Ambient air quality guidelines and standards

Pollutant	World Health Organization (WHO) Ambient Air Quality Guidelines			United States National Ambient Air Quality Standards				European Commission Air Quality Standards			Canada National Ambient Air Quality Objectives & Guidelines			
				Primary Standards		Secondary Standards								
	Averaging Period	Guideline Value (µg/m³)		Averaging Period	Level	Averaging Period	Level	Averaging Period	Concentration	Permitted Exceedences Per Year	Averaging Time	Maximum Desirable Level	Maximum Acceptable Level	Maximum Tolerable Level
Sulfur Dioxide (SO_2)	24 hour	125 (interim target 1) 50 (interim target 2) 20 (guideline)		24 hour	0.14 ppm	3 hour	0.5 ppm	1 hour	350 µg/m³	24	1 hour	172 ppb	334ppb	N/A
	10 minute	500 (guideline)		1 year	0.030 ppm			24 hour	125 µg/m³	3	24 hour 1 year	57 ppb 11 ppb	115ppb 23ppb	306ppb N/A
Nitrogen Dioxide (NO_2)	1 year	40 (guideline)		1 year	53 ppb (100 µg/m3)	1 year	0.053 ppm (100 µg/m³)	1 year	200 µg/m³	N/A	1 year	32 ppb	53ppb	N/A
	1 hour	200 (guideline)		1 hour	100 ppb	N/A	N/A	1 hour	40 µg/m³	18	24hour 1hour	N/A N/A	106ppb 213ppb	160ppb 532ppb
Total Suspended Particulate (TSP)								1 year	N/A	120 µg/m³	400 µg/m³			
								24 hour	60 µg/m³	70 µg/m³	N/A			
Particulate Matter (PM10)	1 year	70 (interim target 1) 50 (interim target 2) 30 (interim target 3) 20 (guideline)		24 hour	150 µg/m³	24 hour	150 µg/m³	24 hour	50 µg/m³	35				
	24 hour	150 (interim target 1) 100 (interim target 2) 75 (interim target 3) 50 (guideline)						1 year	40 µg/m³	N/A				
Particulate Matter (PM2.5)	1Yyear	35 (interim target 1) 25 (interim target 2) 15 (interim target 3) 10 (guideline)		1Yyear	15.0 µg/m³	1Yyear	15.0 µg/m³	1Yyear	25 µg/m³	N/A				
	24hour	75 (interim target 1) 50 (interim target 2) 37.5 (interim target 3) 25 (guideline)		24hour	35 µg/m³	24hour	35 µg/m³							
Ozone	8hour	160 (interim target 1) 100 (guideline)		1 hour**	0.12 ppm (235 µg/m³)	1 hour**	0.12 ppm (235 µg/m³)	8 hour	120 µg/m³	25 days averaged over 3 years	1 year	N/A	15 ppb	N/A
				8 hour	0.075 ppm	8 hour	0.075 ppm				24 hour	15 ppb	25ppb	N/A
											1 hour	51 ppb	82ppb	153ppb
Lead(Pb)	N/A	N/A		3 month	0.15 µg/m³	3 month	0.15 µg/m³	1 year	0.5 µg/m³	N/A				
Carbon Monoxide (CO)	N/A	N/A		1 hour	35 ppm (40 mg/m³)			8 hour	10 mg/m³	N/A	1 hour	13 ppm	31 ppm	N/A
				8 hour	9 ppm (10 mg/m³)						8 hour	5 ppm	13ppm	17 ppm
Benzene								1 year	5 µg/m³	N/A				
Arsenic (As)								1 year	6 ng/m³	N/A				
Cadmium (Cd)								1 year	5 ng/m³	N/A				
Nickel (Ni)								1 year	20 ng/m³	N/A				
Polycyclic Aromatic Hydrocarbons								1Yyear	1 ng/m³ (expressed as a concentration of Benzo(a)pyrene)	N/A				

* Target value enters into force 1.1.2012

** The 1 hour U.S. Ozone standard was revoked beginning on June 15, 2005, and is being replaced by the 8 hour standard.

Sources: European Commission Air Quality Standards: http://ec.europa.eu/environment/air/quality/standards.htm
Canadian National Ambient Air Quality Objectives: http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/reg-eng.php
WHO (quoted in International Finance Corporation Environmental, Health, and Safety General Guidelines): http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf
US National Ambient Air Quality Standards: http://epa.gov/air/criteria.htm

3 HOTEL AND RESORT PERFORMANCE STANDARDS:

3.1 Hotel and Resort Water Discharge / Effluent Limits

Half of the CAFTA-DR countries are signatories to the Cartagena Convention, which seeks to control discharges into the Wider Caribbean basin. Below are the standards reflected in the Cartagena Conventions, as well as country-specific standards. Under the Land Based Sources of pollution (LBS) protocol to the Cartagena Convention, governments must regulate domestic wastewater that is discharged from hotels and commercial entities according to the effluent limits in table C-7. Table C-8 shows the timeline for governments to meet the effluent standards for domestic wastewater discharges.

Table C- 7: Water discharge/effluent limits

Pollutant	Cartagena Convention Class I/ Class II	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	United States	Canada	World Bank/IFC
			Surface& Inland (A,B,C waters) - /Coastal (E,F,G waters)		Surface& inland / Estuary		Surface& Inland / Coastal		Effluent Regs	Max Effluent Values
Aluminum								See supplemental information on United States and Puerto Rico		
Arsenic										
Barium										
Biochemical Oxygen Demand (BOD_5) (mg/l)	30/150	50	30, 60, 300 / 60, 100, 200		200 / 300 (phased down to 100 in 2024)	50	75/90			
Boron										
Cadmium										
Carbamates (total)										
Chemical Oxygen Demand-COD (mg/l)		150	150, 300, 500/ 350, 350, 350		To be monitored but no limit set	200	150/180			
Chlorine (residual)										
Chromium-(total)										
Chromium (hexavalent)										
Color (purity)										
Copper										
Cyanide (total)										
Cyanide (free)										
Cyanide (free but outside mixing area)										

Pollutant	Cartagena Convention Class I/ Class II	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua	United States	Canada	World Bank/IFC
			Inland (A,B,C waters) - /Coastal (E,F,G		Surface& inland / Estuary		Surface& Inland / Coastal		Effluent Regs	Max Effluent Values
Cyanide (weak acid dissociable)								See supplemental information on United States and Puerto Rico		
Fluoride										
Hydro-carbons										
Iron										
Lead										
Mercury										
Nickel										
Nitrogen (total) (mg/l)		50	20, 30, 50 / 40, 40, 40		100 phased down to 20 in 2024	30	30 / 30			
Oil and Grease (mg/l)	15 / 50	30	0.2, 1, 20 / 15, 15, 25		100 phased down to 10 in 2024	10	10 / 20			
Organo-phosphorus Compounds (total) (mg/l)			5, 5, 5 / 8, 8, 10		75 phased down to 10 in 2024	5	8 / 10			
Organo-chlorine Compounds (total)										
Radium 226										
Selenium										
Settleable Solids										
Silver										
Sulfites										
Sulphides										
Tin										
Total coliform bacteria (MPN/100 ml)		1,000	2500, 2500, 10,000		1,000,000 phased down to 10,000 in 2024	5,000	1,000 / 10,000			
Total Metals										
Total Suspended Solids (TSS) (mg/l)	30 / 150	50	75, 150, 200 / 75, 150, 200		600 phased down to 100 in 2024	100	75 / 75			
Zinc										
Temperature										
pH	5-10	5-9	6-9		6-9	6-9	6-9			

Source: "Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region," http://www.cep.unep.org/cartagena-convention/cartagena-convention.pdf

Notes to "Table C- 7: Water Discharge/Effluent Limits":

1 Under the Cartagena Convention, "Class I waters" means waters in the Convention area that, due to inherent or unique environmental characteristics or fragile biological or ecological characteristics or human use, are particularly sensitive to the impacts of domestic wastewater. Class I waters include, but are not limited to:
   (a) waters containing coral reefs, seagrass beds, or mangroves;
   (b) critical breeding, nursery or forage areas for aquatic and terrestrial life;
   (c) areas that provide habitat for species protected under the Protocol Concerning Specially Protected Areas and Wildlife to the Convention (the SPAW Protocol);
   (d) protected areas listed in the SPAW Protocol; and
   (e) waters used for recreation.
2 Under the Cartagena Convention, "Class II waters" means waters in the Convention area that due to oceanographic, hydrologic, climatic or other factors are less sensitive to the impacts of domestic wastewater and where humans or living resources that are likely to be adversely affected by the discharges are not exposed to such discharges.
3 Costa Rica: A Wastewater Discharge Committee is drafting limits for discharges to the marine environment through submarine outfalls.
4 Dominican Republic: Class A, B and C waters are surface inland bodies of water ranging from those with drinking water intakes with no treatment except disinfection to those with navigational and cooling uses. Class E, F and G waters are coastal/marine waters ranging from those designated for natural resource conservation and aquatic sports with direct contact to those for industrial, navigational and port activities. There are also Class D-1 and D-2 waters (limits need to mirror natural conditions), for inland/surface and coastal respectively, designated to preserve natural conditions for their exceptional quality and ecological value.
5 Nicaragua: surface/inland discharge limits include receiving waters with drinking water intakes

Table C- 8: Land based sources protocol timeline for domestic wastewater

Category	Effective Date of Obligation (in years after entry into force for the Contracting Party)	Effluent Sources
1	0	All new domestic wastewater systems
2	10	Existing domestic wastewater systems other than community wastewater systems
3	10*	Communities with 10,000 - 50,000 inhabitants
4	15	Communities with more than 50,000 inhabitants already possessing wastewater collection systems
5	20	Communities with more than 50,000 inhabitants not possessing wastewater collection systems
6	20	All other communities except those relying exclusively on household systems
□ Countries which decide to give higher priority to categories 4 and 5 may extend their obligations pursuant to category 3 to twenty years (category 6).		

Source: "Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region," http://www.cep.unep.org/cartagena-convention/cartagena-convention.pdf

3.2 Supplemental U.S. Water Discharge / Effluent Limits

Discharges of pollutants from any point source into the waters of the U.S. are prohibited except as in compliance with the Clean Water Act. 33 U.S.C. § 1311. Usually this means that for discharges to be lawful they must be authorized by permit (the Clean Water Act Section 301). Discharge permits are issued either by EPA or states with programs approved by EPA administering what is called the National Pollutant Discharge Elimination System (NPDES), or in the case of dredged or fill material the U.S. Army Corps of Engineers or a state authorized to administer a permit program for such discharges with EPA objection rights. 33 U.S.C. §§ 1342, 1344. NPDES permits must contain conditions that, among other things, meet water quality-based and technology-based effluent limits. EPA takes into account both technological availability and economic achievability when it promulgates nationwide effluent limitation guidelines and an explanation of the basis for the standards is accessible via the EPA website (http://water.epa.gov/scitech/wastetech/guide/). The limits listed for reference here are current as of 2011.

3.3 Hotel and Resort Storm Water Discharge Performance Requirements

In the United States, the Environmental Protection Agency (USEPA) issued in 2008 an updated Multi-Sector General Permit (MSGP) for storm water discharges associated with industrial sources. The MSGP identifies specific actions facility operators must take to qualify for a permit, including the submission of a Notice of Intent (NOI), the installation of storm water control measures aimed at minimizing pollutants in storm water discharges, and the formulation of a storm water pollution prevention plan (SWPPP). Although the MSGP only applies in states to which EPA has not authorized state permitting authority (3 states, Puerto Rico, the District of Columbia, and other U.S. territories at the time of this writing), it provides a useful standard for determining allowable pollutant levels in storm water runoff. For more information on where MSGP requirements apply, see Appendix C of the 2008 MSGP (available at http://www.epa.gov/npdes/pubs/msgp2008_appendixc.pdf).

The US MSGP includes several types of required analytical monitoring, one or more of which may apply to a given facility. These monitoring types include: quarterly benchmark monitoring, annual effluent limitations guidelines monitoring, State- or Tribal-specific monitoring, impaired waters monitoring, and other monitoring as required by EPA. EPA has issued several documents to assists industry in complying with the MSGP monitoring requirements, including the *Industrial Storm Water Monitoring and Sampling Guide* (available at http://www.epa.gov/npdes/pubs/msgp_monitoring_guide.pdf).

Under US requirements, benchmark monitoring must be conducted once every three months for the first year of operation under a new permit. Benchmark concentrations are not strict effluent limitations, and they are intended primarily to assist permittees in evaluating the effectiveness of their pollution prevention measures. Consequently, failure to meet a benchmark standard does not result in a permit violation. However, where the average monitoring value for four consecutive quarters exceeds the benchmark, a permittee must undertake a review of the facility's control measures to determine if they are adequate to meet the permit's effluent limits.

3.3.1 Stormwater Discharge Effluent Limit Monitoring Requirements

In addition to quarterly benchmark monitoring, US permitting standards require permittees to engage in annual monitoring for effluent limits based on sector-specific guidelines. Monitoring must be conducted on storm water waste streams resulting from the exposure of the particular industrial activity or materials in question to storm water prior to commingling with other waste streams, even those

covered under other areas of the permit. In addition to numerical effluent limits, the MSGP also includes technology-based effluent limits.

3.4 Hotels and Resorts Air Emission Limits

3.4.1 Cartagena Convention for the Wider Caribbean

The Cartagena Convention addresses the regulation of air emissions in Article 9. By ratifying the Cartagena Convention governments agree to take all appropriate measures to prevent, reduce, and control pollution of the Convention area resulting from discharges into the atmosphere from activities under their jurisdiction. The Cartagena Convention does not provide specific benchmarks for air emissions, but some governments have developed country-specific standards.

3.4.2 Emissions from Stationary Energy Sources

The primary stationary source air emissions from hotels and resorts (other than any open burning of debris and fugitive emissions from disturbed areas where vegetation is removed) would be from energy generation. Information on air emission limits from engines and boilers are included in Appendix C for the EIA Technical Review Guidelines for the Energy Sector including information from the International Finance Corporation Emission Guidelines and the U.S. Environmental Protection Agency. The International Finance Corporation's (IFC) Environmental, Health, and Safety (EHS) Guidelines offer both sector-specific and general requirements for projects and industries. IFC general emission guidelines apply to any facility or project that produces air emissions during any period of its lifecycle. The emission limits for stationary sources of air pollution are complex in that they are pollutant specific, fuel specific, and vary for different size of operations.

3.4.3 United States – Ozone Depleting Substances (ODS)

EPA regulations issued under Sections 601-607 of the Clean Air Act phase out the production and import of ozone-depleting substances (ODS), consistent with the schedules developed under the Montreal Protocol. The U.S. phaseout has operated by reducing in stages the amount of ODS that may be legally produced or imported into the U.S. In the United States, ozone-depleting substances are regulated as Class I or Class II controlled substances. Class I substances have a higher ozone-depleting potential and have been completely phased out in the U.S., except for exemptions allowed under the Montreal Protocol. Class II substances are hydrochlorofluorocarbons (HCFCs), which are transitional substitutes for many Class I substances and are being phased out now.

Compliance with the Montreal protocol and the U.S. Clean Air Act affects tourist-related activities where the following services are provided:

- Commercial Refrigeration
- Commercial Air Conditioning
- Vending Machines
- Commercial Ice Machines

US EPA has established rules for phasing out the production and consumption of Class II substances (HCFCs) in accordance with the terms of the Protocol. See "The Phaseout of Ozone Depleting Substances," available at http://www.epa.gov/ozone/title6/phaseout/index.html.

US EPA also regulates the use of HCFCs under sections 605, 608, and 615 of the Clean Air Act. Under section 605, EPA has restricted the use of certain HCFC refrigerants to the servicing of existing

appliances. Under section 608, EPA has issued regulations to reduce the use and emissions of HCFCs during the maintenance, servicing, and disposal of appliances to the lowest achievable level, and to maximize the recycling of such substances. Further, under section 615 of the Clean Air Act, EPA has issued regulations restricting the sale and distribution of HCFC-containing appliances.

In addition, the Significant New Alternatives Policy (SNAP) Program is EPA's program to evaluate substitutes for the ozone-depleting chemicals that are being phased out under the stratospheric ozone protection provisions of the Clean Air Act (CAA). In Section 612(c) of the Clean Air Act, the EPA is authorized to identify and publish lists of acceptable and unacceptable substitutes for class I or class II ozone-depleting substances as used in specific end uses. Substitutes are reviewed on the basis of, among other things, ozone depletion potential, global warming potential, toxicity, flammability, and exposure potential. US EPA has listed a number of acceptable substitutes for ozone depleting substances being phased out or banned in the refrigeration end use. See:

- "Acceptable Substitutes in Retail Food Refrigeration," http://www.epa.gov/ozone/snap/refrigerants/lists/foodref.html;
- "Acceptable Substitutes in Vending Machines" http://www.epa.gov/ozone/snap/refrigerants/lists/vending.html
- "Acceptable Substitutes in Commercial Ice Machines," http://www.epa.gov/ozone/snap/refrigerants/lists/icemach.html

4 MARINE AND OTHER WATER VESSEL PERFORMANCE STANDARDS

4.1 Water Discharge / Effluent Limits for Vessels

Water discharge from marine and other water vessels is regulated through numerous international and domestic laws. These regulations govern water discharges such as ballast water, incidental discharges, and human sewage discharges.

Discharges from vessels are regulated by a variety of international treaties and conventions, such as the International Convention for the Control and Management of Ships' Ballast Water and Sediments, the International Convention on the Control of Harmful Anti-fouling Systems on Ships, and the International Convention for the Prevention of Pollution from Ships (MARPOL). See Table C-20 for a more complete list of applicable treaties. While most of these international agreements do not contain specific benchmark guidelines, they contain general guidelines that may be informative in the development of country-specific standards.

Countries also regulate water discharges from marine and other water vessels through domestic laws. In the United States, discharges are regulated by a number of domestic laws, including (but not limited to) Title XIV of the Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, which covers sewage and graywater discharges from cruise ships operating in Alaska, and the Clean Boating Act, which covers incidental discharges from recreational vessels.

4.1.1 Ballast Water and Other Discharges Incidental to Vessel Operation

For the regulation of ballast water, the International Marine Organization's (IMO's) Marine Environment Protection Committee is currently developing a global treaty for the Control and Management of Ships' Ballast Water and Sediments that is intended to reduce the introduction of harmful aquatic species through the management of ballast water. See also section 5.3 on invasive species.

In the United States, ballast water discharges are regulated by the EPA under the Vessel General Permit and also separately regulated by the U.S. Coast Guard under the National Invasive Species Act of 1996 (NISA) and Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA).

The EPA's vessel permitting program(NPDES) also regulates incidental discharges from the normal operation of vessels, including ballast water, bilgewater, graywater (e.g., water from sinks, showers), and gradual release of anti-foulant paints (i.e., their leachate). The NPDES vessels permitting program does not regulate discharges from military vessels or recreational vessels. Instead, those are regulated by other EPA programs under section 312 of the Clean Water Act.

The centerpiece of the NPDES vessels program is the Vessel General Permit (VGP). The 2008 VGP regulates discharges incidental to the normal operation of vessels operating in a capacity as a means of transportation. The VGP includes general effluent limits applicable to all discharges; general effluent limits applicable to 26 specific discharge streams; narrative water-quality based effluent limits; inspection, monitoring, recordkeeping, and reporting requirements; and additional requirements applicable to certain vessel types. Recreational vessels as defined in section 502(25) of the Clean Water Act are not subject to this permit. In addition, with the exception of ballast water discharges, non-recreational vessels less than 79 feet (24.08 meters) in length, and all commercial fishing vessels, regardless of length, are not subject to this permit. For more information on the VGP, visit the EPA website at http://cfpub.epa.gov/npdes/vessels/vgpermit.cfm.

4.1.2 Vessel-Based Human Sewage Discharges

The Clean Water Act (CWA) is the centerpiece of federal legislation addressing vessel-based human sewage pollution in U.S. waters. Under section 312 of the CWA, discharges of sewage from vessels are controlled in part by regulating the equipment that treats or holds the sewage: marine sanitation devices (MSDs). Section 312 of the CWA requires the use of operable, U.S. Coast Guard-certified MSDs onboard vessels that are 1) equipped with installed toilets and 2) operating on U.S. navigable waters (which include the three mile territorial seas). 33 U.S.C. 1322(h) (4). The Coast Guard categorizes MSDs into three types, as shown in table C-9.

Additionally, the Clean Water Act provides for the establishment of no discharge zones. No discharge zones are areas where the discharge of sewage from vessels, whether treated by a marine sanitation device or not, are not allowed. For more information about the no discharge zone program, see http://water.epa.gov/polwaste/vwd/ndz.cfm.

Table C- 9: Standards for marine sanitation devices (MSDs)

	Vessel Size	Floating Solids	Fecal Coliform Bacterial Count	Total Suspended Solids
US: Type 1 (Flow-through treatment devices that commonly use maceration and disinfection for the treatment of sewage)	≤ 65 feet in length	No Discharge	< 1000 per 100 ml	
US: Type 2 (Flow-through treatment devices that may employ biological treatment and disinfection (some Type II MSDs may use maceration and disinfection)	Any Length		< 200 per 100 ml	< 150 ml per L
US: Type 3 (Typically a holding tank where sewage is stored until it can be disposed of shore-side or at sea (beyond three miles from shore))	Any Length	No performance standard, but pursuant to Coast Guard regulations, a Type III MSD must "be designed to prevent the overboard discharge of treated or untreated sewage or any waste derived from sewage". 33 CFR 159.53(c).		

Source: "Marine Sanitation Devices," http://water.epa.gov/polwaste/vwd/vsdmsd.cfm

4.2 Marine and Other Water Vessel: Air Emission Limits

Diesel boats and ships include vessels that use marine diesel engines. These vessels range in size and application from large ocean-going vessels to small recreational runabouts. The following tables summarize the emission standards for marine diesel engines as reflected in the MARPOL Convention and USEPA regulations.

For purposes of air emission regulations, vessels are categorized into three distinct groups based on their size, engine type, and purpose:

- Large ships and ocean vessels
- Diesel powered boats and ships
- Personal watercraft

Additional regulations have been developed in the United States for marine loading docks. This section includes the applicable air emission standards for the three categories of vessels, as well as a summary of the standards regarding marine loading docks.

4.2.1 MARPOL Convention Air Emission Limits from Ships: Ocean Vessels and Large Ships

The International Convention on the Prevention of Pollution from Ships, known as MARPOL 73/78 contains rules regarding ship pollution. On 27 September 1997, the MARPOL Convention has been amended by the "1997 Protocol", which includes Annex VI titled "Regulations for the Prevention of Air Pollution from Ships". MARPOL Annex VI sets limits on NO_x and SO_x emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances.

Large ships, such as container ships, tankers, bulk carriers, cruise ships, and lakers are significant contributors to air pollution in many cities and ports. There are two types of diesel engines used on large ships: main propulsion and auxiliary engines. The main propulsion engines on most large ships are "Category 3" marine diesel engines, which can stand over three stories tall and run the length of two school buses. Auxiliary engines on large ships typically range in size from small portable generators to locomotive-size engines.

4.2.1.1 MARPOL Emissions Limits for NOx

MARPOL NO_x emission limits are set for diesel engines and cruise ships depending on the engine maximum operating speed (n, rpm).

Tier I standards become applicable to existing engines installed on ships built between January 1, 1990 to December 31, 1999, with a displacement ≥ 90 liters per cylinder and rated output ≥ 5000 kW, subject to availability of approved engine upgrade kit.

Tier II standards are expected to be met by combustion process optimization. The parameters examined by engine manufacturers include fuel injection timing, pressure, and rate (rate shaping), fuel nozzle flow area, exhaust valve timing, and cylinder compression volume.

Tier III standards are expected to require dedicated NO_x emission control technologies such as various forms of water induction into the combustion process (with fuel, scavenging air, or in-cylinder), exhaust gas recirculation, or selective catalytic reduction. See table C-10 for a summary of these standards.

Table C- 10: MARPOL Annex VI NOx emission limits

Tier	Date	No_x Limit, G/kWh		
		N < 130	130 ≤ n < 2000	N ≥ 2000
Tier I	2000	17.0	$45 \times n^{-0.2}$	9.8
Tier II	2011	14.4	$44 \times n^{-0.23}$	7.7
Tier III	2016*	3.4	$9 \times n^{-0.2}$	1.96
* In No_x Emission Control Areas (ECAs). Tier II standards apply outside ECAs.				

Source: "International: IMO Marine Engine Regulations," http://www.dieselnet.com/standards/inter/imo.php

Table C- 11: Emission standards for large, ocean going ship marine diesel engines: MARPOL

Standard	Engine			Emissions (g/kW-hr)		Year in Effect
		rated power (kW)	Speed (RPM)	NO_x	NO_x + THC	
MARPOL-Annex VI		>130 kW	N < 130	17.0		May 19, 2005* (January 1, 2000)
			130 ≤ N < 2000	$45.0 \times N^{-0.20}$		
			N > 2000	9.8		

N = rated engine speed (crankshaft revolutions per minute)
*MARPOL VI enters into force May 19, 2005, yet applies to diesel engines installed on a ship constructed on or after January 1, 2000 or a diesel engine which undergoes a major conversion on or after January 1, 2000.

4.2.1.2 MARPOL Emissions Limits for SOx

Annex VI regulations include caps on sulfur content of fuel oil as a measure to control SO_x emissions and, indirectly, particulate matter emissions (there are no explicit particulate matter emission limits). Special fuel quality provisions exist for SO_x Emission Control Areas (SO_x ECA or SECA). See table C-12 for a summary of these standards.

Table C- 12: MARPOL Annex VI fuel sulfur limits

Date	SO_x Limit in Fuel (% m/m)	
	SO_x ECA	Global
2000	1.5 %	4.5%
2010.07	1.0%	
2012		3.5%
2015	0.1 %	
2020*		0.5%
*Alternative date is 2025, to be decided by a review in 2018		

Source: "International: IMO Marine Engine Regulations," http://www.dieselnet.com/standards/inter/imo.php

4.2.2 Supplemental Information on United States Emission Limits for Diesel Marine Vessels

The US EPA addresses emissions from marine engines in two ways, through regulation of fuel and through regulation of emission limits. In May 2004, as part of the Clean Air Nonroad Diesel Rule, EPA finalized new requirements for nonroad diesel fuel that decrease the allowable levels of sulfur in fuel used in vessels by 99 percent. In March 2008, EPA finalized a three part program that will dramatically reduce emissions from marine diesel engines below 30 liters per cylinder displacement. These include marine propulsion engines used on vessels from recreational and small fishing boats to towboats, tugboats and Great Lake freighters, and marine auxiliary engines ranging from small generator sets to large generator sets on ocean-going vessels. The rule will cut particulate matter emissions from these engines by as much as 90 percent and NO_x emissions by as much as 80 percent when fully implemented.

The 2008 final rule includes the first-ever national emission standards for existing marine diesel engines, applying to engines larger than 600kW when they are remanufactured. The rule also sets Tier 3 emissions standards for newly-built engines that are phasing in from 2009. Finally, the rule establishes Tier 4 standards for newly-built commercial marine diesel engines above 600kW, based on the application of high-efficiency catalytic after-treatment technology, phasing in beginning in 2014.

4.2.2.1 Ocean Vessel Emission Limits in United States Waters

EPA's most recent regulatory action for large ships, published on April 30, 2010, includes standards that apply to Category 3 (C3) engines installed on U.S. vessels and to marine diesel fuels produced and distributed in the United States. This action also includes a regulatory program to implement Annex VI to the International Convention for the Prevention of Pollution from Ships in the United States, including extending the Emission Control Area (ECA) requirements to U.S. internal waters. These regulations are adopted under EPA's authority in the Act to Prevent Pollution from Ships (APPS).

EPA's 2010 CAA rule added two new tiers of C3 marine diesel engine emission standards: The Tier 2 standards apply to new engines beginning in 2011; the Tier 3 standards begin in 2016. EPA's 2010 rule also revised our CAA diesel fuel program allowing for the production and sale of diesel fuel with up to 1,000 ppm sulfur for use in C3 marine vessels, phasing in by 2015. See tables C-13 and C-14.

Table C- 13: United States air emission standards for marine vessels

Stan-dard	Engine			Emissions (g/kW-hr)				Model Year
	Cate-gory	Rated power (kW)	Speed (RPM)	NOx	NOx + THC	PM	CO	
US EPA Tier 1	1, 2, 3	≥ 2.5		N < 130	17.0			2004-2006
				130 ≤ N < 2000	45.0 x $N^{-0.20}$			
				N > 2000	9.8			
US EPA Tier 2	1	< 0.9	≥ 37 kW		7.5	0.40	5.0	2005
		0.9 – 1.2	all		7.2	0.30	5.0	2004
		1.2 – 2.5	all		7.2	0.20	5.0	2004
		2.5 – 5.0	all		7.2	0.20	5.0	2007
	2	5.0 – 15.0	all		7.8	0.27	5.0	2007
		15.0 – 20.0	< 3300 kW		8.7	0.50	5.0	2007
		15.0 – 20.0	≥ 3300 kW		9.8	0.50	5.0	2007
		20.0 – 25.0	all		9.8	0.50	5.0	2007
		25.0 – 30.0	all		11.0	0.50	5.0	2007
	3	> 30.0	all	Final Tier 3 standards will be promulgated by April 27, 2007				
Recreational Marine Diesel		< 0.9	≥ 37 kW		7.5	0.40	5.0	2007
		0.9 – 1.2	all		7.2	0.30	5.0	2006
		1.2 – 2.5	all		7.2	0.20	5.0	2006
		≥ 2.5	all		7.2	0.20	5.0	2009
Voluntary "Blue Sky Series" Standards	1 and recrea-tional diesel	< 0.9	≥ 37 kW		4.0	0.24		
		0.9 – 1.2	all		4.0	0.18		
		1.2 – 2.5	all		4.0	0.12		
		2.5 – 5.0	all		5.0	0.12		
	2	5.0 – 15.0	all		5.0	0.16		
		15.0 – 20.0	< 3300 kW		5.2	0.30		
		15.0 – 20.0	≥ 3300 kW		5.9	0.30		
		20.0 – 25.0	all		5.9	0.30		
		25.0 – 30.0	all		6.6	0.30		

Source: "Diesel Boats and Ships" http://www.epa.gov/otaq/marine.htm

4.2.2.2 Emission Standards for Marine Tank Vessel Loading Operations-United States

US EPA regulations for emissions standards for marine tank vessel loading operations are currently in development. For additional information, see http://water.epa.gov/lawsregs/lawsguidance/cwa/vessel/CBA/ and http://www.epa.gov/ttn/atw/marine/marinepg.html.

4.2.2.3 Personal Watercraft Vessels

Personal watercraft vessels encompass any vessel that uses gasoline engines or other spark-ignition engines. EPA emission standards for hydrocarbon, nitrogen oxides, and carbon monoxide reduce the environmental impact from personal watercraft vessels. The emission standards require manufacturers to control exhaust emissions from the engines and evaporative emissions from fuel tanks and fuel lines. The US EPA has issued exhaust emission standards for marine spark-ignition engines and compression-ignition engines, as shown in tables C-14 and C-15, respectively.

Table C- 14: Marine spark-ignition engines -- exhaust emission standards

Engine Type	Model Year	HC + NOx (g/KW-hr)		CO (g/KW-hr)		Useful Life (hours/years)	Warranty Period (hours/years)
		P ≤ 4.3 kW	P > 4.3 kW	P ≤ 4.3 kW	P > 4.3 kW		
Personal Watercraft & Outboard Marine Engines	1998	278 [ABT]	(0.917 x (151 + 557/$P^{0.9}$ + 2.44) [ABT]	-	-	350 / 5	All Emission-related Components: 1 year
	1999	253 [ABT]	(0.833 x (151 + 557/$P^{0.9}$ + 2.89) [ABT]	-	-		
	2000	228 [ABT]	(0.750 x (151 + 557/$P^{0.9}$) + 3.33 [ABT]		-		
	2001	204 [ABT]	(0.667 x (151 + 557/$P^{0.9}$) + 3.78 [ABT]	-	-		All Emission-related Components: 1 year Specified Major Emission Control Components: 200 / 3
	2002	179 [ABT]	(0.583 x (151 + 557/$P^{0.9}$) + 4.22 [ABT]	-	-		
	2003	155 [ABT]	(0.500 x (151 + 557/$P^{0.9}$) + 4.67 [ABT]	-	-		
	2004	130 [ABT]	(0.417 x (151 + 557/$P^{0.9}$) + 5.11 [ABT]	-	-		All Emission-related Components: 200 / 2 Specified Major Emission
	2005	105 [ABT]	(0.333 x (151 + 557/$P^{0.9}$) + 5.56 [ABT]	-	-		

Engine Type		Model Year	HC + NOx (g/KW-hr)		CO (g/KW-hr)		Useful Life (hours/years)	Warranty Period (hours/years)
			P ≤ 4.3 kW	P > 4.3 kW	P ≤ 4.3 kW	P > 4.3 kW		
		2006-2009	81 [ABT]	(0.250 x (151 + 557/$P^{0.9}$) + 6.00 [ABT]	-	-		Control Components: 200 / 3
		2010 +	30.0 [ABT]	2.1 + 0.09 x (151 + 557/$P^{0.9}$) [ABT]	500 - 5.0 x P	300	Personal Watercraft: 350 / 5 Outboard: 350 / 10	Personal Watercraft: 175 hours or 30 months Outboard Engines: 175 / 5
Sterndrive / Inboard Engines	Conventional Engines	2010 +	5.0 [ABT]		75.0 [ABT]		480 / 10	Electrical & Mechanical Components: 480/3
Sterndrive / Inboard Engines	High-Performance Engines		P ≤ kW	P > 485 kW	350		P ≤ 485 kW: 150 / 3 P > 485 kW: 50 / 1	Electrical Components: 480 / 3 Mechanical Components: P ≤ 485 kW: 150 / 3 P > 485 kW: 50 / 1
Sterndrive / Inboard Engines	High-Performance Engines	2010	20.0	25.0				
Sterndrive / Inboard Engines	High-Performance Engines	2011+	16.0	22.0				

Sources: "Gasoline Boats and Personal Watercraft" http://www.epa.gov/otaq/marinesi.htm
40 CFR 91.104 = Outboard and personal watercraft (PWC) exhaust emission standards (1998-2009)
40 CFR 91.105 = Outboard and PWC useful life (1998-2009)
40 CFR 91.1203 = Warranty period (1998-2009)
40 CFR 1045.103 = Outboard and PWC exhaust emission standards (2010+)
40 CFR 1045.105 = Sterndrive/Inboard exhaust emission standards
40 CFR 1045.107 = Not-to-exceed exhaust emission standards
40 CFR 1045.120 = Warranty period (2010+)

Notes:

1 The numerical emission standards for hydrocarbons (HC) must be met based on the following types of HC emissions for engines powered by the following fuels: (1) total hydrocarbon equivalent for alcohol; (2) non-methane hydrocarbon for natural gas; and (3) total hydrocarbons for other fuels.
2 P stands for the maximum engine power in kilowatts.
3 Manufacturers may generate or use emission credits for averaging, but not for banking or trading.
4 Useful life and warranty period are expressed hours or years of operation (unless otherwise indicated), whichever comes first.
5 The test procedure for federal standards uses the International Organization for Standardization (ISO) 8178 E4 5-Mode Steady-State Test Cycle.

6 Also applies to model year (MY) 1997 engine families certified pursuant to 40 Code of Federal Regulations (CFR) 91.205.
7 Not-to-exceed emission standards specified in 40 CFR 1045.107 also apply.
8 A longer useful life in terms of hours must be specified for the engine family if the average service life is longer than the minimum value as described in 40 CFR 1045.103(e)(3).
9 The useful life may not be shorter than: (1) 150 hours of operation; (2) the recommended overhaul interval; or (3) the engine's mechanical warranty. A longer useful life must be specified in terms of hours if the average service life is longer than the minimum value as described in 40 CFR 1045.105(e)(3).

4.2.2.4 Other Emission Limits for Marine Vessels

Table C- 15: Visible emissions limits for marine vessels

	United States/ Puerto Rico
Opacity Standard (6 mins)	20%
Opacity Maximum	60 % for up to 4 mins in 30 min interval

Source: "Environmental Quality Board Regulation for the Control of Atmospheric Pollution," http://www.jca.gobierno.pr/

Table C- 16: Marine compression-ignition (CI) engines -- exhaust emission standards

Category	Tier	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Model Year	NOx (g/kW-hr)	HC (g/kW-hr)	HC+NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Useful Life (yrs/hrs)		Waranty Period (yrs/hrs)	
C1 Commercial	1	≥ 2.5	≥ 37	rpm < 130	2004	17.0	-	-	-	-	10 / 10,000		5 / 5,000	
				130 ≤rpm < 2000		$45.0 \times N^{-0.20}$	-	-	-	-				
				rpm ≥2000		9.8	-	-	-	-				
	2	disp. < 0.9	≥ 37	-	2005	-	-	7.5 (ABT)	0.40 (ABT)	5.0	10 / 10,000		5 / 5,000	
		0.9 ≤ disp < 1.2	all	-	2004	-	-	7.2 (ABT)	0.30 (ABT)	5.0				
		1.2 ≤ disp < 2.5		-	2004	-	-	7.2 (ABT)	0.20 (ABT)	5.0				
		2.5 ≤ disp < 5.0		-	2007	-	-	7.2 (ABT)	0.20 (ABT)	5.0				
C1 Commercial & Recreational	1	≥ 2.5	≥ 37	rpm < 130	2004	17	-	-	-	-	10/ 1,000		5 / 500	
				130 ≤ rpm < 2000		$45.0 \times N^{-0.20}$	-	-	-	-				
				rpm ≥ 2000		9.8	-	-	-	-				
	2	disp < 0.9	≥ 37	-	2007	-	-	7.5 (ABT)	0.40 (ABT)	5.0	10 / 1,000		5 / 500	
		0.9 ≤ disp < 1.2	all	-	2006	-	-	7.2 (ABT)	0.30 (ABT)	5.0				
		1.2 ≤ disp < 2.5		-	2006	-	-	7.2 (ABT)	0.20 (ABT)	5.0				
		2.5 ≤ disp < 5.0		-	2009	-	-	7.2 (ABT)	0.20 (ABT)	5.0				
C1 Commercial & Recreational < 75 kW	3	< 0.9	< 8	-	2009 +	-	-	7.5 (ABT)	0.40 (ABT)	8.0	5 / 3,000	10 / 1,000 for CI Recreational	2.5 / 1,500	10 / 500 for CI Recreational
			8 ≤ kW < 19	-	2009 +	-	-	7.5 (ABT)	0.40 (ABT)	6.6				
			19 ≤ kW < 37	-	2009 - 2013	-	-	7.5 (ABT)	0.30 (ABT)	5.5	7 / 5,000		3.5 / 2,500	
				-	2014 +	-	-	4.7 (ABT)	0.20 (ABT)	5.0				
			37 ≤ kW < 75	-	2009 - 2013	-	-	7.5 (ABT)	0.30 (ABT)	5.0	10 / 10,000		5 / 5,000	
				-	2014 +	-	-	4.7 (ABT)		5.0				
cial Engines with ≤ 35 kW/L	3	< 0.9	-	-	2012 +	-	-	5.4 (ABT)	0.14 (ABT)	8.0 for < 8 kW 6.6 for 8 ≤ kW	5 / 3,000 for commercial engines < 19 kW		2.5 / 1,500 for commercial engines < 19	
		0.9 ≤ disp < 1.2	All	-	2013 +	-	-	5.4 (ABT)	0.12 (ABT)					

Category	Tier	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Model Year	NOx (g/kW-hr)	HC (g/kW-hr)	HC+NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Useful Life (yrs/hrs)	Waranty Period (yrs/hrs)
		1.2 ≤ disp < 2.5	< 600	-	2014 - 2017	-	-	5.6 (ABT)	0.11 (ABT)	< 19 5.5 for 19 ≤ kW < 37 5.0 for ≤ 37 kW	7 / 5,000 for commercial engines 19 ≤ kW < 37 10 / 10,000 for C1 Commercial ≤ 37 kW	kW 3.5 / 2,500 for commercial engines 19 ≤ kW < 37 5 / 5,000 for C1 Commercial ≤ 37 kW
				-	2018 +	-			0.10 (ABT)			
			≥ 600	-	2014 +	-	-	5.6 (ABT)	0.11 (ABT)			
		2.5 ≤ disp < 3.5	< 600	-	2013 - 2017	-	-	5.6 (ABT)	0.11 (ABT)			
				-	2018 +	-			0.10 (ABT)			
			≥ 600	-	2013 +	-	-	5.6 (ABT)	0.11 (ABT)			
		3.5 ≤ disp < 7.0	< 600	-	2012 - 2017	-	-	5.8 (ABT)	0.11 (ABT)			
				-	2018 +	-			0.10 (ABT)			
			≥ 600	-	2012 +	-	-	5.8 (ABT)	0.11 (ABT)			
C1 Commercial engines with > 35 kW/L power density & All Recreational Engines	3	< 0.9	≥ 75	-	2012 +	-	-	5.8 (ABT)	0.15 (ABT)	8.0 for < 8 kW 6.6 for 8 ≤ kW < 19 5.5 for 19 ≤ kW < 37 5.0 for ≥ 37 kW	5 / 3,000 for commercial engines < 19 kW 7 / 5,000 for commercial engines 19 ≤ kW < 37 10 / 10,000 for C1 Commercial ≥ 37 kW 10 / 1,000 for CI Recreational	2.5 / 1,500 for commercial engines < 19 kW 3.5 / 2,500 for commercial engines 19 ≤ kW < 37 5 / 5,000 for C1 Commercial ≥ 37 kW 5 / 500 for CI Recreational
		0.9 ≤ disp < 1.2	All	-	2013 +	-	-	5.8 (ABT)	0.14 (ABT)			
		1.2 ≤ disp < 2.5		-	2014 +	-	-	5.8 (ABT)	0.14 (ABT)			
		2.5 ≤ disp < 3.5		-	2013 +	-	-	5.8 (ABT)	0.12 (ABT)			
		3.5 ≤ disp < 7.0		-	2012 +	-	-	5.8 (ABT)	0.11 (ABT)			
C1 Commercial > 600 kW	4	All	600 ≤ kW < 1,400	-	2017 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)	5.0	10 / 10,000	5 / 5,000
		All	1,400 ≤ kW < 2,000	-	2016 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)			
		All	2,000 ≤ kW < 3,700	-	2014 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)			
		< 7.0	≥	-	2014	1.8	-	0.19 HC	0.12 (ABT)			

Category	Tier	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Model Year	NOx (g/kW-hr)	HC (g/kW-hr)	HC+NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Useful Life (yrs/hrs)	Waranty Period (yrs/hrs)
			3,700		- 2015	(ABT)						
				-	2016 +	1.8 (ABT)	-	0.19 HC	0.06 (ABT)			
C2	1	≥ 2.5	≥ 37	rpm < 130	2004	17.0	-	-	-	-	10 / 20,000	5 / 10,000
				130 ≤ rpm < 2,000		45.0 x $N^{-0.20}$	-	-	-	-		
				rpm ≥ 2,000		9.8	-	-	-	-		
	2	5.0 ≤ disp < 15.0	All	-	2007	-	-	7.8 (ABT)	0.27 (ABT)	5.0	10 / 20,000	5 / 10,000
		15.0 ≤ disp < 20.0	< 3,300	-		-	-	8.7 (ABT)	0.50 (ABT)	5.0		
		15.0 ≤ disp < 20.0	≥ 3,300	-		-	-	9.8 (ABT)	0.50 (ABT)	5.0		
		20.0 ≤ disp < 25.0	All	-		-	-	9.8 (ABT)	0.50 (ABT)	5.0		
		25.0 ≤ disp < 30.0	All	-		-	-	11.0 (ABT)	0.50 (ABT)	5.0		
	3	7.0 ≤ disp < 15.0	< 2,000	-	2013 +	-	-	6.2 (ABT)	0.14 (ABT)	5.0	10 / 20,000	5 / 10,000
			2,000 ≤ kW < 3,700	-		-	-	7.8 (ABT)	0.14 (ABT)	5.0		
		15.0 ≤ disp < 20.0	< 2,000	-	2014 +	-	-	7.0 (ABT)	0.34 (ABT)	5.0		
		20.0 ≤ disp < 25.0	< 2,000	-		-	-	9.8 (ABT)	0.27 (ABT)	5.0		
		25.0 ≤ disp < 30.0	< 2,000	-		-	-	11.0 (ABT)	0.27 (ABT)	5.0		
	4	All	600 ≤ kW < 1,400	-	2017 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)	5.0	10 / 20,000	5 / 10,000
		All	1400 ≤ kW < 2,000	-	2016 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)			
		All	2,000 ≤ kW < 3,70	-	2014 +	1.8 (ABT)	-	0.19 HC	0.04 (ABT)			
		< 15.0	≥ 3,700	-	2014 - 2015	1.8 (ABT)	-	0.19 HC	0.12 (ABT)			
		15.0 ≤ disp < 30.0		-	2014 - 2015	1.8 (ABT)	-	0.19 HC	0.25 (ABT)			
		All		-	2016 +	1.8 (ABT)	-	0.19 HC	0.06 (ABT)			

Category	Tier	Displacement (L/cylinder)	Power (kW)	Speed (rpm)	Model Year	NOx (g/kW-hr)	HC (g/kW-hr)	HC+NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Useful Life (yrs/hrs)	Waranty Period (yrs/hrs)
C3	1	≥30.0	All	rpm < 130	2004	17.0	-	-	-	-	3 / 10,000	3 / 10,000
				130 ≤ rpm < 2,000		$45.0 \times N^{-0.20}$	-	-	-	-		
				rpm ≥ 2,000		9.8	-	-	-	-		
	2	≥30.0	All	rpm < 130	2011	14.4	2.0	-	-	5.0	3 / 10,000	3 / 10,000
				130 ≤ rpm < 2,000		$44.0 \times N^{-0.23}$		-	-			
				rpm ≥ 2,000		7.7		-	-			
	3	≥ 30.0	All	rpm < 130	2016	3.4	2.0	-	-	5.0	3 / 10,000	3 / 10,000
				130 ≤ rpm < 2,000		9.0 × N-0.20		-	-			
				rpm ≥ 2,000		2.0		-	-			

Sources:
40 CFR 89.104 = Tiers 1 and 2 useful life and warranty period for marine CI engines less than 37 kW
40 CFR 89.112 = Tiers 1 and 2 emission standards for marine CI engines less than 37 kW
40 CFR 89 Subpart E = Tiers 1 and 2 test procedures for marine CI engines less than 37 kW
40 CFR 94.8 = Tiers 1 and 2 emission standards for C1 (both commercial & recreational), C2 and C3 engines
40 CFR 94.9 = Tiers 1 and 2 useful life for C1 (both commercial & recreational), C2 and C3 engines
40 CFR 94.10 = Tiers 1 and 2 warranty period for C1 (both commercial & recreational), C2 and C3 engines
40 CFR 94 Subpart B = Tiers 1 and 2 test procedures for C1 (both commercial & recreational), C2 and C3 engines
40 CFR 1042.101 = Tiers 3 and 4 exhaust emission standards and useful life
40 CFR 1042.107 = Tiers 3 and 4 evaporative emission standards engines using a volatile liquid fuel (e.g., methanol)
40 CFR 1042.120 = Tiers 3 and 4 warranty period
40 CFR 1042 Subpart F = Tiers 3 and 4 test procedures

Notes:

1 For Tiers 1 and 2, Category 1 marine engines are greater than or equal to 37 kilowatts (kW) and have a displacement less than 5.0 liters per cylinder (L/cylinder); Category 2 marine engines have a displacement greater than or equal to 5.0 L/cylinder and less than 30 L/cylinder; and Category 3 marine engines have a displacement greater than or equal to 30.0 L/cylinder. For Tiers 3 and 4, Category 1 represents engines up to 7 L/cylinder displacement; and Category 2 includes engines from 7 to 30 L/cylinder. The definition of Category 3 marine engines remains the same.

2 Tiers 1 and 2 for marine engines less than 37 kW are subject to the same emission standards as for land-based engines. See Table 1 in 40 Code of Federal Regulations (CFR) Part 89.112 and 40 CFR Part 89.104.

3 For Tiers 1 and 2, this refers to the rated power; for Tiers 3 and 4, this refers to the maximum engine power.

4 Total hydrocarbon (THC) plus nitrogen oxides (NOx) for Tier 2 standards.

5 Useful life is expressed in hours or years, whichever comes first. For Tiers 3 and 4, a longer useful life in hours for an engine family must be specified if either: 1) the engine is designed, advertised, or marketed to operate longer than the minimum useful life; or 2) the basic mechanical warranty is longer than the minimum useful life.

6 Warranty period is expressed in years and hours, whichever comes first.

7 For Tiers 3 and 4, there are no evaporative emission standards for diesel-fueled engines, or engines using other nonvolatile or nonliquid fuels (e.g., natural gas). If an engine uses a volatile liquid fuel, such as methanol, the engine's fuel system and the vessel in which the engine is installed must meet the evaporative emission requirements of 40 Code of Federal Regulations (CFR) Part 1045 that apply with respect to spark-ignition engines. Manufacturers subject to evaporative emission standards must meet the requirements of 40 CFR 1045.112 as described in 40 CFR 1060.1(a) (2).

8 Indicates the model years for which the specified standards start.

9 N is the maximum test speed of the engine in revolutions per minute (rpm).

10 Manufacturers of Tier 3 engines greater than or equal to 19 kW and less than 75 kW with displacement below 0.9 L/cylinder may alternatively certify some or all of their engine families to a particulate matter (PM) emission standard of 0.20 grams per kilowatt-hour (g/kW-hr) and a NOx+HC emission standard fo 5.8 g/kW-hr for 2014 and later model years.

11 The applicable Tier 2 NOx+HC standards continue to apply instead of the Tier 3 values for engines at or above 2000 kW.

12 These Tier 3 standards apply to Category 1 engines below 3700 kW except for recreational marine engines at or above 3700 kW (with any displacement), which must meet the Tier 3 standards specified for recreational marine engines with a displacement of 3.5 to 7.0 L/cylinder.

13 The following provisions are optional: 1)Manufacturers may use NOx credits to certify Tier 4 engines to a NOX+HC emission standard of 1.9 g/kW-hr instead of the NOX and HC standards. See 40 CFR 1042.101(a) (8) (i) for more details. 2) For engines below 1000 kW, manufacturers may delay complying with the Tier 4 standards until October 1, 2017. 3) For engines at or above 3700 kW, manufacturers may delay complying with the Tier 4 standards until December 31, 2016.

14 The Tier 4 standard is for HC (not HC+NOx) in g/kW-hr.

15 These Tier 3 standards apply to Category 2 engines below 3700 kW; no Tier 3 standards apply for Category 2 engines at or above 3700 kW, although there are Tier 4 standards that apply.

16 An alternative set of Tier 3 and Tier 4 standards for PM, NOx, and HC are available for Category 2 engines at or above 1400 kW, but must be applied to all of a manufacturer's engines in a given displacement category in model years 2012 through 2015.

4.3 Marine and Other Vessel: Solid Waste

The disposal of solid wastes from ships can be regulated under a number of international conventions, including (but not limited to):

- London Convention/London Protocol (ocean dumping)
- MARPOL Annex V (garbage from vessels)

Several CAFTA-DR countries and the United States are parties to MARPOL Annex V and the London Convention. The United States is a signatory to the London Protocol (but has not ratified the convention).

The London Convention governs the deliberate disposal of wastes or other matter from vessels, aircraft, platforms, and other man-made structures at sea. The London Convention prohibits the disposal at sea of radioactive wastes and other radioactive matter. For additional information about the London Convention, see http://water.epa.gov/type/oceb/oceandumping/dredgedmaterial/londonconvention.cfm.

In the United States the disposal of dredged material into ocean waters is governed by the Marine Protection, Research and Sanctuaries Act, which implements the requirements of the London Convention. The ocean dumping regulations are found at 40 CFR Parts 220-229.

Annex V of MARPOL prohibits ocean dumping of all ship-generated plastics and regulates the dumping of other garbage. The U.S. implements Annex V pursuant to APPS (the Act to Prevent Pollution from Ships). Table C-17 shows United States's regulations that implement the requirements of MARPOL.

Table C- 17: Summary of garbage discharge restrictions for vessels in the United States

Garbage Type	All Vessels Except Fixed or Floating Platforms and Associated Vessels	
	Outside special areas (33 CFR 151.69)	**In special areas[2] (33 CFR 151.71)**
Plastics, including synthetic ropes and fishing nets and plastic bags	Disposal prohibited (33 CFR 151.67)	Disposal prohibited (33 CFR 151.67)
Dunnage, lining, and packaging materials that float	Disposal prohibited less than 25 miles from nearest land and in the navigable waters of the U.S.	Disposal prohibited (33 CFR 151.71)
Paper, rags, glass, metal bottles, crockery and similar refuse	Disposal prohibited less than 12 miles from nearest land and in the navigable waters of the U.S.	Disposal prohibited (33 CFR 151.71)
Paper, rags, glass, etc. -- comminuted or ground[1]	Disposal prohibited less than 3 miles from nearest land and in the navigable waters of the U.S.	Disposal prohibited (33 CFR 151.71)
Victual waste[4] not comminuted or ground	Disposal prohibited less than 12 miles from nearest land and in the navigable waters of the U.S.	Disposal prohibited less than 12 miles from nearest land
Victual waste comminuted or ground[1]	Disposal prohibited less than 3 miles from nearest land and in the navigable waters of the U.S.	Disposal prohibited less than 12 miles from nearest land

Source: "Cruise Ship Discharge Assessment Report," page 5-5, http://water.epa.gov/polwaste/vwd/upload/2009_01_28_oceans_cruise_ships_section5_solidwaste.pdf

Notes to "Summary of Garbage Discharge Restrictions for Vessels":

1 Comminuted or ground garbage must be able to pass through a screen with a mesh size no larger than 25 mm (1inch) (33 CFR 151.75).
2 Special areas under Annex V are the Mediterranean, Baltic, Black, Red, and North Seas areas, the Gulfs area, the Antarctic area, and the Wider Caribbean region, including the Gulf of Mexico and the Caribbean Sea (33 CFR 151.53).
3 When garbage is mixed with other substances having different disposal or discharge requirements, the more stringent disposal restrictions shall apply.
4 Victual waste is any spoiled or unspoiled food waste.

4.3.1 Toxic Chemicals: Paints and Anti-Fouling Systems

The International Convention on the Control of Harmful Anti-Fouling Systems on Ships prohibits the use of harmful organotins in anti-fouling paints used on ships and seeks to prevent the future use of other harmful substances in anti-fouling systems. See table C-18 for an overview of regulations concerning anti-fouling systems in various countries.

Table C- 18: Regulations on use of organotin-based anti-foulants

Regulations	United States/Puerto Rico	Canada	Australia	United Kingdom	EU Countries
Vessels <25m: all organotin-based antifouling coatings prohibited; exemptions for aluminum structures.	X	X			X
Vessels <25m: all organotin-based antifouling coatings prohibited; no exemptions for aluminum structures.			X		
Vessels <25m: TBT -based antifouling coatings prohibited; no exemptions foraluminum structures.					X
All antifouling products containing triorganotins banned on vessels <25m,and on fish-farming equipment.				X	
Vessels >25m: TBT antifouling available only in 20l containers.					X
Vessels >25m: low release rate(<4µg TBT/cm2/day) permitted.	X	X			
Vessels >25m: low release rate(<5µg TBT/cm2/day) permitted.			X		
All antifoulants must be registered.	X	X	X	X	X
TBT paints can only be applied by certified operator.	X				
All antifoulants registered as pesticides, sale and use must be approved by Advisory Committee on pesticides.				X	
Triorganotin paints only sold In drums of 20l or more; must contain <7.5% total tin in copolymers or 2.5% total tin as free tin.				X	

Source: "Anti-Fouling Systems," IMO, http://www.imo.org/OurWork/Environment/Anti-foulingSystems/Documents/FOULING2003.pdf

5 BIODIVERSITY/ECOSYSTEMS

5.1 Protection of Coral Reefs

There have been increasing efforts to establish better management and conservation measures to protect the diversity of these biologically rich coral reefs on both the national and international levels. Current management efforts recognize the importance of including reefs as part of a larger system, where integrated coastal zone management tools and watershed concepts can be used in the

development of comprehensive management and conservation plans. Important efforts in coral reef conservation and management include the U.S. Coral Reef Task Force and the International and the U.S. Coral Reef Initiatives. For more information on these initiatives, see http://water.epa.gov/type/oceb/habitat/initiative.cfm#3.

Table C- 19: Summary of monitoring programs relevant to coral reef ecosystems under U.S. jurisdiction

Program	Location	Period	Status	Parameters
Flower Gardens National Marine Sanctuary Monitoring Program	Gulf of Mexico	1972 - present	Ongoing	Photo techniques and direct measurements of coral cover, population levels, diversity, evenness, accretionary encrusting growth
Virgin Islands National Park	U.S. Virgin Islands - St. John	1989 -present	Ongoing	Coral and macroalgae cover.
CARICOMP	Puetro Rico	1993-present	Ongoing	CARICOMP Level 1
NOAA Mussel Watch Program	Florida Keys (6 sites), Hawaii (4 sites)	1986-present	Ongoing	Trace metals and organiccompounds
NOAA Status & Trends - Benthic Surveillance	Florida Keys & vicinity – some cruises with EPA/EMAP	1984-1994	Stopped	Sediment samples, fish, chemistry, fish biology
Dry Tortugas National Park Coral Reef Monitoring	Florida – Dry Tortugas (3 sites) 1	1989-1995	Stopped	Quadrate sampling of stony & soft coral spp. abundance, diversity & evenness
Harbor Branch – Carysfort Reef Florida 1974 -1982	Florida	1974-1982	Intermittent	Coral cover, diversity, recruitment, & mortality
The History of A. palmata	Florida - Dry Tortugas	1881 - 1993	Intermittent	Distribution & abundance
University of Georgia - Institute of Ecology	Florida - Looe Key (2 sites), Key Largo (2 sites), Biscayne National Park (2 sites)	1984 - 1991	Intermittent	Photo stations monitoring species number, % cover, & species diversity for scleractinia & hydrozoan corals
Kaneohe Bay	Hawaii - Kaneohe Bay	1970 - 1990	Intermittent	Changes in coral & algal cover, changes in coral spp. diversity
University of Guam technical reports, theses, publications	Marianas Islands - various locations	Starting in late 1960's	Intermittent	Coral cover & recruitment, sedimentation, fish catch

Source: Stephen Jameson, et. al, "Development of Biological Criteria for Coral Reef Ecosystem Assessment Citation," http://water.epa.gov/type/oceb/habitat/biocrit.cfm

5.2 Specially Protected Areas

Article 10 of the Cartagena Convention provides that parties should establish specially protected areas to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species, in the Convention area. In the United States, these specially protected areas are called Marine Protection Areas.

5.3 Aquatic Invasive Species

The issue of invasive species is recognized by a number of treaties such as the Convention on Biological Diversity (CBD). Article 12 of the Specially Protected Areas and Wildlife (SPAW) Protocol provides that each Party "shall take all appropriate measures to regulate or prohibit intentional or accidental introduction of non-indigenous or genetically altered species to the wild that may cause harmful impacts to the natural flora, fauna or other features."

The US EPA is a member of the United States delegation to the Marine Environment Protection Committee. Aquatic invasive species are regulated domestically in the United States under the National Invasive Species Act and the Nonindigenous Aquatic Nuisance Prevention and Control Act. For additional information on the US EPA's work on combating aquatic invasive species, see http://water.epa.gov/polwaste/vwd/ballastwater/invasive_species_index.cfm. Additionally, the US EPA is working to develop national numerical standards for ballast water. For more information, see http://cfpub.epa.gov/npdes/home.cfm?program_id=350.

6 INTERNATIONAL TREATIES AND AGREEMENTS

CAFTA-DR countries have ratified and/or signed a number of international treaties and agreements which provide commitments to adopting and implementing a range of environmental protection regimes. Most do not confer specific quantitative benchmarks for performance and therefore are not summarized in this Appendix. However, for convenience they are listed below by the date of publication.

Table C- 20: Multilateral environmental agreements ratified (R) , signed (S) or member (M) by CAFTA-DR countries

Multilateral Environmental Agreement	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
Air Pollution						
Kyoto Protocol to the United Nations Framework Convention on Climate Change **entered into force** - 23 February 2005	R	R	R	R	R	R
Montreal Protocol on Substances That Deplete the Ozone Layer **entered into force** – 1 January 1989	R	R	R	R	R	R
Protocol of 1978 Relating to the International Convention for the Prevention of Pollution From Ships, 1973 (MARPOL) entered into force - 2 October 1983 Annex VI to MARPOL - Regulations for the Prevention of **Air Pollution from Ships** entered into force **-** 19 May 2005	R	R	R	R	R	R
United Nations Framework Convention on **Climate Change** entered into force **-** 21 March 1994	R	R	R	R	R	R
Biodiversity/Ecosystems						
Protocol Concerning Specially **Protected Areas and Wildlife** (1990 SPAW Protocol) entered into force 18 June 2000		R	*			
Convention on **Biological Diversity** - abbreviated as Biodiversity entered into force - 29 December 1993	R	R	R	R	R	R
Convention on the International Trade in **Endangered Species** of Wild Flora and Fauna (CITES) entered into force - 1 July 1975	R	R	R	R	R	R
Convention on **Wetlands** of International Importance Especially as Waterfowl Habitat (Ramsar) entered into force - 21 December 1975	R	R	R	R	R	R
United Nations Convention to Combat Desertification in Those Countries Experiencing Serious **Drought and/or Desertification,** Particularly in Africa entered into force - 26 December 1996	R	R	R	R	R	R
International **Tropical Timber** Agreement, 1994 entered into force - 1 January 1997				R	R	
International Convention for the Control and Management of **Ships' Ballast Water and Sediments**, 2004 – Not yet in force for control of invasive species						

Multilateral Environmental Agreement	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
International Convention for the Regulation of **Whaling** entered into force - 10 November 1948	R			R		R
Solid and Hazardous Wastes						
Basel Convention on the Control of Transboundary Movements of **Hazardous Wastes** and Their Disposal entered into force - 5 May 1992	R	R	R	R	R	R
International Convention on Liability and Compensation for Damage in connection with the **Carriage of Hazardous and Noxious** Substances by Sea, 1996 – not yet in force						
Protocol of 1978 Relating to the International Convention for the Prevention of **Pollution From Ships**, 1973 (MARPOL) entered into force - 2 October 1983	R	R	R	R	R	R
Annex II to MARPOL - Regulations for the Control of Pollution by **Noxious Liquid Substances in Bulk** entered into force - 6 April 1987	R	R	R	R	R	R
Annex III to MARPOL - Regulations for the Prevention of Pollution by **Harmful Substances Carried by Sea in Packaged** Form entered into force - 1 July 1992	R	R	R	R		R
Annex V to MARPOL - Regulations for the Prevention of **Pollution by Garbage from Ships** entered into force - 31 December 1988	R	R	R	R	R	R
Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 entered into force - 14 June 2007						
Water Pollution						
Protocol of 1978 Relating to the International Convention for the Prevention of **Pollution From Ships**, 1973 (MARPOL) entered into force - 2 October 1983 Annex IV to MARPOL - Regulations for the **Prevention of Pollution by Sewage from Ships** entered into force - 27 September 2003	R	R	R	R	R	R
Convention for the Cooperation in the Protection and Sustainable Development of the **Marine and Coastal Environment of the Northeast Pacific**	R	*	R	R	R	R
Convention for the Protection and Development of the **Marine Environment of the Wider Caribbean** (1983 Cartagena Convention) entered into force - 11 October 1986	R	R	*	R	R	R
Convention on the Prevention of **Marine Pollution by Dumping Wastes** and Other Matter (London Convention) entered into force - 30 August 1975	R	R		R	R	
1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 entered into force – 24 March 2006						
United Nations Convention on the **Law of the Sea** (LOS) entered into force - 16 November 1994	R	S	S	R	R	R
United Nations Environmental Programme – **Regional Seas Programme** – **Caribbean Environment** Program	M	M	*	M	M	M
Water Pollution: Land-Based Sources						
Protocol Concerning **Pollution from Land-Based Sources** and Activities (1999 LBS Protocol) entered into force - 13 August 2010			*			
Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques entered into force - 5 October 1978	R			R		R
Water Pollution: From Ships						
Protocol Concerning Cooperation in Combating **Oil Spills in the Wider Caribbean**	R	R	*	R	R	R

Multilateral Environmental Agreement	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
Region (1983 Oil Spill Protocol) entered into force - 11 October 1986						
International Convention for the Control and Management of **Ships' Ballast Water and Sediments**, 2004 – Not yet in force						
International Convention on the Control of **Harmful Anti-fouling Systems on Ships**, 2001 entered into force - September 17, 2008						
International Convention on **Oil Pollution Preparedness, Response and Co-operation,** 1990 entered into force 13 May 1995			R			
Protocol of 1978 Relating to the International Convention for the **Prevention of Pollution From Ships**, 1973 (MARPOL) entered into force - 2 October 1983	R	R	R	R	R	R
Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL PROT 1997) entered into force 19 May 2005	R	R	R	R	R	R
Annex I to MARPOL - Regulations for the Prevention of **Pollution by Oil** entered into force - 2 October 1983	R	R	R	R	R	R
Hong Kong International Convention for the **Safe and Environmentally Sound Recycling of Ships**, 2009 – Not yet in force						
Nairobi International Convention on the **Removal of Wrecks**, 2007 – Not yet in force						

Source: https://www.cia.gov/library/publications/the-world-factbook/appendix/appendix-c.html

*Not included in the convention area

7 TOURISM SECTOR WEBSITE REFERENCES

More information on environmental impacts, mitigation measures, industry best practices, and quantitative standards for the tourism sector can be found at the following websites:

BLUE COMMUNITY PROGRAM

http://www.bluecommunity.info/

INTERNATIONAL MARITIME ORGANIZATION

http://www.imo.org/Pages/home.aspx

UNITED NATIONS ENVIRONMENTAL PROGRAMME

Integrating Biodiversity into the Tourism Sector: Best Practices
http://www.unep.org/bpsp/tourism/tourism%20synthesis%20report.pdf

Caribbean Environmental Programme-Tourism
http://www.cep.unep.org/issues/tourism.htm

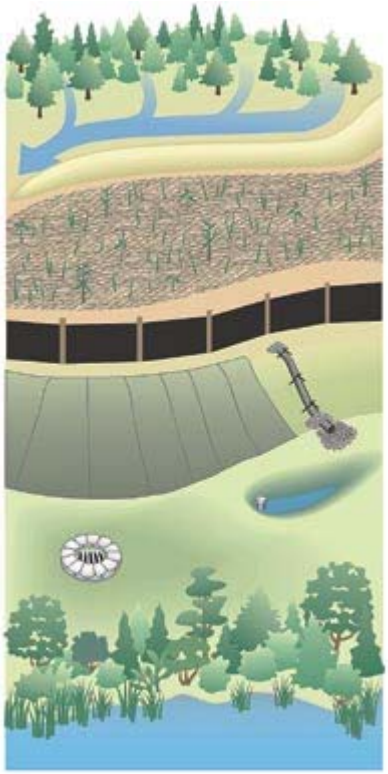
APPENDIX D. RULES OF THUMB FOR EROSION AND SEDIMENTATION CONTROL

RULES OF THUMB FOR EROSION AND SEDIMENT CONTROL
(Excerpted from Kentucky Erosion Prevention and Sediment Control Field Guide)

TETRA TECH funded by
Kentucky Division of Water (KDOW), Nonpoint Source Section
and the Kentucky Division of Conservation (KDOC) through a grant from USEPA

http://www.epa.gov/region8/water/stormwater/pdf/Kentucky%20Erosion%20prevention%20field%20guide.pdf

This Appendix presents illustrations and photographs of Best Management Practices for Erosion and Sediment Control. This information was excerpted from the US EPA funded Kentucky Erosion Prevention and Sediment Control Field Guide.



BASIC RULES

Preserve existing Vegetation

Divert upland runoff around exposed soil

Seed/mulch/ cover bare soil immediately

Use sediment barriers to trap soil in runoff

Protect slopes and channels from gullying

Install sediment traps and settling basins

Preserve vegetation near all waterways

NEED FOR EROSION AND SEDIMENT CONTROL MEASURES

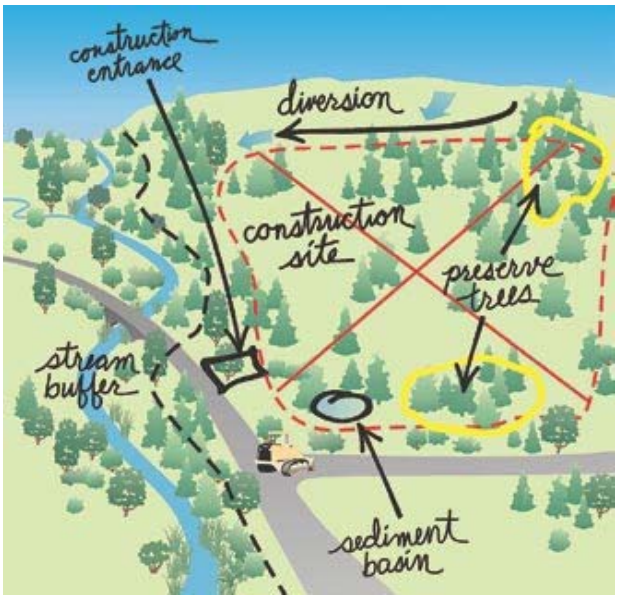
	Soil Type		
Slope Angle	**Silty**	**Clays**	**Sandy**
Very Steep (2:1 or more)	*Very high*	*High*	*High*
Steep (2:1–4:1)	*Very High*	*High*	*Moderate*
Moderate (5:1–10:1)	*High*	*Moderate*	*Moderate*
Slight (10:1–20:1	*Moderate*	*Moderate*	*Low*

PRIORIZATION OF EROSION AND SEDIMENT CONTROL MEASURES

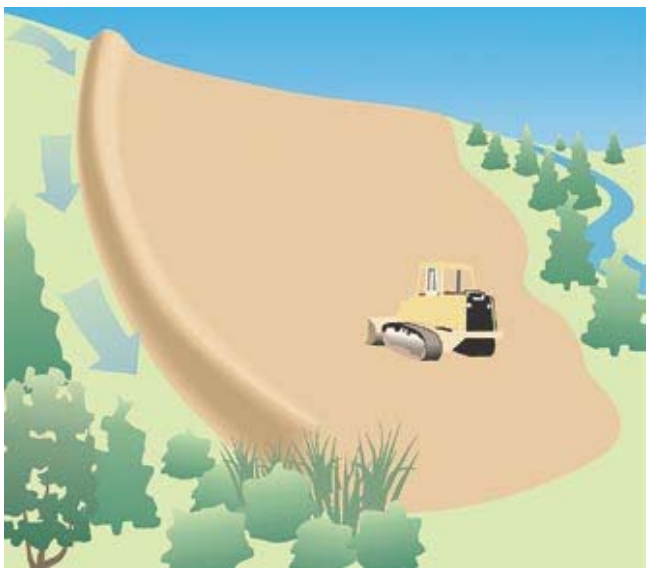
PRACTICE	COST	EFFECTIVENESS
Limiting disturbed area through phasing	**$**	*****
Protecting disturbed areas with mulch and revegetation	**$$**	****
Installing diversions around disturbed areas	**$$$**	***
Sediment removal through detention of all site drainage	**$$$$**	**
Other structural controls to contain sediment laden drainage	**$$$$$**	*

PLAN AHEAD

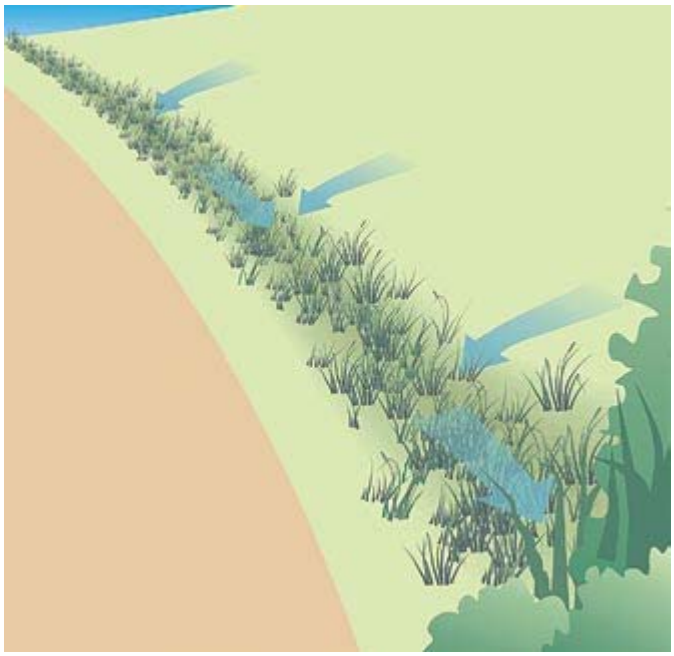
Identify drainage areas and plan for drainage ditches and channels, diversions, grassed channels, sediment traps/basins, down slope sediment barriers, and rock construction and install before beginning excavation.



DIVERT RUNOFF AROUND EXCAVATION AND DISTURBANCE



Berms and ditches diverting clean upland runoff around construction sites reduce erosion and sedimentation problems. Seed berms and ditches after construction.

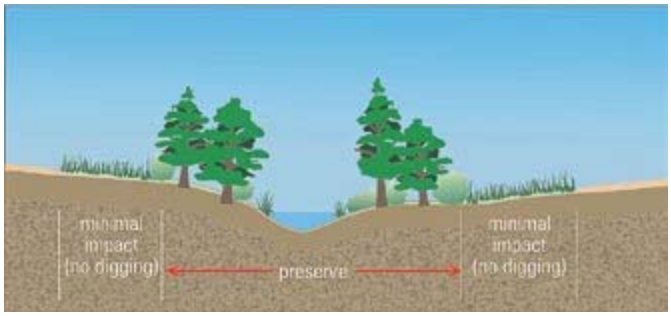


Diversion ditches should be lined with grass at a minimum, and blankets if slopes exceed 10:1

VEGETATIVE BUFFERS

Vegetated buffers above or below your work site are always a plus.

They trap sediment before it can wash into waterways, and prevent bank erosion.



Vegetated waterways help move upland water through or past your site while keeping it clear of mud. Do not disturb existing vegetation along banks, and leave a buffer of tall grass and shrubs between stream bank trees and disturbed areas.

Good construction, seeding, and stabilization of diversion berm. Note that diversion ditch is lined with grass on flatter part of slope, and with rock on steeper part.

SOIL COVER VS EROSION PROTECTION

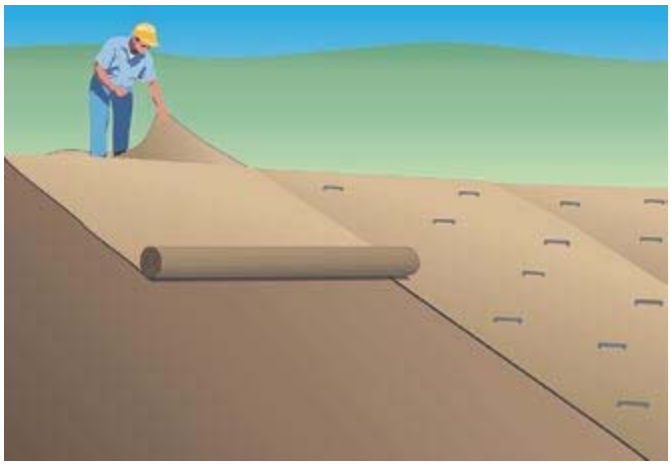
SOIL COVERING	EROSION REDUCTION
Mulch (hay or straw)	
1.2 ton per 0.4 hectare	75 percent
1 ton per 0.4 hectare	87 percent
2 tons per 0.4 hectare	98 percent
Grass (seed or sod)	
40 percent cover	90 percent
60 percent cover	96 percent
90 percent cover	99 percent
Bushes and shrubs	
25 percent cover	60 percent
75 percent cover	72 percent
Trees	
25 percent cover	58 percent
75 percent cover	64 percent
Erosion control blankets	95–99 percent

Prepare bare soil for planting by disking across slopes, scarifying, or tilling if soil has been sealed or crusted over by rain. Seedbed must be dry with loose soil to a depth of 3 to 6 inches.

For slopes steeper than 4:1, walk bulldozer or other tracked vehicle up and down slopes before seeding to create tread-track depressions for catching and holding seed. Mulch slopes after seeding if possible. Cover seed with erosion control blankets or turf mats if slopes are 2:1 or greater. Apply more seed to ditches and berms.

Erosion and sediment loss is virtually eliminated on seeded areas (left side). Rills and small gullies form quickly on unseeded slopes (right).

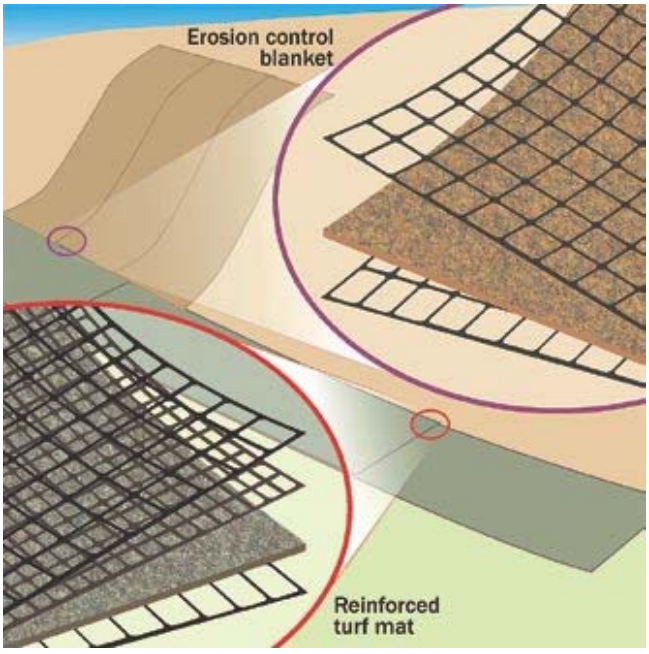
BLANKET INSTALLATION (GEOFABRIC)



Install blankets and mats vertically on long slopes. Unroll from top of hill, staple as you unroll it. Do not stretch blankets.

Erosion control blankets are thinner and usually degrade quicker than turf reinforced mats. Check manufacturer's product information for degradation rate (life span), slope limitations, and installation.

Remember to apply seed, fertilizer, and lime before covering with blankets or mats!

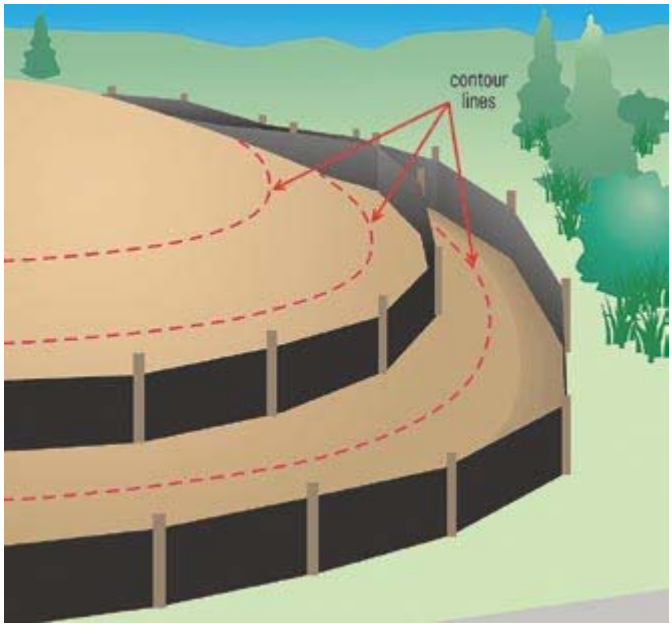


Blankets installed along stream banks or other short slopes can be laid horizontally. Install blankets vertically on longer slopes. Ensure 15 cm minimum overlap.

BLANKET INSTALLATION

SITE CONDITIONS	BLANKET INSTALLATION NOTES
Ditches and channels (from high flow line to ditch bottom)	• Grade, disk, and prepare seedbed. • Seed, lime, and fertilize the area first • Install horizontally (across slope). • Start at ditch bottom. • Staple down blanket center line first. • Staple & bury top in 8" deep trench. • Top staples should be 12" apart. • Uphill layers overlap bottom layers. • Side overlap should be 6"–8". • Side & middle staples = 24" apart. • Staple below the flow level every 12". • Staple thru both blankets at overlaps.
Long slopes, including areas above ditch flow levels	• Grade, disk, and prepare seedbed. • Seed, lime, and fertilize first. • Install vertically (up & down hill). • Unroll from top of hill if possible. • Staple down center line of blanket first. • Staple & bury top in 8" deep trench. • Top staples should be 12" apart. • Side & middle staples = 24" apart. • Uphill layers overlap downhill layers. • Overlaps should be 6"–8". • Staple thru both blankets at overlap.

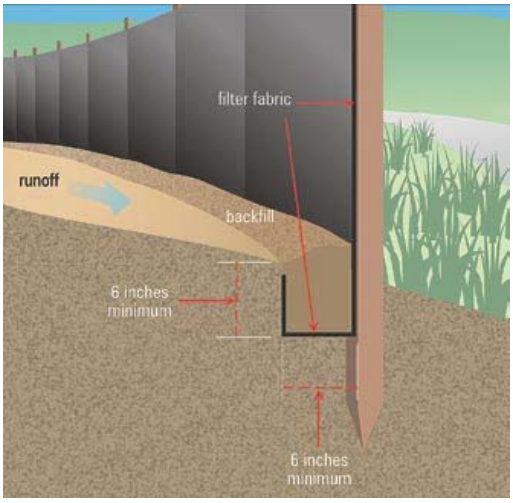
SEDIMENT BARRIERS (Silt fences and others)



Silt fences should be installed on the contour below bare soil areas.

Use multiple fences on long slopes 20 to 26 meters a part. Remove accumulated sediment before it reaches halfway up the fence.
Each 33-meter section of silt fence can filter runoff from about 0.6 hectare (about 35 meters uphill). To install a silt fence correctly, follow these steps:

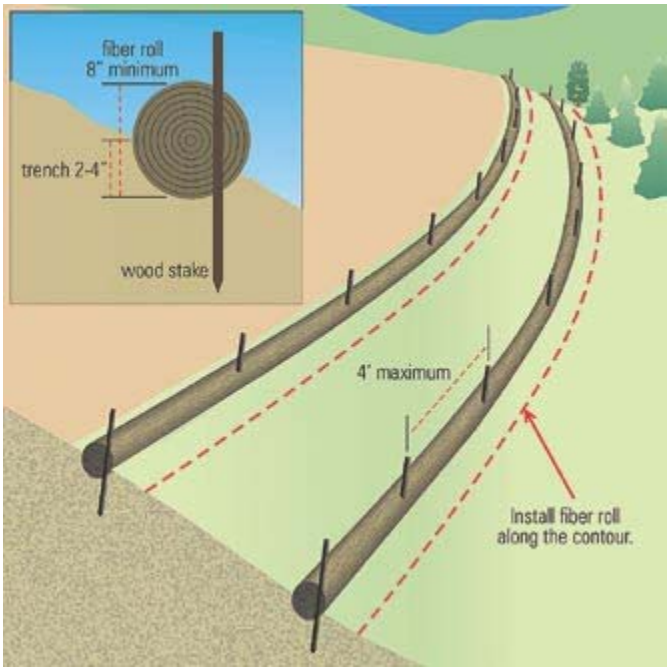
- Note the location & extent of the bare soil area.
- Mark silt fence location just below bare soil area.
- Make sure fence will catch all flows from area.
- Dig trench 15 centimeters deep across slope.
- Unroll silt fence along trench.



- Join fencing by rolling the end stakes together.
- Make sure stakes are on downhill side of fence.
- Drive stakes in against downhill side of trench.
- Drive stakes until 20 to 25 centimeters of fabric is in trench.
- Push fabric into trench; spread along bottom.
- Fill trench with soil and tamp down.

Stakes go on the downhill side. Dig trench first, install fence in downhill side of trench, and tuck fabric into trench, then backfill on the uphill side (the side toward the bare soil area).

Use J-hooks to trap and pond muddy runoff flowing along uphill side of silt fence. Turn ends of silt fence toward the uphill side to prevent bypassing. Use multiple J-hooks every 17 to 50 meters for heavier flows.



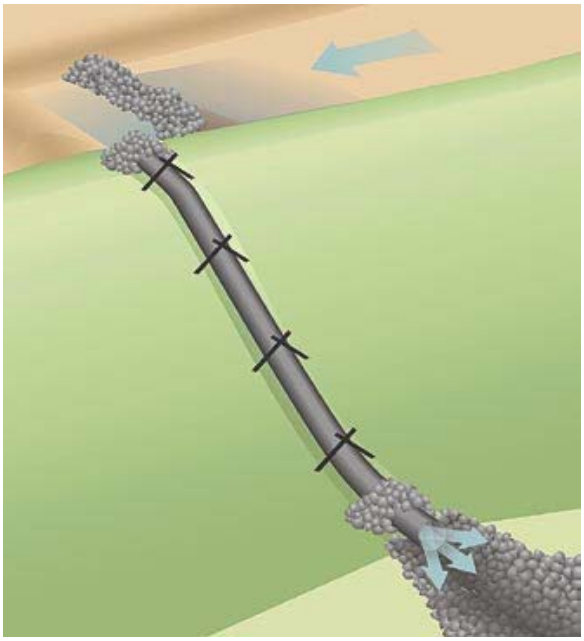
Fiber rolls can be used to break up runoff flows on long slopes. Install on the contour and trench in slightly. Press rolls firmly into trench and stake down securely. Consult manufacturer's instructions for expected lifespan of product, slope limits, etc. As always, seed and mulch long slopes as soon as possible.

Very good installation of multiple silt fences on long slope. Turn ends of fencing uphill to prevent bypass. Leave silt fences up until grass is well established on all areas of the slope. Re-seed bare areas as soon as possible. Remove or spread accumulated sediment and remove silt fence after all grass is up.

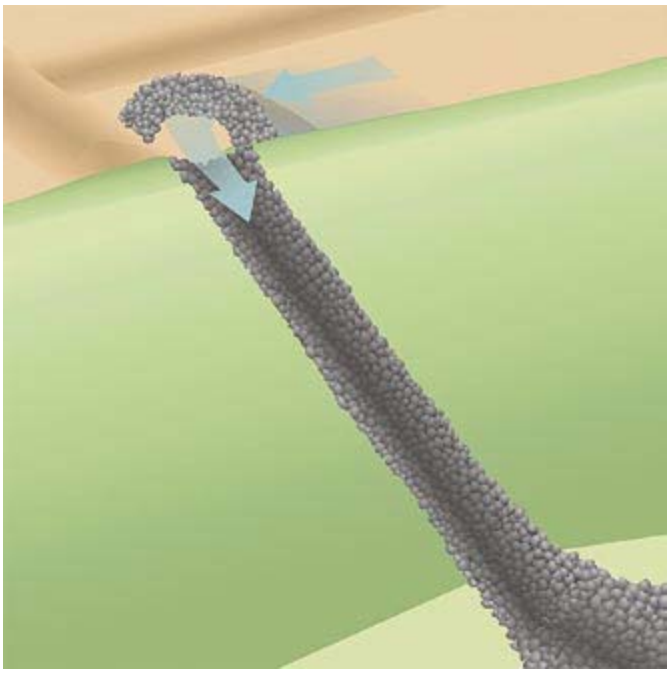
SLOPE PROTECTION TO PREVENT GULLIES

If soil is:	Erosion will be:
Compacted and smooth	30 percent *more*
Tracks across slopes	20 percent *more*
Tracks up & down slopes	10 percent *less*
Rough and irregular	10 percent *less*
Rough & loose to 12" deep	20 percent *less*

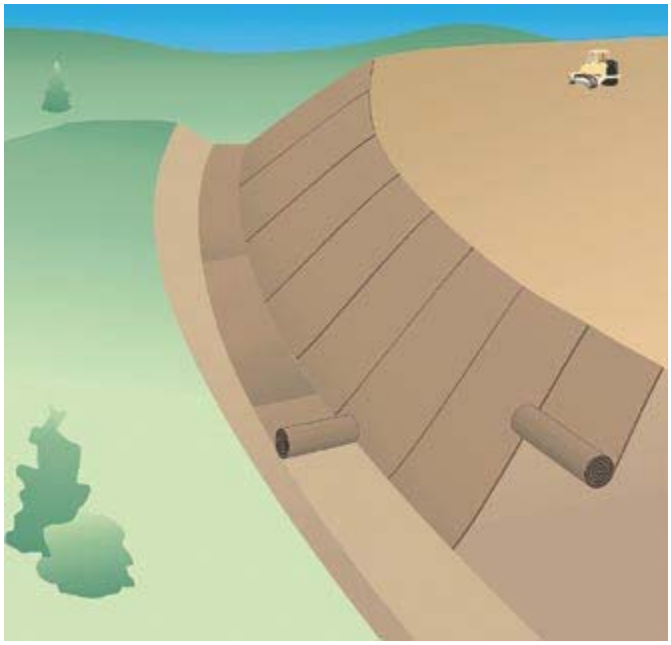
Tread-track slopes up and down hill to improve stability.



Temporary down drain using plastic pipe. Stake down securely, and install where heavy flows need to be transported down highly erodible slopes. Note silt check dam in front of inlet.



Temporary or permanent down drain using geotextile underliner and riprap. All slope drains must have flow dissipaters at the outlet to absorb high energy discharges, and silt checks at the inlet until grass is established.

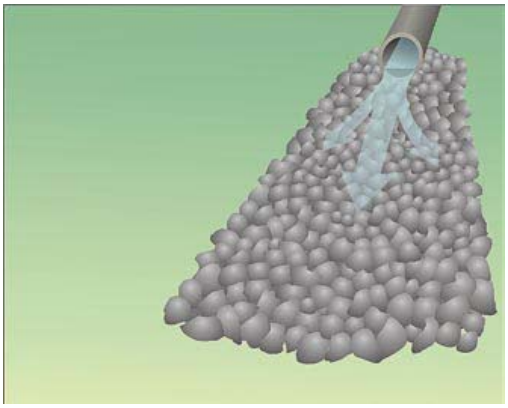


Steep, long slopes need blankets or mats. Install blankets and mats up and down long slopes. For channels below slopes, install horizontally. Don't forget to apply seed, lime, and fertilizer (if used) before installing blanket.

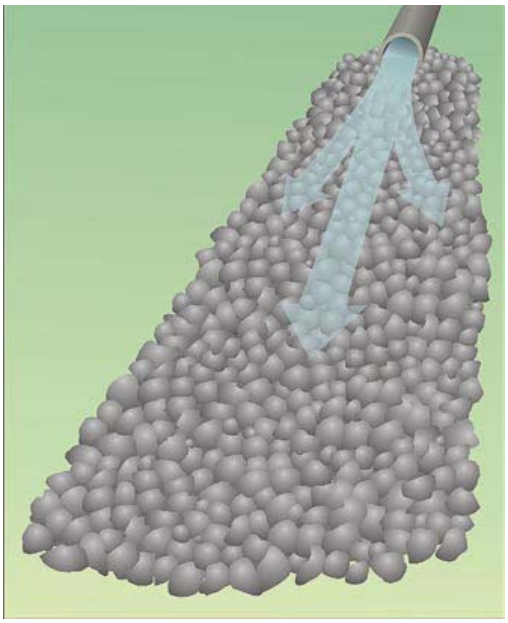
Other methods that could be considered are breaking up steep slopes with terraces, ditches along contours, straw bales and other methods.

PROTECTING DITCHS AND CULVERTS INLETS/OUTLETS

Very good application of mixed rock for culvert inlet ponding dam. Mixing rock promotes better ponding, drainage, and settling of sediment.



Low-flow energy dissipaters (above) are shorter than those for high-flow outlets (below).

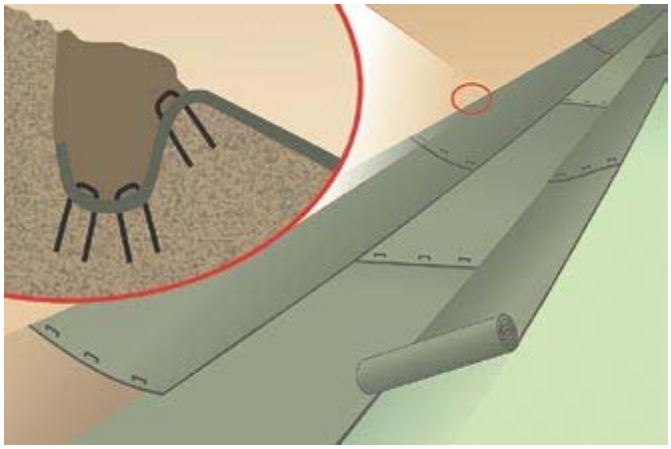


Excellent placement and construction of rock apron to dissipate flows from culvert outlet. Area needs seeding and mulching.

STABILIZING DRAINAGE DITCHES

Stabilization approaches for drainage ditches

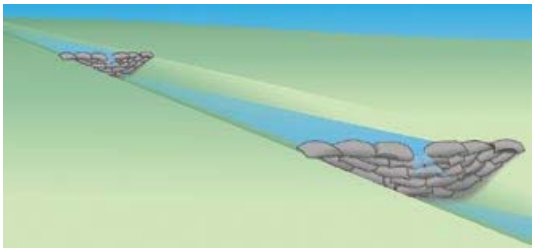
	Soil Type in Ditch		
Ditch Slope	**Sandy**	**Silty**	**Clays**
Steep >10%	Concrete or riprap	Concrete or riprap	Riprap
Moderate 10%	Riprap with filter fabric	Riprap or turf mats &seeding	Riprap or turf mats& seeding
Slight 5%	Riprap or turf mats &seeding	Seeding &turf mats	Seeding &turf mats
Mostly Flat <3%	Seeding &blankets	Seeding &mulching	Seeding &mulching



Lay in ditch blankets similar to roof shingles; start at the lowest part of the ditch, then work your way up. Uphill pieces lap over downhill sections. Staple through both layers around edges. Trench, tuck, and tamp down ends at the top of the slope. Do not stretch blankets or mats.

Check Dams

Silt check dams of rock, stone-filled bags, or commercial products must be installed before uphill excavation or fill activities begin. See table below for correct silt check spacing for various channel slopes. Tied end of bag goes on downstream side.



Spacing of Check Dams in Ditches

Ditch Slope	Check Dam Spacing (meters)	Additional Information
30%	*3.2*	*Calculated for 1 meter high check dam*
20%	*5*	
15%	*7*	
10%	*12*	*Center of the dam should be 150 centimeters lower than the sides*
5%	*17*	
3%	*33*	
2%	*50*	*Use 15 to 25 cm rock, stone bags, or commercial products*
1%	*100*	
0.5%	*200*	

Good installation of temporary rock silt checks. Remember to tie sides of silt check to upper banks. Middle section should be lower. Clean out sediment as it accumulates. Remove silt checks after site and channel are stabilized with vegetation.

Good placement and spacing of fiber-roll silt checks. Coconut fiber rolls and other commercial products can be used where ditch slopes do not exceed three percent.

DITCH LINING

Ditch lined with rock.

Rock Sizing for ditch liners

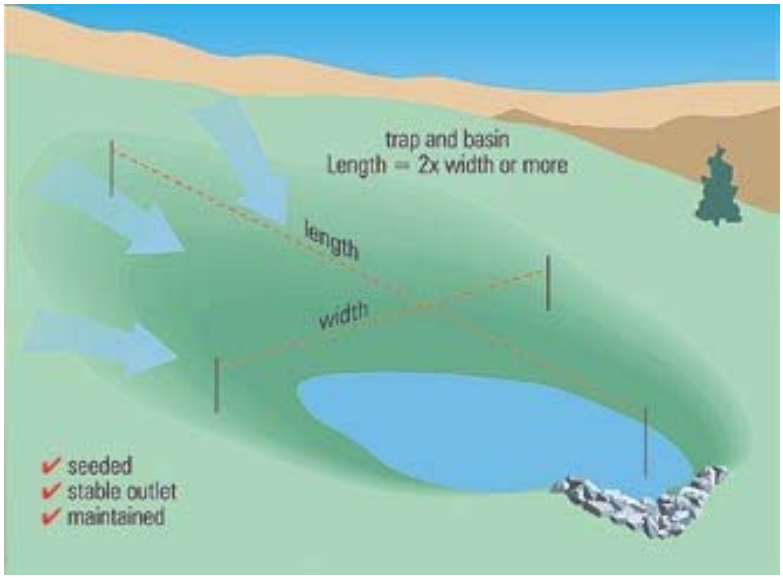
Flow Velocity	Average rock diameter
2 m/sec	12.5 cm
2.5 m/sec	25.0 cm
3.3 m/sec	35.0 cm
4 m/sec	50.0 cm

SEDIMENT TRAPS AND BASINS

In general, sediment traps are designed to treat runoff from about 1 to 5 acres. Sediment basins are larger, and serve areas of about 5 to 10 acres. Basins draining areas larger than 10 acres require an engineered design, and often function as permanent storm water treatment ponds after construction is complete.

Sediment traps

Any depression, swale, or low-lying place that receives muddy flows from exposed soil areas can serve as a sediment trap. Installing several small traps at strategic locations is often better than building one large basin. The simplest approach is to dig a hole or build a dike (berm) of earth or stone where concentrated flows are present. This will help to detain runoff so sediment can settle out. The outlet can be a rock lined depression in the containment berm.



Sediment basins

Sediment basins are somewhat larger than traps, but the construction approach is the same. Sediment basins usually have more spillway protection due to their larger flows. Most have risers and outlet pipes rather than rock spillways to handle the larger flows. Sediment basins are often designed to serve later as storm water treatment ponds. If this is the case, agreements are required for long-term sediment removal and general maintenance. Construction of a permanent, stable outlet is key to long-term performance.

Sizing and design considerations

A minimum storage volume of 130 cubic meters per 0.4 hectare of exposed soil drained is required for basins and traps. Traps and basins are designed so that flow paths through the trap or basin are as long as possible, to promote greater settling of soil particles. Sediment basin length must be twice the width or more if possible—the longer the flow path through the basin, the better.

Side slopes for the excavation or earthen containment berms are 2:1 or flatter. Berms are made of well-compacted clayey soil, with a height of 1.5 meters or less. Well mixed rock can also be used as a containment berm for traps. Place soil fill for the berm or dam in 15 cm layers and compact. The entire trap or basin, including the ponding area, berms, outlet, and discharge area, must be seeded and mulched immediately after construction. An overflow outlet can be made by making a notch in the containment berm and lining it with rock. Rock in the notch must be large enough to handle over-flows, and the downhill outlet should be stabilized with rock or other flow dissipaters similar to a culvert outlet. Overflow should be at an elevation so dam will not overtop. Allow at least 0.33 meter of freeboard. Outlets must be designed to promote sheet flow of discharges onto vegetated areas if possible. If the discharge will enter a ditch or channel, make sure it is stabilized with vegetation or lined.

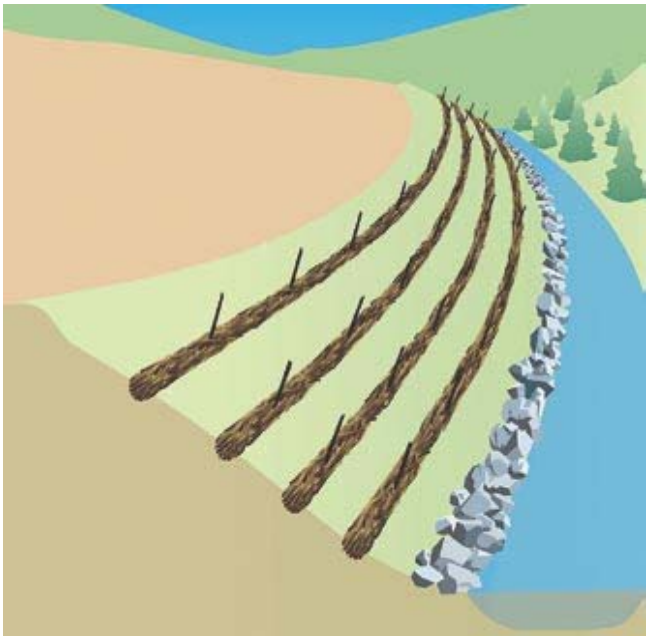
PROTECTING STREAMS AND STREAM BANKS

Recommended Setbacks of Activities from Streams

	Soil Type Along Banks		
Bank Slope	**Sandy**	**Silty**	**Clays**
Very Steep (2:1 or more)	33 m	27 m	20 m
Steep (4:1 or more)	27 m	20 m	13 m
Moderate (6:1 or more)	20 m	13 m	10 m
Mostly flat (< 10:1)	13 m	10 m	6.5 m

Vegetated buffers

Preserve existing vegetation near waterways wherever possible. This vegetation is the last chance barrier to capture sediment runoff before it enters the lake, river, stream, or wetland. Where vegetation has been removed or where it is absent, plant native species of trees, shrubs, and grasses.



Live hardwood stakes driven through live wattles or rolls and trenched into slope provide excellent stream bank protection. Protect toe of slope with rock or additional rolls or rocks.

STREAM CROSSINGS

Keep equipment away from and out of streams. If a temporary crossing is needed, put it where the least stream or bank damage will occur. Look for:

- Hard stream bottom areas
- Low or gently sloping banks
- Heavy, stable vegetation on both sides

Use one or more culverts, as needed, sized to carry the two-year 24-hour rain storm. Cover culverts with at least 27 cm of soil and at least 15 cm inches of mixed rock. An 8.5 meter long, 15 cm thick pad of rock should extend down the haul road on each side of the crossing.

Good use of silt fence, straw, rock and other practices for temporary stream crossing. Any work in stream channels—such as installation of culverts

APPENDIX E. SAMPLING AND ANALYSIS PLAN

GUIDANCE AND TEMPLATE

VERSION 2, PRIVATE ANALYTICAL SERVICES USED
R9QA/002.1
April, 2000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9

This Sampling and Analysis Plan (SAP) guidance and template is based USEPA guidance as presented at http://ndep.nv.gov/BCA/file/reid_sap.pdf. It is intended assist organization in documenting the procedural and analytical requirements for baseline and routine monitoring of surface water ground water, soils, and biological samples. It has originally developed to characterize contaminated land but has been modified here to address sampling, laboratory analysis, and quality control/quality assurance for evaluation pre-mining, mining, and post mining hydrologic and biologic conditions. This guide is to be used as a template. It provides item-by-item instructions for creating a SAP and includes example language which can be used with or without modification.

1 INTRODUCTION

[This section should include a brief description of the project, including the history, problem to be investigated, scope of sampling effort, and types of analyses that will be required. These topics will be covered in depth later so do not include a detailed discussion here.]

1.1 Site Name or Sampling Area

[Provide the most commonly used name of the site or sampling area.]

1.2 Site or Sampling Area Location

[Provide a general description of the region, or district in which the site or sampling area is located. Detailed sampling location information should be provided later in Section 2.]

1.3 Responsible Organization

[Provide a description of the organization conducting the sampling.]

1.4 Project Organization

[Provide the name and phone number(s) of the person(s) and/or contractor working on the sampling project as listed in the table. The table can be modified to include titles or positions appropriate to the specific project. Delete personnel or titles not appropriate to the project.]

Title/Responsibility Name Phone Number
Project Manager
Staff
Quality Assurance Manager

Contractor (Company Name)
Contractor Staff

1.5 Statement of the Specific Problem

[In describing the problem, include historical, as well as recent, information and data that may be relevant. List and briefly outline citizens' complaints, public agency inspections, and existing data. Include sources of information if possible.]

2 BACKGROUND

This section provides an overview of the location of, previous investigations of, and the apparent problem(s) associated with the site or sampling area. [Provide a brief description of the site or sampling area, including chemicals used on the site, site history, past and present operations or activities that may have contributed to the suspected contamination, etc.]

2.1 Site or Sampling Area Description [Fill in the blanks.]

[Two maps of the area should be provided: the first (Figure 2.1), on a larger scale, should place the area within its geographic region; the second (Figure 2.2), on a smaller scale, should mark the sampling site or sampling areas within the local area. Additional maps may be provided, as necessary, for clarity. Maps should include a North arrow, groundwater flow arrow (if appropriate), buildings or former buildings, project area, area to be disturbed, etc. If longitude or latitude information is available, such as from a Global Positioning System (GPS), provide it. Sampling locations can be shown in Figure 2.2.]. Example language is as follows:

The site or sampling area occupies _____ [e.g., hectares or square meters] in a _____ [e.g., urban, commercial, industrial, residential, agricultural, or undeveloped] area. The site or sampling area is bordered on the north by _____, on the west by _____, on the south by _____, and on the east by _____. The specific location of the site or sampling area is shown in Figure 2.2.

_____
_____
_____
_____
_____

The second paragraph (or set of paragraphs) should describe historic and current on-site structures and should be consistent with what is presented in Figure 2.2.

2.2 Operational History

[As applicable, describe in as much detail possible (i.e., use several paragraphs) the past and present activities at the site or sampling area. The discussion might include the following information:

- **A description of the owner(s) and/or operator(s) of the site or areas near the site, the watershed of interest, the sampling area, etc. (present this information chronologically);**
- **A description of past and current operations or activities that may have contributed to suspected contamination of the sit;**
- **A description of the processes involved in the operation(s) and the environmentally detrimental substances, if any, used in the processes;**
- **A description of any past and present waste management practices.**

- **If a waste site, were/are hazardous wastes generated by one or more of the processes described earlier? If so, what were/are they, how and where were/are they stored on the site or sampling area, and where were/are they ultimately disposed of? If an ecosystem, what point and non-point sources which may have affected the river, stream, lake or watershed?]**

2.3 Previous Investigations/Regulatory Involvement

[If applicable] [Summarize all previous sampling efforts at the site or sampling area. Include the sampling date(s); name of the party(ies) that conducted the sampling; local, regional, or federal government agency for which the sampling was conducted; a rationale for the sampling; the type of media sampled (e.g., soil, sediment, water); laboratory methods that were used; and a discussion of what is known about data quality and usability. The summaries should be presented in subsections according to the media that were sampled (e.g., soil, water, etc.) and chronologically within each medium. Attach reports or summary tables of results or include in appendices if necessary.]

2.4 Geological Information

[Groundwater sampling only][Provide a description of the hydrogeology of the area. Indicate the direction of groundwater flow, if known.]

2.5 Environmental and/or Human Impact

[Discuss what is known about the possible and actual impacts of the possible environmental problem on human health or the environment.]

3 PROJECT DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements for establishing criteria for data quality and for developing data collection designs.

3.1 Project Task and Problem Definition

[Describe the purpose of the environmental investigation in qualitative terms and how the data will be used. Generally, this discussion will be brief and generic. Include all measurements to be made on an analyte specific basis in whatever medium (soil, sediment, water, etc.) is to be sampled. This discussion should relate to how this sampling effort will support the specific decisions described in Section 3.2.]

3.2 Data Quality Objectives (DQOs)

Data quality objectives (DQOs) are quantitative and qualitative criteria that establish the level of uncertainty associated with a set of data. This section should describe decisions to be made based on the data and provide criteria on which these decisions will be made.

[Discuss Data Quality Objectives, action levels, and decisions to be made based on the data here.]

3.3 Data Quality Indicators (DQIs)

Data quality indicators (accuracy, precision, completeness, representativeness, comparability, and method detection limits) refer to quality control criteria established for various aspects of data gathering, sampling, or analysis activity. In defining DQIs specifically for the project, the level of uncertainty associated with each measurement is defined. Definition of the different terms are provided

below:

- *Accuracy is the degree of agreement of a measurement with a known or true value. To determine accuracy, a laboratory or field value is compared to a known or true concentration. Accuracy is determined by such QC indicators as: matrix spikes, surrogate spikes, laboratory control samples (blind spikes) and performance samples.*
- *Precision is the degree of mutual agreement between or among independent measurements of a similar property (usually reported as a standard deviation [SD] or relative percent difference [RPD]). This indicator relates to the analysis of duplicate laboratory or field samples. An RPD of <20% for water and <35% for soil, depending upon the chemical being analyzed, is generally acceptable. Typically field precision is assessed by co-located samples, field duplicates, or field splits and laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates).*
- *Completeness is expressed as percent of valid usable data actually obtained compared to the amount that was expected. Due to a variety of circumstances, sometimes either not all samples scheduled to be collected can be collected or else the data from samples cannot be used (for example, samples lost, bottles broken, instrument failures, laboratory mistakes, etc.). The minimum percent of completed analyses defined in this section depends on how much information is needed for decision making. Generally, completeness goals rise the fewer the number of samples taken per event or the more critical the data are for decision making. Goals in the 75-95% range are typical.*
- *Representativeness is the expression of the degree to which data accurately and precisely represent a characteristic of an environmental condition or a population. It relates both to the area of interest and to the method of taking the individual sample. The idea of representativeness should be incorporated into discussions of sampling design. Representativeness is best assured by a comprehensive statistical sampling design, but it is recognized that is usually outside the scope of most one-time events. Most one time SAPs should focus on issues related to judgmental sampling and why certain areas are included or not included and the steps being taken to avoid either false positives or false negatives.*
- *Comparability expresses the confidence with which one data set can be compared to another. The use of methods from EPA or "Standard Methods" or from some other recognized sources allows the data to be compared facilitating evaluation of trends or changes in a site, a river, groundwater, etc. Comparability also refers to the reporting of data in comparable units so direct comparisons are simplified (e.g., this avoids comparison of mg/L for nitrate reported as nitrogen to mg/L of nitrate reported as nitrate, or ppm vs. mg/L discussions).*
- *Detection Limit(s) (usually expressed as method detection limits for all analytes or compounds of interest for all analyses requested must be included in this section. These limits should be related to any decisions that will be made as a result of the data collection effort. A critical element to be addressed is how these limits relate to any regulatory or action levels that may apply.*

DQI tables are available from the QA Office for most routinely ordered methods. These tables can be attached to the SAP and referenced in this section. If an organization, its contractor, or its laboratory wish to use different limits or acceptance criteria, the table should be modified accordingly. SOPs should be included for methods not covered by the DQI tables or they can be submitted in lieu of the tables. Due to resource constraints, generally only the DQI aspects of these SOPs will be evaluated.

[Provide or reference DQI tables here.]

3.4 Data Review and Validation

This section should discuss data review, including what organizations or individuals will be responsible

for what aspects of data review and what the review will include.

[Discuss data review and data validation here including what organizations or individuals will be responsible for what aspects of data review and what the review will include. This section should also discuss how data that do not meet data quality objectives will be designated, flagged, or otherwise handled. Possible corrective actions associated with the rejection of data, such as reanalysis, resampling, no action but monitor the data more closely next quarter, etc., also need to be addressed.]

3.5 Data Management

[Provide a list of the steps that will be taken to ensure that data are transferred accurately from collection to analysis to reporting. Discuss the measures that will be taken to review the data collection processes, including field notes or field data sheets; to obtain and review complete laboratory reports; and to review the data entry system, including its use in reports. A checklist is acceptable.]

3.6 Assessment Oversight

[Describe the procedures which will be used to implement the QA Program. This would include oversight by the Quality Assurance Manager or the person assigned QA responsibilities. Indicate how often a QA review of the different aspects of the project, including audits of field and laboratory procedures, use of performance samples, review of laboratory and field data, etc., will take place. Describe what authority the QA Manager or designated QA person has to ensure that identified field and analytical problems will be corrected and the mechanism by which this will be accomplished.]

4 SAMPLING RATIONALE

For each sampling event, the SAP must describe the sampling locations, the media to be sampled, and the analytes of concern at each location. A rationale should then be provided justifying these choices. The following sections are subdivided on a media specific basis among soil, sediment, water, and biological media. Other media should be added as needed. This section is crucial to plan approval and should be closely related to previously discussed DQOs.

4.1 Soil Sampling

[Provide a general overview of the soil sampling event. Present a rationale for choosing each sampling location at the site or sampling area and the depths at which the samples are to be taken, if relevant. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g., trace metals etc.) were chosen. Include sampling locations in Figure 2.2 or equivalent.]

4.2 Sediment Sampling

[Provide a general overview of the sediment sampling event. Present a rationale for choosing each sampling location at the site or sampling area and the depths or area of the river, stream or lake at which the samples are to be taken, if relevant. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g., trace metals) were chosen. Include sampling locations in Figure

2.2 or equivalent.]

4.3 Water Sampling

[Provide a general overview of the water sampling event. For groundwater, describe the wells to be sampled or how the samples will be collected (e.g., hydro punch), including the depths at which the samples are to be taken. For surface water, describe the depth and nature of the samples to be collected (fast or slow moving water, stream traverse, etc.). Present a rationale for choosing each sampling location or sampling area. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed). List the analytes of concern at each location and provide a rationale for why the specific chemical or group of chemicals (e.g., trace metals) were chosen. For microbiological samples, discuss the types of bacterial samples being collected. Include sampling locations in Figure 2.2 or equivalent.]

4.4 Biological Sampling

[For each of the two types of events identified, provide a general overview of the biological sampling event. Present a rationale for choosing each sampling location at the site or sampling area, including the parameters of interest at each location. If decisions will be made in the field, provide details concerning the criteria that will be used to make these decisions (i.e., the decision tree to be followed).

4.4.1 Biological Samples for Chemical Analysis

[For sampling where flora or fauna will be analyzed for the presence of a chemical (e.g. fish collected for tissue analysis), explain why the specific chemical or group of chemicals (e.g., metals, organochlorine pesticides, etc.) is included. List the types of samples to be collected (e.g., fish, by species or size, etc.) and explain how these will be representative. Include sampling locations in Figure 2.2 or equivalent.]

4.4.2 Biological Sample for Species Identification and Habitat Assessment

[If the purpose of the sampling is to collect insects or other invertebrates or to make a habitat assessment, a rationale for the sampling to take place should be provided. For example: what species are of interest and why?]

5 REQUEST FOR ANALYSES

This section should discuss analytical support for the project depending on several factors including the analyses requested, analytes of concern, turnaround times, available resources, available laboratories, etc. If samples will be sent to more than one organization it should be clear which samples go to which laboratory. Field analyses for pH, conductivity, turbidity, or other field tests should be discussed in the sampling section. Field measurements in a mobile laboratory should be discussed here and differentiated from samples to be sent to a fixed laboratory. Field screening tests (for example, immunoassay tests) should be discussed in the sampling section, but the confirmation tests should be discussed here and the totals included in the tables.

[Complete the following narrative subsection concerning the analyses for each matrix. In addition, fill in Tables 5-1 through 5-5, as appropriate. Each table must be completed to list analytical parameters for each type of sample. Include information on container types, sample volumes, preservatives, special handling and analytical holding times for each parameter. Quality Control (QC) samples (blanks, duplicates, splits, and laboratory QC samples, see Section 10 for description) should be indicated in the column titled "Special Designation." The extra volume needed for laboratory QC

samples (for water samples only) should be noted on the table. The tables provided do not have to be used, but the critical information concerning the number of samples, matrix, analyses requested and QC sample identification should be provided in some form. The selected analyses must be consistent with earlier discussion concerning DQOs and analytes of concern. DQI information for the methods should be discussed in Section 8 on quality control requirements.]

5.1 Analyses Narrative

[Fill in the blanks. Provide information for each analysis requested. Delete the information below as appropriate. Include any special requests, such as fast turn-around time (2 weeks or less), specific QC requirements, or modified sample preparation techniques in this section.]

5.2 Analytical Laboratory

[A QA Plan from the laboratory or SOPs for the methods to be performed must accompany the SAP.]

6 FIELD METHODS AND PROCEDURES

In the general introductory paragraph to this section, there should be a description of the methods and procedures that will be used to accomplish the sampling goals, e.g., "...collect soil, sediment and water samples." It should be noted that personnel involved in sampling must wear clean, disposable gloves of the appropriate type. The sampling discussion should track the samples identified in Section 4.0 and Table(s) 5-1, 5-2, 5-3, or 5-4. A general statement should be made that refers to the sections containing information about sample tracking and shipping (Section 7). Provide a description of sampling procedures. Example procedures are provided below, but the organization's own procedures can be used instead. In that case, attach a copy of the applicable SOP.

6.1 Field Equipment

6.1.1 List of Equipment Needed

[List all the equipment that will be used in the field to collect samples, including decontamination equipment, if required. Discuss the availability of back-up equipment and spare parts.]

6.1.2 Calibration of Field Equipment

[Describe the procedures by which field equipment is prepared for sampling, including calibration standards used, frequency of calibration and maintenance routines. Indicate where the equipment maintenance and calibration record(s) for the project will be kept.]

6.2 Field Screening

In some projects a combination of field screening using a less accurate or sensitive method may be used in conjunction with confirmation samples analyzed in a fixed laboratory. This section should describe these methods or reference attached SOPs. Analyses such as soil gas or immunoassay kits are two examples.

[Describe any field screening methods to be used on the project here including how samples will be collected, prepared, and analyzed in the field. Include in an appendix, as appropriate, SOPs covering these methods. Confirmation of screening results should also be described. The role of the field screening in decision making for the site should also be discussed here if it has not been covered previously.]

6.3 Soil

6.3.1 Surface Soil Sampling

[Use this subsection to describe the collection of surface soil samples that are to be collected within 15-30 centimeters of the ground surface. Specify the method (e.g., hand trowels) that will be used to collect the samples and use the language below or reference the appropriate sections of a Soil Sampling SOP.]

[If exact soil sampling locations will be determined in the field, this should be stated. The criteria that will be used to determine sampling locations, such as accessibility, visible signs of potential contamination (e.g., stained soils, location of former fuel storage tank, etc.), and topographical features which may indicate the location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation) should be provided.]

Exact soil sampling locations will be determined in the field based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

[If surface soil samples are to be analyzed for organic (non volatile compounds and other analytes, use this paragraph; otherwise delete.]

Surface soil samples will be collected as grab samples (independent, discrete samples) from a depth of 0 to ___centimeters below ground surface (bgs). Surface soil samples will be collected using a stainless steel hand trowel. Samples to be analyzed for volatile organic compounds will be collected first (see below). Samples to be analyzed for _____ [List all analytical methods for soil samples except for volatile organic compounds] will be placed in a sample-dedicated disposable pail and homogenized with a trowel. Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, chilled to 4°C if appropriate, and processed for shipment to the laboratory.

[If surface soil samples are to be analyzed for volatile organic compounds (VOCs), use this paragraph; otherwise delete.]

Surface soil samples for VOC analyses will be collected as grab samples (independent, discrete samples) from a depth of 0 to ___ [centimeters or meters] below ground surface (bgs). Surface soil samples will be collected using a 5 gram Encore sampling device, and will be collected in triplicate. Samples will be sealed using the Encore sampler and a zip lock bag or else transferred directly from the sampler into a VOA vial containing either 10 mLs of methanol or sodium bisulfate solution. Sample containers will be closed as soon as they are filled, chilled immediately to 4°C before wrapping them in bubble wrap, and processed them for shipment to the laboratory.

[For surface soil samples which are not to be analyzed for volatile compounds, use this paragraph; otherwise delete.]

Surface soil samples will be collected as grab samples (independent, discrete samples) from a depth of 0

to ___ [centimeters or meters] below ground surface (bgs). Surface soil samples will be collected using a stainless steel hand trowel. Samples will be placed in a sample-dedicated disposable pail and homogenized with a trowel. Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, chilled if appropriate, and processed for shipment to the laboratory.

6.3.2 Subsurface Soil Sampling

[Use this subsection for subsurface soil samples that are to be collected 30 cm or more below the surface. Specify the method (e.g., hand augers) that will be used to access the appropriate depth and then state the depth at which samples will be collected and the method to be used to collect and then transfer samples to the appropriate containers or reference the appropriate sections of a Soil Sampling SOP. If SOPs are referenced, they should be included in an Appendix.]

[If exact soil sampling locations will be determined in the field, this should be stated. The criteria that will be used to determine sampling locations, such as accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate the location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation) should be provided. There should also be a discussion concerning possible problems, such as subsurface refusal]

[Include this paragraph first if exact sampling locations are to be determined in the field; otherwise delete.]

Exact soil sampling locations will be determined in the field based on accessibility, visible signs of potential contamination (e.g., stained soils), and topographical features which may indicate location of hazardous substance disposal (e.g., depressions that may indicate a historic excavation). Soil sample locations will be recorded in the field logbook as sampling is completed. A sketch of the sample location will be entered into the logbook and any physical reference points will be labeled. If possible, distances to the reference points will be given.

[If subsurface soil samples are to be analyzed for volatile compounds, use this paragraph; otherwise delete.]

Samples to be analyzed for volatile organic compounds will be collected first. Subsurface samples will be collected by boring to the desired sample depth using _____ _____ [whatever method is appropriate or available]. Once the desired sample depth is reached, soil samples for VOC analyses will be collected as independent, discrete samples. Surface soil samples will be collected using a 5 gram Encore sampling device, and will be collected in triplicate. Samples will be sealed using the Encore sampler and a zip lock bag or else transferred directly from the sampler into a VOA vial containing either 10 mLs of methanol or sodium bisulfate solution. Sample containers will be closed as soon as they are filled, chilled immediately to 4°C before wrapping them in bubble wrap, and processed for shipment to the laboratory. [If subsurface soil samples are being collected for other than volatile organic compounds, use these paragraphs; otherwise delete.]

Subsurface samples will be collected by boring to the desired sample depth using _____ _____ [whatever method is appropriate or available]. Once the desired sample depth is reached, the _____ [hand- or power-operated device, such as a shovel, hand auger, trier, hollow-stem auger or split-spoon sampler] will be inserted into the hole and used to collect the sample. Samples will be transferred from the _____

[sampling device] to a sample-dedicated disposable pail and homogenized with a trowel.

Material in the pail will be transferred with a trowel from the pail to the appropriate sample containers. Sample containers will be filled to the top taking care to prevent soil from remaining in the lid threads prior to being sealed to prevent potential contaminant migration to or from the sample. After sample containers are filled, they will be immediately sealed, chilled if appropriate, and processed for shipment to the laboratory. [Include this as the final paragraph regardless of the analyses for subsurface soil samples.] Excess set-aside soil from the above the sampled interval will then be repacked into the hole.

6.4 Sediment Sampling

[Use this subsection if sediment samples are to be collected. Specify the method (e.g., dredges) that will be used to collect the samples and at what depth samples will be collected. Describe how samples will be homogenized and the method to be used to transfer samples to the appropriate containers. If a SOP will be followed rather than the language provided, the SOP should be referenced and included in the appendix.]

[If exact sediment sampling locations will be determined in the field, this should be stated. Describe where sediment samples will be collected, e.g., slow moving portions of streams, lake bottoms, washes, etc.]

Exact sediment sampling locations will be determined in the field, based on _____ _____ [Describe the criteria to be used to determine sampling locations]. Care will be taken to obtain as representative a sample as possible. The sample will be taken from areas likely to collect sediment deposits, such as slow moving portions of streams or from the bottom of the lake at a minimum depth of .6 meters. Sediment samples will be collected from the well bottom at a depth of _____ inches using a pre-cleaned _____ sampler.

[The final paragraph describes sample homogenization, especially important if the sample is to be separated into solid and liquid phases, and container filling. Include this paragraph, or a modified form of it, for all sediment sampling. It is assumed that sediment samples will not be analyzed for volatile compounds. If sediment is to be analyzed for volatile organic compounds, the samples to be analyzed for volatile compounds should not be homogenized, but rather transferred directly from the sampler into the sample container. If feasible, an Encore sampling device should be used.]

Material in the sampler will be transferred to a sample-dedicated disposable pail and homogenized with a trowel. Material from the pail will be transferred with a trowel from the bucket to the appropriate sample containers. Sample containers will be filled to the top taking care to prevent soil from remaining in the lid groves prior to being sealed in order to prevent potential contamination migration to or from the sample containers. After sample containers are filled, they will be immediately sealed, chilled if appropriate, and processed for shipment to the laboratory.

6.5 Water Sampling

6.5.1 Surface Water Sampling

[Use this subsection if samples are to be collected in rivers, streams, lakes and reservoirs, or from standing water in runoff collection ponds, gullies, drainage ditches, etc. Describe the sampling procedure, including the type of sample (grab or composite - see definitions below), sample bottle preparation, and project-specific directions for taking the sample. State whether samples will be collected for chemical and/or microbiological analyses. Alternatively, reference the appropriate sections of attached SOPs.]

Grab: Samples will be collected at one time from one location. The sample should be taken from flowing, not stagnant water, and the sampler should be facing upstream in the middle of the stream. Samples will be collected by hand or with a sample bottle holder. For samples taken at a single depth, the bottle should be uncapped and the cap protected from contamination. The bottle should be plunged into the water mouth down and filled 15 to 30 centimeters below the surface of the water. If it is important to take samples at depths, special samplers (e.g., Niskin or Kemmerer Depth Samplers) may be required. After filling the bottle(s), pour out some sample leaving a headspace of 2.5-5cm. For microbiological samples, bottles and caps must be sterile. If sampling of chlorinated water is anticipated, sodium thiosulfate at a concentration of 0.1 mL of a 10% solution for each 125 mL (4 oz) of sample volume must be put into the bottle before it is sterilized. Time Composite: Samples are collected over a period of time, usually 24 hours. If a composite sample is required, a flow- and time-proportional automatic sampler should be positioned to take samples at the appropriate location in a manner such that the sample can be held at 4oC for the duration of the sampling.

Spatial Composite: Samples are collected from different representative positions in the water body and combined in equal amounts. A Churn Splitter or equivalent device will be used to ensure that the sample is homogeneously mixed before the sample bottles are filled. Volatile organic compound samples will be collected as discrete samples and not composited. [If exact surface water sample locations will be determined in the field, this should be stated. Describe the criteria that will be used to determine where surface water samples will be collected.]

6.5.2 Groundwater Sampling

[This subsection contains procedures for water level measurements, well purging, and well sampling. Relevant procedures should be described under this heading with any necessary site-specific modifications. Alternatively, reference appropriate SOP(s).]

6.5.2.1 Water-Level Measurements

[The following language may be used as is or modified to meet project needs.]

All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use. Field meter probes will be decontaminated before and after use at each well. If well heads are accessible, all wells will be sounded for depth to water from top of casing and total well depth prior to purging. An electronic sounder, accurate to the nearest +/- cm, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column; the graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Typically, the measuring device emits a constant tone when the probe is submerged in standing water and most electronic water level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering the weighted probe to the bottom of the well and recording the depth to the nearest centimeter. Water-level sounding equipment will be decontaminated before and after use in each well. Water levels will be measured in wells which have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

6.5.2.2 Purging

[Describe the method that will be used for well purging (e.g., dedicated well pump, bailer, hand pump). Reference the appropriate sections in the Ground Water SOP and state in which Appendix the

SOP is located.]

[VERSION A]
All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump.

[VERSION B]
All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using a hand pump, submersible pump, or bailer, depending on the diameter and configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. All tubes will be decontaminated before use in each well. Pumps will be placed 0.66 to 1 meter from the bottom of the well to permit reasonable drawdown while preventing cascading conditions.

[VERSION C]
All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump, if present, or a bailer, hand pump, or submersible pump depending on the diameter and configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. All tubes will be decontaminated before use in each well. Pumps will be placed 0.66 to 1 meter from the bottom of the well to permit reasonable draw down while preventing cascading conditions.

[ALL VERSIONS - to be included in all sample plans]
Water will be collected into a measured bucket to record the purge volume. Casing volumes will be calculated based on total well depth, standing water level, and casing diameter.

It is most important to obtain a representative sample from the well. Stable water quality parameter (temperature, pH and specific conductance) measurements indicate representative sampling is obtainable. Water quality is considered stable if for three consecutive readings:

- Temperature range is no more than +1/C;
- pH varies by no more than 0.2 pH units;
- Specific conductance readings are within 10% of the average.

The water in which measurements were taken will not be used to fill sample bottles. If the well casing volume is known, measurements will be taken before the start of purging, in the middle of purging, and at the end of purging each casing volume. If the well casing volume is NOT known, measurements will be taken every 2.5 minutes after flow starts. If water quality parameters are not stable after 5 casing volumes or 30 minutes, purging will cease, which will be noted in the logbook, and ground water samples will be taken. The depth to water, water quality measurements and purge volumes will be entered in the logbook. If a well dewaters during purging and three casing volumes are not purged, that well will be allowed to recharge up to 80% of the static water column and dewatered once more. After water levels have recharged to 80% of the static water column, groundwater samples will be collected.

6.5.2.3 Well Sampling

[Describe the method that will be used to collect samples from wells. (This will probably be the same method as was used to purge the wells.) Specify the sequence for sample collection (e.g., bottles for volatile analysis will be filled first, followed by semi-volatiles, etc.). State whether samples for metals analysis will be filtered or unfiltered. Include the specific conditions, such as turbidity, that will require samples to be filtered. Alternatively, reference the appropriate sections in the Ground Water

SOP and state in which Appendix the SOP is located.]

ALL VERSIONS - to be included in all sample plans]
At each sampling location, all bottles designated for a particular analysis (e.g., trace metals) will be filled sequentially before bottles designated for the next analysis are filled. If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis for both sample designations will be filled sequentially before bottles for another analysis are filled. Groundwater samples will be transferred from the tap directly into the appropriate sample containers with preservative, if required, chilled if appropriate, and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the tap to the sample container. [If samples are to be collected for volatiles analysis, the following paragraph should be added; otherwise delete.]

Samples for volatile organic compound analyses will be collected using a low flow sampling device. A [specify type of pump] pump will be used at a flow rate of _____. Vials for volatile organic compound analysis will be filled first to minimize the effect of aeration on the water sample. A test vial will be filled with sample, preserved with hydrochloric acid (HCl) and tested with pH paper to determine the amount of preservative needed to lower the pH to less than 2. The appropriate amount of HCl will then be added to the sample vials prior to the addition of the sample. The vials will be filled directly from the tap and capped. The vial will be inverted and checked for air bubbles to ensure zero headspace. If a bubble appears, the vial will be discarded and a new sample will be collected. [If some samples for metals (or other) analysis are to be filtered, depending upon sample turbidity, the following paragraph should be added; otherwise delete.]

After well purging and prior to collecting groundwater samples for metals analyses, the turbidity of the groundwater extracted from each well will be measured using a portable turbidity meter. A small quantity of groundwater will be collected from the well using the tap and a small amount of water will be transferred to a disposable vial and a turbidity measurement will be taken. The results of the turbidity measurement will be recorded in the field logbook. The water used to measure turbidity will be discarded after use. If the turbidity of the groundwater from a well is above 5 Nephelometric Turbidity Units (NTUs), both a filtered and unfiltered sample will be collected. A [specify size]-micron filter will be used to remove larger particles that have been entrained in the water sample. A sample-dedicated Teflon tube will be attached to the tap closest to the well head. The filter will be attached to the outlet of the Teflon tube. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers with a preservative and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be removed and an unfiltered sample will be collected. A sample number appended with an "Fl" will represent a sample filtered with a 5-micron filter.

[If samples are to be filtered for metals (or other) analysis regardless of sample turbidity, the following paragraph should be added; otherwise delete.]

Samples designated for metals analysis will be filtered. A 5-micron filter will be used to remove larger particles that have been entrained in the water sample. A sample-dedicated Teflon tube will be attached to the tap closest to the well head. The filter will be attached to the outlet of the Teflon tube. A clean, unused filter will be used for each filtered sample collected. Groundwater samples will be transferred from the filter directly into the appropriate sample containers to which preservative has been added and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the filter to the sample container. After the filtered sample has been collected, the Teflon tube and filter will be removed and an unfiltered sample will be collected. A sample number

appended with an "Fl" will represent a sample filtered with a 5-micron filter.

6.6 Biological Sampling

For the purpose of this guidance, biological sampling falls into two categories. Other types of biological sampling events should be discussed with the QA Office to determine what type of planning document is needed. The two types addressed in this guidance are biological samples being collected for chemical analysis and biological samples for the purpose of assessing species diversity. If the latter type of sampling is planned, a quality assurance project plan may be a more appropriate document. Samples collected for microbiological analyses should be discussed under water sampling.

6.6.1 Biological Sampling for Chemical Analysis

[The two most common types of biological samples being collected for chemical analysis are fish and foliage samples. The following paragraphs are suggested, but field circumstances may dictate alternative collection procedures; if no biological samples will be collected, put "not applicable" by these sections. If a SOP will be followed, include it in the appendix.]

6.6.1.1 Fish Samples

[Use if collecting fish, otherwise delete. Alternatively, reference appropriate SOPs.] Fish will be collected using _____ [name method; nets, electro-shocking, lines, etc.]. Three fish of each type or species _____ [indicate type of fish, e. g., trout, catfish, etc.] will be collected. Efforts will be made to collect fish of approximately the same size and maturity by checking to make sure that lengths and weights do not differ by more than 20%. Once collected the _____ [indicate whether whole fish or filets] will be frozen, wrapped in aluminum foil and plastic bags and sent to a laboratory.]

[If samples are to be composited by the laboratory, also indicate that in this section.]

6.6.1.2 Foliage Samples

[Use if collecting foliage samples, otherwise delete. This section may require considerable modification because of the potential diversity of projects involving plants sampling.]

A representative foliage sample will be collected from the target area. It is recommended that a statistical approach be used, if possible. The following plants will be collected: _____, _____, and _____. These plants are being collected because they are most likely affected by chemicals used in the area. Only foliage showing visible signs of stress or damage will be collected. Stems and twigs will be discarded; leaves only will be collected. The same type of leaf material [Describe material, mature leaves, young shoots, etc.] will be obtained from each plant type. Provided contamination is uniform, material will be composited from several plants to yield a total of about [specify quantity] pound(s) of material. Control samples will also be collected from a nearby unaffected area [Describe area], if available. Latex gloves will be worn during the collection of all samples. Samples will be stored in [describe container, plastic bags, bottles, etc.] and brought to the laboratory as soon as possible to prevent sample deterioration.

6.6.2 Biological Sampling for Species Assessment

[Describe the collection of insects, other invertebrates, or other types of biological samples here. Reference or attach appropriate protocols to support the sampling effort.]

6.7 Decontamination Procedures

[Specify the decontamination procedures that will be followed if non-dedicated sampling equipment

is used. Alternatively, reference the appropriate sections in the organization's Decontamination Standard Operating Procedure.]

The decontamination procedures that will be followed are in accordance with approved procedures. Decontamination of sampling equipment must be conducted consistently as to assure the quality of samples collected. All equipment that comes into contact with potentially contaminated soil or water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. All sampling devices used, including trowels and augers, will be steam-cleaned or decontaminated according to the following decontamination procedures:

[Use the following decontamination procedures, if samples are collected for organic analyses only; otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary.
- Tap-water rinse.
- Deionized/distilled water rinse.
- Pesticide-grade solvent (reagent grade hexane) rinse in a decontamination bucket.
- Deionized/distilled water rinse (twice).

[Use the following decontamination procedures if samples are collected for inorganic (metals) analyses only, otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary.
- Tap-water rinse.
- 0.1 N nitric acid rinse.
- Deionized/distilled water rinse (twice).

[Use the following decontamination procedures if samples are collected for both organic and inorganic analyses, otherwise delete.]

- Non-phosphate detergent and tap water wash, using a brush if necessary.
- Tap-water rinse.
- 0.1 N nitric acid rinse.
- Deionized/distilled water rinse.
- Pesticide-grade solvent (reagent grade hexane) rinse in a decontamination bucket.
- Deionized/distilled water rinse (twice).

Equipment will be decontaminated in a predesignated area on pallets or plastic sheeting, and clean bulky equipment will be stored on plastic sheeting in uncontaminated areas. Cleaned small equipment will be stored in plastic bags. Materials to be stored more than a few hours will also be covered.

[NOTE: A different decontamination procedure may be used; but if so, a rationale for using the different approach should be provided.]

7 SAMPLE CONTAINERS, PRESERVATION AND STORAGE

[This section requires a reference to the types of bottles to be used, preparation and preservatives to be added. The organization responsible for adding preservatives should be named. If the information is provided in the request for analyses tables, reference them in the appropriate section below.]

The number of sample containers, volumes, and materials are listed in Section 5.0. The containers are pre-cleaned and will not be rinsed prior to sample collection. Preservatives, if required, will be added by

_____ [name of agency/organization doing the sampling] to the containers prior to shipment of the samples to the laboratory.

7.1 Soil Samples

[If soil samples are to be collected, specify the analyses that will be performed. Use the language below or reference the appropriate sections in the Preservation SOP and state in which Appendix the SOP is located.]

[Include this subsection if collecting soil samples; otherwise delete.]

[If requested analyses include analyses other than volatile organic compounds or metals, include this paragraph; otherwise delete.]

Soil samples for _____ [Include all requested analysis(es), e.g., Pesticides, Semi-volatile Organic Compounds] will be homogenized and transferred from the sample-dedicated homogenization pail into 8-ounce (oz), wide-mouth glass jars using a trowel. For each sample, one 8-oz wide-mouth glass jar will be collected for each laboratory. Alternatively, sample will be retained in the brass sleeve in which collected until sample preparation begins. The samples will be chilled to 4/C immediately upon collection.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Soil samples to be analyzed for volatile organic compounds will be stored in their sealed Encore samplers for no more than two days prior to analysis. Frozen Encore sampler samples will be stored for no more than 4 days prior to analysis. If samples are preserved by ejecting into either methanol or sodium bisulfate solution the holding time is two weeks. Preserved samples will be chilled to 4/C immediately upon collection.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Surface soil samples to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory. Samples will not be chilled. Subsurface samples will be retained in their original brass sleeves or other container unless transferred to bottles.

7.2 Sediment Samples

[If sediment samples are to be collected, specify the analyses that will be performed. Use the language below or reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

[If requested analyses include analyses other than volatile organic compounds or metals, include this paragraph; otherwise delete.]

_____ [Include all requested analysis(es), e.g., Pesticides, Semi-volatile Organic Compounds]. Sediment samples will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory.

The samples will be chilled to 4/C immediately upon collection.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Sediment samples to be analyzed for volatile organic compounds will be stored in their sealed Encore samplers for no more than two days prior to analysis. Frozen Encore sampler samples will be stored for no more than 4 days prior to analysis. If samples are preserved by ejecting into either methanol or sodium bisulfate solution the holding time is two weeks. Preserved samples will be chilled to 4/C immediately upon collection.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Sediment samples, with rocks and debris removed, which are to be analyzed for metals will be homogenized and transferred from the sample-dedicated homogenization pail into 8-oz, wide-mouth glass jars. For each sample, one 8-oz glass jar will be collected for each laboratory. Samples will not be chilled.

7.3 Water Samples

[If water samples are to be collected, specify the analyses that will be performed. Use the language below or else reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

[Include this subsection if collecting water samples; otherwise delete.]

Depending on the type of analysis (organic or inorganic) requested, and any other project-specific analytical requirements, sample bottles should be plastic (inorganics) or glass (organics), pre-cleaned (general decontamination procedures) or low-detection level pre-cleaned (extensive decontamination procedures).

[Describe the type of bottles that will be used for the project, including the cleaning procedures that will be followed to prepare the bottles for sampling.]

[If requested analyses do not require preservation, include this paragraph; otherwise delete. A separate paragraph should be included for each bottle type.]

_____ [Include all requested analysis(es), e.g., Anions, Pesticides, Semi-volatile Organic Compounds]. Low concentration water samples to be analyzed for _____ [Specify analysis(es), e.g., Semi-volatile Organic Compounds] will be collected in _____ [Specify bottle type, e. g., 1-liter (L) amber glass bottles]. No preservative is required for these samples. The samples will be chilled to 4/C immediately upon collection. Two bottles of each water sample are required for each laboratory.

[If requested analyses include volatile organic compounds, include this paragraph; otherwise delete.]

VOLATILE ORGANIC COMPOUNDS. Low concentration water samples to be analyzed for volatile organic compounds will be collected in 40-mL glass vials. 1:1 hydrochloric acid (HCl) will be added to the vial prior to sample collection. During purging, the pH will be measured using a pH meter to test at least one vial at each sample location to ensure sufficient acid is present to result in a pH of less than 2. The tested vial will be discarded. If the pH is greater than 2, additional HCl will be added to the sample vials. Another vial will be pH tested to ensure the pH is less than 2. The tested vial will be discarded. The vials will be filled so that there is no headspace. The samples will be chilled to 4/C immediately upon

collection. Three vials of each water sample are required for each laboratory.

[If requested analyses include metals, include this paragraph; otherwise delete.]

METALS. Water samples collected for metals analysis will be collected in 1L polyethylene bottles. The samples will be preserved by adding nitric acid (HNO3) to the sample bottle. The bottle will be capped and lightly shaken to mix in the acid. A small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be <2. The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. The samples will be chilled to 4/C immediately upon collection. One bottle of each water sample is required for each laboratory.

GENERAL CHEMISTRY (WATER QUALITY) PARAMETERS. Water samples collected for water quality analysis [Specify what parameters are included. Examples include (but are not limited to) anions (nitrate-N, nitrite-N, sulfate, phosphate), total phosphorus, ammonia-N, total dissolved solids, total suspended solids, alkalinity (may include carbonate, and/or bicarbonate), hardness, cyanide, MBAS (methylene blue active substances), etc.], will be collected in [Specify size of container] polyethylene bottles. The [Specify analysis] samples will be preserved by adding [Describe preservative appropriate to each sample type] to the sample bottle. The [Specify analysis] samples will not be preserved. If preservative is added, the bottle will be capped and lightly shaken to mix in the preservative. Where the preservative affects the pH, a small quantity of sample will be poured into the bottle cap where the pH will be measured using pH paper. The pH must be within the appropriate range. The sample in the cap will be discarded, and the pH of the sample will be adjusted further if necessary. Samples will be chilled to 4/C immediately upon collection. Samples from each location that require the same preservative will be placed in the same bottle if being analyzed by the same laboratory.

7.4 Biological Samples

[If biological samples are to be collected, specify the analyses that will be performed. Use the language below or reference the appropriate sections in a Preservation SOP and state in which Appendix the SOP is located.]

7.4.1 Fish Samples

Fish (whole or fillets) will be wrapped in aluminum foil, labeled, and placed in individual zip lock bags. The samples will be frozen as quickly as possible and shipped using dry ice to maintain the frozen state.

7.4.2 Foliage Samples

[Describe the containers that will be used for the project. Usually foliage samples are collected in clean zip lock bags, but bottles or other containers can be used. Paper bags are not recommended.]

For foliage samples, samples will be collected in a large zip Lock bag. A self adhesive label will be placed on each bag and the top sealed with a custody seal

7.4.3 Biological Sampling for Species Assessment

[Describe the containers in which macroinvertebrates, insects and other biological samples will be stored. If a fixation liquid will be used, it should be described as well. This section should also discuss any special handling procedures which must be followed to minimize damage to the specimens.]

8 DISPOSAL OF RESIDUAL MATERIALS

[This section should describe the type(s) of investigation- derived wastes (IDW) that will be generated

during this sampling event. IDW may not be generated in all sampling events, in which case this section would not apply. Use the language below or reference the appropriate sections in a Disposal of Residual Materials SOP and state in which Appendix the SOP is located. Depending upon site-specific conditions and applicable federal, state, and local regulations, other provisions for IDW disposal may be required. If any analyses of IDW are required, these should be discussed. If IDW are to be placed in drums, labeling for the drums should be discussed in this section.]

In the process of collecting environmental samples at the _____ [site or sampling area name] during the site investigation (SI) [or name of other investigation]; the _____ [name of your organization/agency] sampling team will generate different types of potentially contaminated IDW that include the following:

- Used personal protective equipment (PPE).
- Disposable sampling equipment.
- Decontamination fluids [Include this bullet when sampling soils; otherwise delete.]
- Soil cuttings from soil borings [Include this bullet when sampling groundwater; otherwise delete.]
- Purged groundwater and excess groundwater collected for sample container filling.

[The following bullet is generally appropriate for site or sampling areas with low levels of contamination or for routine monitoring. If higher levels of contamination exist at the site or sampling area, other disposal methods (such as the drumming of wastes) should be used to dispose of used PPE and disposable sampling equipment.]

- Used PPE and disposable equipment will be double bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE and disposable equipment that is to be disposed of which can still be reused will be rendered inoperable before disposal in the refuse dumpster. [Include this bullet if sampling for both metals and organics; otherwise delete.]
- Decontamination fluids that will be generated in the sampling event will consist of dilute nitric acid, pesticide-grade solvent, deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. Pesticide-grade solvents will be allowed to evaporate from the decontamination bucket. The nitric acid will be diluted and/or neutralized with sodium hydroxide and tested with pH paper before pouring onto the ground or into a storm drain. [Include this bullet if sampling for metals but not organics; otherwise delete.]
- Decontamination fluids that will be generated in the sampling event will consist of nitric acid, deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. The nitric acid will be diluted and/or neutralized with sodium hydroxide and tested with pH paper before pouring onto the ground or into a storm drain. [Include this bullet if sampling for organics but not metals; otherwise delete.]
- Decontamination fluids that will be generated in the sampling event will consist of pesticide-grade solvent, deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid will be sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) will be poured onto the ground or into a storm drain. Pesticide-grade solvents will be allowed to

evaporate from the decontamination bucket. [Include this bullet if sampling soils; otherwise delete.]

- Soil cuttings generated during the subsurface sampling will be disposed of in an appropriate manner. [Include this bullet if sampling groundwater; otherwise delete.]
- Purged groundwater will be _____ [depending upon the degree of groundwater contamination, site-specific conditions, and applicable federal, state, and local regulations, disposal methods will vary. Disposal methods can also vary for purge water from different wells sampled during the same sampling event.]

9 SAMPLE DOCUMENTATION AND SHIPMENT

9.1 Field Notes

This section should discuss record keeping in the field. This may be through a combination of logbooks, preprinted forms, photographs, or other documentation. Information to be maintained is provided below.

9.1.1 Field Logbooks

[Describe how field logbooks will be used and maintained.]
Use field logbooks to document where, when, how, and from whom any vital project information was obtained. Logbook entries should be complete and accurate enough to permit reconstruction of field activities. Maintain a separate logbook for each sampling event or project. Logbooks should have consecutively numbered pages. All entries should be legible, written in black ink, and signed by the individual making the entries. Use factual, objective language.

At a minimum, the following information will be recorded during the collection of each sample:
[Edit this list as relevant.]

- Sample location and description;
- Site or sampling area sketch showing sample location and measured distances;
- Sampler's name(s);
- Date and time of sample collection;
- Designation of sample as composite or grab;
- Type of sample (soil, sediment or water);
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.);
- Preliminary sample descriptions (e.g., for soils: clay loam, very wet; for water: clear water with strong ammonia-like odor);
- Sample preservation;
- Lot numbers of the sample containers, sample identification numbers and any explanatory codes, and chain-of-custody form numbers;
- Shipping arrangements (overnight air bill number);
- Name(s) of recipient laboratory(ies).

In addition to the sampling information, the following specific information will also be recorded in the field logbook for each day of sampling: [Edit this list as relevant.]

1. Team members and their responsibilities;
2. Time of arrival/entry on site and time of site departure;
3. Other personnel on site;

4. Summary of any meetings or discussions with contractor, or federal agency personnel;
5. Deviations from sampling plans, site safety plans, and QAPP procedures;
6. Changes in personnel and responsibilities with reasons for the changes;
7. Levels of safety protection;
8. Calibration readings for any equipment used and equipment model and serial number.

[A checklist of the field notes, following the suggestions above, using only those that are appropriate, should be developed and included in project field notes.]

9.1.2 Photographs

[If photographs will be taken, the following language may be used as is or modified as appropriate.]

Photographs will be taken at the sampling locations and at other areas of interest on site or sampling area. They will serve to verify information entered in the field logbook. For each photograph taken, the following information will be written in the logbook or recorded in a separate field photography log:

- Time, date, location, and weather conditions;
- Description of the subject photographed;
- Name of person taking the photograph.

9.2 Labeling

[The following paragraph provides a generic explanation and description of the use of labels. It may be incorporated as is, if appropriate, or modified to meet any project-specific conditions.]

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. A copy of the sample label is included in Appendix __. The samples will have preassigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information: station location, date of collection, analytical parameter(s), and method of preservation. Every sample, including samples collected from a single location but going to separate laboratories, will be assigned a unique sample number.

9.3 Sample Chain-Of-Custody Forms and Custody Seals

[The following paragraphs provide a generic explanation and description of the use of chain-of-custody forms and custody seals. They may be incorporated as is, if they are appropriate, or modified to meet any project-specific conditions.]

Organic and inorganic chain-of-custody record/traffic report forms are used to document sample collection and shipment to laboratories for analysis. All sample shipments for analyses will be accompanied by a chain-of-custody record. A copy of the form is found in Appendix. Form(s) will be completed and sent with the samples for each laboratory and each shipment (i.e., each day). If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler.

The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of _____ [name of agency/ organization conducting sampling]. The sampling team leader or designee will sign the chain-of-custody form in the "relinquished by" box and note date, time, and air

bill number. The sample numbers for all reference samples, laboratory QC samples, and duplicates will be documented on this form (see Section 10.0). A photocopy will be made for the _____'s [name of agency/ organization conducting sampling] master files.

A self-adhesive custody seal will be placed across the lid of each sample. A copy of the seal is found in Appendix _. For VOC samples, the seal will be wrapped around the cap. The shipping containers in which samples are stored (usually a sturdy picnic cooler or ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

9.4 Packaging and Shipment

[The following paragraphs provide a generic explanation and description of how to pack and ship samples. They may be incorporated as is, if appropriate, or modified to meet any project-specific conditions.]

All sample containers will be placed in a strong-outside shipping container (a steel-belted cooler). The following outlines the packaging procedures that will be followed for low concentration samples.

1. When ice is used, pack it in zip-locked, double plastic bags. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
2. The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
4. Secure bottle/container tops with clear tape and custody seal all container tops.
5. Affix sample labels onto the containers with clear tape.
6. Wrap all glass sample containers in bubble wrap to prevent breakage.
7. Seal all sample containers in heavy duty plastic zip-lock bags. Write the sample numbers on the outside of the plastic bags with indelible ink.
8. Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid.
9. Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment.
10. Ice used to cool samples will be double sealed in two zip lock plastic bags and placed on top and around the samples to chill them to the correct temperature.
11. Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

Records will be maintained by the [organization]'s sample custodian of the following information:

- Sampling contractor's name *(if not the organization itself)*;
- Name and location of the site or sampling area;
- Case or Regional Analytical Program (RAP) number;
- Total number(s) by estimated concentration and matrix of samples shipped to each laboratory;
- Carrier, air bill number(s), method of shipment (priority next day);
- Shipment date and when it should be received by lab;
- Irregularities or anticipated problems associated with the samples;
- Whether additional samples will be shipped or if this is the last shipment.

10 QUALITY CONTROL

This section should discuss the quality control samples that are being collected to support the sampling activity. This includes field QC samples, confirmation samples, background samples, laboratory QC samples, and split samples. Wherever possible, the locations at which the samples will be collected should be identified and a rationale provided for the choice of location. Frequency of collection should be discussed. All samples, except laboratory QC samples, should be sent to the laboratory blind, wherever possible. Laboratory QC samples should be identified and additional sample (e.g., a double volume) collected for that purpose.

10.1 Field Quality Control Samples

Field quality control samples are intended to help evaluate conditions resulting from field activities and are intended to accomplish two primary goals, assessment of field contamination and assessment of sampling variability. The former looks for substances introduced in the field due to environmental or sampling equipment and is assessed using blanks of different types. The latter includes variability due to sampling technique and instrument performance as well as variability possibly caused by the heterogeneity of the matrix being sampled and is assessed using replicate sample collection. The following sections cover field QC.

10.1.1 Assessment of Field Contamination (Blanks)

Field contamination is usually assessed through the collection of different types of blanks. Equipment blanks are obtained by passing distilled or deionized water, as appropriate, over or through the decontaminated equipment used for sampling. They provide the best overall means of assessing contamination arising from the equipment, ambient conditions, sample containers, transit, and the laboratory. Field blanks are sample containers filled in the field. They help assess contamination from ambient conditions, sample containers, transit, and the laboratory. Trip blanks are prepared by the laboratory and shipped to and from the field. They help assess contamination from shipping and the laboratory and are for volatile organic compounds only. Equipment blanks should be collected, where appropriate (e.g., where neither disposable nor dedicated equipment is used). Field blanks are next in priority, and trip blanks next. Only one type of blank must be collected per event, not all three.

10.1.1.1 Equipment Blanks

In general, equipment (rinsate) blanks should be collected when reusable, non-disposable sampling equipment (e.g., trowels, hand augers, and non-dedicated groundwater sampling pumps) are being used for the sampling event. Only one blank sample per matrix per day should be collected. If equipment blanks are collected, field blanks and trip blanks are not required under normal circumstances. Equipment blanks can be collected for soil, sediment, and ground water samples. A minimum of one equipment blank is prepared each day for each matrix when equipment is decontaminated in the field. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free. HPLC water, which is often used for equipment and field blanks, can contain VOCs if it is not purged.

[If equipment blanks are to be collected describe how they are to be collected and the analyses that will be performed. A maximum of one blank sample per matrix per day should be collected, but at a rate to not exceed one blank per 10 samples. The 1:10 ratio overrides the one per day requirement. If equipment rinsate blanks are collected, field blanks and trip blanks are not required under normal circumstances. Use the language below or reference the appropriate sections in a Quality Control SOP and state in which Appendix the SOP is located.]

[Include this subsection if equipment blanks are to be collected, otherwise, delete.]

[Include this paragraph if blanks will be analyzed for both metals and organic compounds; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free (for organics) or deionized water (for inorganics) over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for _____ [Include names of target analytes, e.g., metals, total petroleum hydrocarbons, volatile organic compounds, etc.].

[Include this paragraph if blanks will be analyzed only for organic compounds; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring High Performance Liquid Chromatography (HPLC) organic-free water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for _____ [Include names of target analytes, e.g., volatile organic compounds, total petroleum hydrocarbons, etc.] [Include this paragraph if blanks will be analyzed only for metals; otherwise delete.]

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated sampling equipment. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing deionized water through or over the decontaminated sampling devices used that day. The insate blanks that are collected will be analyzed for metals.

[Always include this paragraph.]The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

10.1.2 Field Blanks

Field blanks are collected when sampling water or air and equipment decontamination is not necessary or sample collection equipment is not used (e.g., dedicated pumps). A minimum of one field blank is prepared each day sampling occurs in the field, but equipment is not decontaminated. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free. HPLC water, which is often used for equipment and field blanks, can contain VOCs if it is not purged.

[Include this subsection if field blanks will be collected; otherwise delete. Only one blank sample per matrix per day should be collected. If field blanks are prepared, equipment rinsate blanks and trip blanks are not required under normal circumstances.]

[Include this paragraph if blanks will be analyzed for both metals and organic compounds; otherwise

delete.]

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to ambient conditions or from sample containers. Field blank samples will be obtained by pouring High Performance Liquid Chromatography (HPLC) organic-free water (for organics) and/or deionized water (for inorganics) into a sampling container at the sampling point. The field blanks that are collected will be analyzed for _____ [Include names of target analytes, e.g., metals, volatile organic compounds, etc.].

[Include this paragraph if blanks will be analyzed only for organic compounds; otherwise delete.]

Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to ambient conditions or from sample containers. Field blank samples will be obtained by pouring High Performance Liquid Chromatography (HPLC) organic-free water into a sampling container at the sampling point. The field blanks that are collected will be analyzed for _____ [Include names of target analytes, e.g., volatile organic compounds, total petroleum hydrocarbons, etc.].

[Include this paragraph if blanks will be analyzed only for metals; otherwise delete.]
Field blanks will be collected to evaluate whether contaminants have been introduced into the samples during the sampling due to contamination from sample containers. Field blank samples will be obtained by pouring deionized water into a sampling container at the sampling point. The field blanks that are collected will be analyzed for metals.

[Always include this paragraph.]

The field blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory.

10.1.3 Trip Blanks

Trip blanks are required only if no other type of blank will be collected for volatile organic compound analysis and when air and/or water samples are being collected. If trip blanks are required, one is submitted to the laboratory for analysis with every shipment of samples for VOC analysis. These blanks are submitted "blind" to the laboratory, packaged like other samples and each with its own unique identification number. Note that for samples which may contain VOCs, water for blanks should be purged prior to use to ensure that it is organic free. Laboratory water, which is used for trip blanks, can contain VOCs if it is not purged.

[Include this subsection if trip blanks will be collected; otherwise delete. Only one blank sample per matrix per day should be collected. Trip blanks are only relevant to volatile organic compound (VOC) sampling efforts.]

Trip blanks will be prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected samples. A minimum of one trip blank will be submitted to the laboratory for analysis with every shipment of samples for VOC analysis. Trip blanks are 40 mL vials that have been filled with HPLC-grade water that has been purged so it is VOC free and shipped with the empty sampling containers to the site or sampling area prior to sampling. The sealed trip blanks are not opened in the field and are shipped to the laboratory in the same cooler with the samples collected for

volatile analyses. The trip blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each trip sample and it will be submitted blind to the laboratory.

10.1.4 Temperature Blanks

[Include this paragraph with all plans.] For each cooler that is shipped or transported to an analytical laboratory a 40 mL VOA vial will be included that is marked "temperature blank." This blank will be used by the sample custodian to check the temperature of samples upon receipt.

10.1.5 Assessment of Field Variability (Field Duplicate or Co-located Samples)

Duplicate samples are collected simultaneously with a standard sample from the same source under identical conditions into separate sample containers. Field duplicates will consist of a homogenized sample divided in two or else a co-located sample. Each duplicate portion should be assigned its own sample number so that it will be blind to the laboratory. A duplicate sample is treated independently of its counterpart in order to assess laboratory performance through comparison of the results. At least 10% of samples collected per event should be field duplicates. At least one duplicate should be collected for each sample matrix, but their collection can be stretched out over more than one day (e.g., if it takes more than one day to reach 10 samples). Every group of analytes for which a standard sample is analyzed will also be tested for in one or more duplicate samples. Duplicate samples should be collected from areas of known or suspected contamination. Since the objective is to assess variability due to sampling technique and possible sample heterogeneity, source variability is a good reason to collect co-located samples, not to avoid their collection.

Duplicate soils samples will be collected at sample locations [identify soil sample locations from which samples will be collected for duplicate analysis].

Duplicate samples will be collected from these locations because [Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g., samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.]

[Include this paragraph if collecting soil samples and analyzing for compounds other than volatiles; otherwise delete.]

Soil samples to be analyzed for _____ [List all analytical methods for this sample event except for volatiles.] will be homogenized with a trowel in a sample-dedicated disposable pail. Homogenized material from the bucket will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., semi-volatile organic compounds) will be filled sequentially before jars designated for another analysis are filled (e.g., metals).

[Include this paragraph if collecting soil samples and analyzing for volatiles; otherwise delete.]

Soil samples for volatile organic compound analyses will not be homogenized. Equivalent Encore samples from a colocated location will be collected identically to the original samples, assigned unique sample numbers and sent blind to the laboratory.

[Include these paragraphs if collecting sediment samples. If volatile organic compound analysis will be performed on sediment samples, modify the above paragraph for soil sample volatile analyses by changing "soil" to "sediment."]

Duplicate sediment samples will be collected at sample locations _____ [Identify sediment sample locations from which duplicate or colocated samples for duplicate analysis will be obtained]. Duplicate samples will be collected from these locations because _____[Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g., samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.] Sediment samples will be homogenized with a trowel in a sample-dedicated 1-gallon disposable pail. Homogenized material from the bucket will then be transferred to the appropriate wide-mouth glass jars for both the regular and duplicate samples. All jars designated for a particular analysis (e.g., semi-volatile organic compounds) will be filled sequentially before jars designated for another analysis are filled (e.g., metals).

[Include this paragraph if collecting water samples.]

Duplicate water samples will be collected for water sample numbers _____ [water sample numbers which will be split for duplicate analysis]. Duplicate samples will be collected from these locations because **_____[Add sentence(s) here explaining a rationale for collecting duplicate samples from these locations; e.g. samples from these locations are suspected to exhibit moderate concentrations of contaminants or previous sampling events have detected moderate levels of contamination at the site or sampling area at these locations.]** When collecting duplicate water samples, bottles with the two different sample identification numbers will alternate in the filling sequence (e.g., a typical filling sequence might be, VOCs designation GW-2, VOCs designation GW-4 (duplicate of GW-2); metals, designation GW-2, metals, designation GW-4, (duplicate of GW-2) etc.). Note that bottles for one type of analysis will be filled before bottles for the next analysis are filled. Volatiles will always be filled first.

[Always include this paragraph.]

Duplicate samples will be preserved, packaged, and sealed in then same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

10.1.6 Background Samples

Background samples are collected in situations where the possibility exists that there are native or ambient levels of one or more target analytes present or where one aim of the sampling event is to differentiate between on-site and off-site contributions to contamination. One or more locations are chosen which should be free of contamination from the site or sampling location itself, but have similar geology, hydrogeology, or other characteristics to the proposed sampling locations that may have been impacted by site activities. For example, an area adjacent to but removed from the site, upstream from the sampling points, or up gradient or cross gradient from the groundwater under the site. Not all sampling events require background samples.

[Specify the sample locations that have been designated as background. Include a rationale for collecting background samples from these locations and describe or reference the sampling and analytical procedures which will be followed to collect these samples.]

10.1.7 Field Screening and Confirmation Samples

For projects where field screening methods are used (typically defined as testing using field test kits, immunoassay kits, or soil gas measurements or equivalent, but not usually defined as the use of a

mobile laboratory which generates data equivalent to a fixed laboratory), two aspects of the tests should be described. First, the QC which will be run in conjunction with the field screening method itself, and, second, any fixed laboratory confirmation tests which will be conducted. QC acceptance criteria for these tests should be defined in these sections rather than in the DQO section.

10.1.8 Field Screening Samples

[For projects where field screening methods are used describe the QC, samples which will be run in the field to ensure that the screening method is working properly. This usually consists of a combination of field duplicates and background (clean) samples). The discussion should specify acceptance criteria and corrective action to be taken if results are not within defined limits. Discuss confirmation tests below.]

10.1.9 Confirmation Samples

If the planned sampling event includes a combination of field screening and fixed laboratory confirmation, this section should describe the frequency with which the confirmation samples will be collected and the criteria which will be used to select confirmation locations. These will both be dependent on the use of the data in decision making. It is recommended that the selection process be at a minimum of 10% and that a selection criteria include checks for both false positives (i.e., the field detections are invalid or the concentrations are not accurate) and false negatives (i.e., the analyte was not detected in the field). Because many field screening techniques are less sensitive than laboratory methods false negative screening is especially important unless the field method is below the action level for any decision making. It is recommended that some "hits" be chosen and that other locations be chosen randomly.

[Describe confirmation sampling. Discuss the frequency with which samples will be confirmed and how location will be chosen. Define acceptance criteria for the confirmation results (e.g., RPD#25%) and corrective actions to be taken if samples are not confirmed.]

10.1.10 Split Samples

Split Samples are defined differently by different organizations, but for the purpose of this guidance, s split samples are samples that are divided among two or more laboratory for the purpose of providing an inter-laboratory or inter-organization comparison. Usually one organization (for example, a responsible party) collects the samples and provides sufficient material to the other organization (for example, EPA) to enable it to perform independent analyses. It is expected that the sampling party will have prepared a sampling plan which the QA Office has reviewed and approved that describes the sampling locations and a rationale for their choice, sampling methods, and analyses.

[Describe the purpose of the split sampling. Include references to the approved sampling plan of the party collecting the samples. Provide a rationale for the sample locations at which split samples will be obtained and how these locations are representative of the sampling event as a whole. Describe how results are to be compared and define criteria by which agreement will be measured. Discuss corrective action to be taken if results are found to not be in agreement.]

10.2 Laboratory Quality Control Samples

Laboratory quality control (QC) samples are analyzed as part of standard laboratory practice. The laboratory monitors the precision and accuracy of the results of its analytical procedures through analysis of QC samples. In part, laboratory QC samples consist of matrix spike/matrix spike duplicate samples for organic analyses, and matrix spike and duplicate samples for inorganic analyses. The term "matrix" refers to use of the actual media collected in the field (e.g., routine soil and water samples).

Laboratory QC samples are an aliquot (subset) of the field sample. They are not a separate sample, but a special designation of an existing sample.

[Include the following language if soil samples are to be collected for other than VOCs. Otherwise delete.]

A routinely collected soil sample (a full 8-oz sample jar or two 120-mL sample vials) contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes will not be collected. [Include the following language if soil samples are to be collected for other than VOCs. Otherwise delete.] Soil samples for volatile organic compound analyses for laboratory QC purposes will be obtained by collecting double the number of equivalent Encore samples from a colocated location in the same way as the original samples, assigned a unique sample numbers and sent blind to the laboratory.

[Include the following language if water samples are to be collected. Otherwise delete.]

For water samples, double volumes of samples are supplied to the laboratory for its use for QC purposes. Two sets of water sample containers are filled and all containers are labeled with a single sample number.

For VOC samples this would result in 6 vials being collected instead of 3, for pesticides and semi-volatile samples this would be 4 liters instead of 2, etc.

The laboratory should be alerted as to which sample is to be used for QC analysis by a notation on the sample container label and the chain-of-custody record or packing list. At a minimum, one laboratory QC sample is required per 14 days or one per 20 samples (including blanks and duplicates), whichever is greater. If the sample event lasts longer than 14 days or involves collection of more than 20 samples per matrix, additional QC samples will be designated.

For this sampling event, samples collected at the following locations will be the designated laboratory QC samples: [If a matrix is not being sampled, delete the reference to that matrix.]

- For soil, samples _____ [List soil sample locations and numbers designated for QA/QC.]
- For sediment, samples _____ [List sediment sample locations and numbers designated for QA/QC.]
- For water, samples _____ [List water sample locations and numbers designated for QA/QC.]

[Add a paragraph explaining why these sample locations were chosen for QA/QC samples. QA/QC samples should be samples expected to contain moderate levels of contamination. A rationale should justify the selection of QA/QC samples based on previously-detected contamination at the site or sampling area, historic site or sampling area operations, expected contaminant deposition/migration, etc.]

11 FIELD VARIANCES

[It is not uncommon to find that, on the actual sampling date, conditions are different from expectations such that changes must be made to the SAP once the samplers are in the field. The following paragraph provides a means for documenting those deviations, or variances. Adopt the paragraph as is, or modify it to project-specific conditions.]

As conditions in the field may vary, it may become necessary to implement minor modifications to sampling as presented in this plan. When appropriate, the QA Office will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the sampling project report.

12 FIELD HEALTH AND SAFETY PROCEDURES

[Describe any agency-, program- or project-specific health and safety procedures that must be followed in the field, including safety equipment and clothing that may be required, explanation of potential hazards that may be encountered, and location and route to the nearest hospital or medical treatment facility. A copy of the organization health and safety plan may be included in the Appendix and referenced in this section.]

APPENDIX F. COMPENSATORY MITIGATION FOR LOSSES OF AQUATIC RESOURCES

Federal Register

Thursday, April 10, 2008

Part II

Department of Defense

Department of the Army, Corps of Engineers
33 CFR Parts 325 and 332

Environmental Protection Agency

40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule

PART 332—COMPENSATORY MITIGATION FOR LOSSES OF AQUATIC RESOURCES

Authority: 33 U.S.C. 401 *et seq.*; 33 U.S.C. 1344; and Pub. L. 108–136.

§ 332.1 Purpose and general considerations.

(a) *Purpose.* (1) The purpose of this part is to establish standards and criteria for the use of all types of compensatory mitigation, including on-site and off-site permittee-responsible mitigation, mitigation banks, and in-lieu fee mitigation to offset unavoidable impacts to waters of the United States authorized through the issuance of Department of the Army (DA) permits pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344) and/or sections 9 or 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401, 403). This part implements section 314(b) of the 2004 National Defense Authorization Act (Pub. L. 108–136), which directs that the standards and criteria shall, to the maximum extent practicable, maximize available credits and opportunities for mitigation, provide for regional variations in wetland conditions, functions, and values, and apply equivalent standards and criteria to each type of compensatory mitigation. This part is intended to further clarify mitigation requirements established under U.S. Army Corps of Engineers (Corps) and U.S. Environmental Protection Agency (U.S. EPA) regulations at 33 CFR part 320 and 40 CFR part 230, respectively. (2) This part has been jointly developed by the Secretary of the Army, acting through the Chief of Engineers, and the Administrator of the Environmental Protection Agency. From time to time guidance on interpreting and implementing this part may be prepared jointly by U.S. EPA and the Corps at the national or regional level. No modifications to the basic application, meaning, or intent of this part will be made without further joint rulemaking by the Secretary of the Army, acting through the Chief of Engineers and the Administrator of the Environmental Protection Agency, pursuant to the Administrative Procedure Act (5 U.S.C. 551 *et seq.*).

(b) *Applicability.* This part does not alter the regulations at § 320.4(r) of this title, which address the general mitigation requirements for DA permits. In particular, it does not alter the circumstances under which compensatory mitigation is required or the definitions of ''waters of the United States'' or ''navigable waters of the United States,'' which are provided at parts 328 and 329 of this chapter, respectively. Use of resources as compensatory mitigation that are not otherwise subject to regulation under section 404 of the Clean Water Act and/or sections 9 or 10 of the Rivers and Harbors Act of 1899 does not in and of itself make them subject to such regulation.

(c) *Sequencing.* (1) Nothing in this section affects the requirement that all DA permits subject to section 404 of the Clean Water Act comply with applicable provisions of the Section 404(b)(1) Guidelines at 40 CFR part 230.

(2) Pursuant to these requirements, the district engineer will issue an individual section 404 permit only upon a determination that the proposed discharge complies with applicable provisions of 40 CFR part 230, including those which require the permit applicant to take all appropriate and practicable steps to avoid and minimize adverse impacts to waters of the United States. Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines.

(3) Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines. During the 404(b)(1) Guidelines compliance analysis, the district engineer may determine that a DA permit for the proposed activity cannot be issued because of the lack of appropriate and practicable compensatory mitigation options.

(d) *Public interest.* Compensatory mitigation may also be required to ensure that an activity requiring authorization under section 404 of the Clean Water Act and/or sections 9 or 10 of the Rivers and Harbors Act of 1899 is not contrary to the public interest.

(e) *Accounting for regional variations.* Where appropriate, district engineers shall account for regional characteristics of aquatic resource types, functions and services when determining performance standards and monitoring requirements for compensatory mitigation projects.

(f) *Relationship to other guidance documents.* (1) This part applies instead of the ''Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks,'' which was issued on November 28, 1995, the ''Federal Guidance on the Use of In-Lieu Fee Arrangements for Compensatory Mitigation Under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act,'' which was issued on November 7, 2000, and Regulatory Guidance Letter 02–02, ''Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899'' which was issued on December 24, 2002. These guidance documents are no longer to be used as compensatory mitigation policy in the Corps Regulatory Program.

(2) In addition, this part also applies instead of the provisions relating to the amount, type, and location of compensatory mitigation projects, including the use of preservation, in the February 6, 1990, Memorandum of Agreement (MOA) between the Department of the Army and the Environmental Protection Agency on the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines. All other provisions of this MOA remain in effect.

§ 332.2 Definitions.

For the purposes of this part, the following terms are defined:

Adaptive management means the development of a management strategy that anticipates likely challenges associated with compensatory mitigation projects and provides for the implementation of actions to address those challenges, as well as unforeseen changes to those projects. It requires consideration of the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. It includes the selection of appropriate measures that will ensure that the aquatic resource functions are provided and involves analysis of monitoring results to identify potential problems of a compensatory mitigation project and the identification and implementation of measures to rectify those problems.

Advance credits means any credits of an approved in-lieu fee program that are available for sale prior to being fulfilled in accordance with an approved mitigation project plan. Advance credit sales require an approved in-lieu fee program instrument that meets all applicable requirements including a specific allocation of advance credits, by service area where applicable. The instrument must also contain a schedule for fulfillment of advance credit sales.

Buffer means an upland, wetland,

and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses.

Compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Compensatory mitigation project means compensatory mitigation implemented by the permittee as a requirement of a DA permit (i.e., permittee-responsible mitigation), or by a mitigation bank or an in-lieu fee program.

Condition means the relative ability of an aquatic resource to support and maintain a community of organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region.

Credit means a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the accrual or attainment of aquatic functions at a compensatory mitigation site. The measure of aquatic functions is based on the resources restored, established, enhanced, or preserved.

DA means Department of the Army.

Days means calendar days.

Debit means a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the loss of aquatic functions at an impact or project site. The measure of aquatic functions is based on the resources impacted by the authorized activity.

Enhancement means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation) means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

Fulfillment of advance credit sales of an in-lieu fee program means application of credits released in accordance with a credit release schedule in an approved mitigation project plan to satisfy the mitigation requirements represented by the advance credits. Only after any advance credit sales within a service area have been fulfilled through the application of released credits from an in-lieu fee project (in accordance with the credit release schedule for an approved mitigation project plan), may additional released credits from that project be sold or transferred to permittees. When advance credits are fulfilled, an equal number of new advance credits is restored to the program sponsor for sale or transfer to permit applicants.

Functional capacity means the degree to which an area of aquatic resource performs a specific function.

Functions means the physical, chemical, and biological processes that occur in ecosystems.

Impact means adverse effect.

In-kind means a resource of a similar structural and functional type to the impacted resource.

In-lieu fee program means a program involving the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for DA permits. Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. However, the rules governing the operation and use of in-lieu fee programs are somewhat different from the rules governing operation and use of mitigation banks. The operation and use of an in-lieu fee program are governed by an in-lieu fee program instrument.

In-lieu fee program instrument means the legal document for the establishment, operation, and use of an in-lieu fee program.

Instrument means mitigation banking instrument or in-lieu fee program instrument.

Interagency Review Team (IRT) means an interagency group of federal, tribal, state, and/or local regulatory and resource agency representatives that reviews documentation for, and advises the district engineer on, the establishment and management of a mitigation bank or an in-lieu fee program.

Mitigation bank means a site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by DA permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of a mitigation bank are governed by a mitigation banking instrument.

Mitigation banking instrument means the legal document for the establishment, operation, and use of a mitigation bank.

Off-site means an area that is neither located on the same parcel of land as the impact site, nor on a parcel of land contiguous to the parcel containing the impact site.

On-site means an area located on the same parcel of land as the impact site,

or on a parcel of land contiguous to the impact site.

Out-of-kind means a resource of a different structural and functional type from the impacted resource.

Performance standards are observable or measurable physical (including hydrological), chemical and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives.

Permittee-responsible mitigation means an aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

Preservation means the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Reference aquatic resources are a set of aquatic resources that represent the full range of variability exhibited by a regional class of aquatic resources as a result of natural processes and anthropogenic disturbances.

Rehabilitation means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Release of credits means a determination by the district engineer, in consultation with the IRT, that credits associated with an approved mitigation plan are available for sale or transfer, or in the case of an in-lieu fee program, for fulfillment of advance credit sales. A proportion of projected credits for a specific mitigation bank or in-lieu fee project may be released upon approval of the mitigation plan, with additional credits released as milestones specified in the credit release schedule are achieved.

Restoration means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riparian areas are lands adjacent to streams, rivers, lakes, and estuarine-marine shorelines. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality.

Service area means the geographic area within which impacts can be mitigated at a specific mitigation bank or an in-lieu fee program, as designated in its instrument.

Services mean the benefits that human populations receive from functions that occur in ecosystems.

Sponsor means any public or private entity responsible for establishing, and in most circumstances, operating a mitigation bank or in-lieu fee program.

Standard permit means a standard, individual permit issued under the authority of section 404 of the Clean Water Act and/or sections 9 or 10 of the Rivers and Harbors Act of 1899.

Temporal loss is the time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site. Higher compensation ratios may be required to compensate for temporal loss. When the compensatory mitigation project is initiated prior to, or concurrent with, the permitted impacts, the district engineer may determine that compensation for temporal loss is not necessary, unless the resource has a long development time.

Watershed means a land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

Watershed approach means an analytical process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. It involves consideration of watershed needs, and how locations and types of compensatory mitigation projects address those needs. A landscape perspective is used to identify the types and locations of compensatory mitigation projects that will benefit the watershed and offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The watershed approach may involve consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for DA permits.

Watershed plan means a plan developed by federal, tribal, state, and/or local government agencies or appropriate non-governmental organizations, in consultation with relevant stakeholders, for the specific goal of aquatic resource restoration, establishment, enhancement, and preservation. A watershed plan addresses aquatic resource conditions in the watershed, multiple stakeholder interests, and land uses. Watershed plans may also identify priority sites for aquatic resource restoration and protection. Examples of watershed plans include special area management plans, advance identification programs, and wetland management plans.

§ 332.3 General compensatory mitigation requirements.

(a) *General considerations.* (1) The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by DA permits. The district engineer must determine the compensatory mitigation to be required in a DA permit, based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity. When evaluating compensatory mitigation options, the district engineer will consider what would be environmentally preferable. In making this determination, the district engineer must assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project. In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success. Compensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular DA permit. Permit applicants are responsible for proposing an

appropriate compensatory mitigation option to offset unavoidable impacts.

(2) Compensatory mitigation may be performed using the methods of restoration, enhancement, establishment, and in certain circumstances preservation. Restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are reduced compared to establishment, and the potential gains in terms of aquatic resource functions are greater, compared to enhancement and preservation.

(3) Compensatory mitigation projects may be sited on public or private lands. Credits for compensatory mitigation projects on public land must be based solely on aquatic resource functions provided by the compensatory mitigation project, over and above those provided by public programs already planned or in place. All compensatory mitigation projects must comply with the standards in this part, if they are to be used to provide compensatory mitigation for activities authorized by DA permits, regardless of whether they are sited on public or private lands and whether the sponsor is a governmental or private entity.

(b) *Type and location of compensatory mitigation.* (1) When considering options for successfully providing the required compensatory mitigation, the district engineer shall consider the type and location options in the order presented in paragraphs (b)(2) through (b)(6) of this section. In general, the required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources (including the availability of water rights), trends in land use, ecological benefits, and compatibility with adjacent land uses. When compensating for impacts to marine resources, the location of the compensatory mitigation site should be chosen to replace lost functions and services within the same marine ecological system (e.g., reef complex, littoral drift cell). Compensation for impacts to aquatic resources in coastal watersheds (watersheds that include a tidal water body) should also be located in a coastal watershed where practicable. Compensatory mitigation projects should not be located where they will increase risks to aviation by attracting wildlife to areas where aircraft-wildlife strikes may occur (e.g., near airports).

(2) *Mitigation bank credits.* When permitted impacts are located within the service area of an approved mitigation bank, and the bank has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits from the sponsor. Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable. However, these same considerations may also be used to override this preference, where appropriate, as, for example, where an in-lieu fee program has released credits available from a specific approved in-lieu fee project, or a permittee-responsible project will restore an outstanding resource based on rigorous scientific and technical analysis.

(3) *In-lieu fee program credits.* Where permitted impacts are located within the service area of an approved in-lieu fee program, and the sponsor has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits from the sponsor. Where permitted impacts are not located in the service area of an approved mitigation bank, or the approved mitigation bank does not have the appropriate number and resource type of credits available to offset those impacts, in-lieu fee mitigation, if available, is generally preferable to permittee-responsible mitigation. In-lieu fee projects typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. They also devote significant resources to identifying and addressing high-priority resource needs on a watershed scale, as reflected in their compensation planning framework. For these reasons, the district engineer should give preference to in-lieu fee program credits over permittee-responsible mitigation, where these considerations are applicable. However, as with the preference for mitigation bank credits, these same considerations may be used to override this preference where appropriate. Additionally, in cases where permittee-responsible mitigation is likely to successfully meet performance standards before advance credits secured from an in-lieu fee program are fulfilled, the district engineer should also give consideration to this factor in deciding between in-lieu fee mitigation and permittee-responsible mitigation.

(4) *Permittee-responsible mitigation under a watershed approach.* Where permitted impacts are not in the service area of an approved mitigation bank or in-lieu fee program that has the appropriate number and resource type of credits available, permittee-responsible mitigation is the only option. Where practicable and likely to be successful and sustainable, the resource type and location for the required permittee-responsible compensatory mitigation should be determined using the principles of a watershed approach as outlined in paragraph (c) of this section.

(5) *Permittee-responsible mitigation through on-site and in-kind mitigation.* In cases where a watershed approach is not practicable, the district engineer should consider opportunities to offset anticipated aquatic resource impacts by requiring on-site and in-kind compensatory mitigation. The district engineer must also consider the practicability of on-site compensatory mitigation and its compatibility with the proposed project.

(6) *Permittee-responsible mitigation through off-site and/or out-of-kind mitigation.* If, after considering opportunities for on-site, in-kind compensatory mitigation as provided in paragraph (b)(5) of this section, the district engineer determines that these compensatory mitigation opportunities are not practicable, are unlikely to compensate for the permitted impacts, or will be incompatible with the proposed project, and an alternative,

practicable off-site and/or out-of-kind mitigation opportunity is identified that has a greater likelihood of offsetting the permitted impacts or is environmentally preferable to on-site or in-kind mitigation, the district engineer should require that this alternative compensatory mitigation be provided.

(c) *Watershed approach to compensatory mitigation.* (1) The district engineer must use a watershed approach to establish compensatory mitigation requirements in DA permits to the extent appropriate and practicable. Where a watershed plan is available, the district engineer will determine whether the plan is appropriate for use in the watershed approach for compensatory mitigation. In cases where the district engineer determines that an appropriate watershed plan is available, the watershed approach should be based on that plan. Where no such plan is available, the watershed approach should be based on information provided by the project sponsor or available from other sources. The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites.

(2) *Considerations.* (i) A watershed approach to compensatory mitigation considers the importance of landscape position and resource type of compensatory mitigation projects for the sustainability of aquatic resource functions within the watershed. Such an approach considers how the types and locations of compensatory mitigation projects will provide the desired aquatic resource functions, and will continue to function over time in a changing landscape. It also considers the habitat requirements of important species, habitat loss or conversion trends, sources of watershed impairment, and current development trends, as well as the requirements of other regulatory and non-regulatory programs that affect the watershed, such as storm water management or habitat conservation programs. It includes the protection and maintenance of terrestrial resources, such as non-wetland riparian areas and uplands, when those resources contribute to or improve the overall ecological functioning of aquatic resources in the watershed. Compensatory mitigation requirements determined through the watershed approach should not focus exclusively on specific functions (e.g., water quality or habitat for certain species), but should provide, where practicable, the suite of functions typically provided by the affected aquatic resource.

(ii) Locational factors (e.g., hydrology, surrounding land use) are important to the success of compensatory mitigation for impacted habitat functions and may lead to siting of such mitigation away from the project area. However, consideration should also be given to functions and services (e.g., water quality, flood control, shoreline protection) that will likely need to be addressed at or near the areas impacted by the permitted impacts.

(iii) A watershed approach may include on-site compensatory mitigation, off-site compensatory mitigation (including mitigation banks or in-lieu fee programs), or a combination of on-site and off-site compensatory mitigation.

(iv) A watershed approach to compensatory mitigation should include, to the extent practicable, inventories of historic and existing aquatic resources, including identification of degraded aquatic resources, and identification of immediate and long-term aquatic resource needs within watersheds that can be met through permittee-responsible mitigation projects, mitigation banks, or in-lieu fee programs. Planning efforts should identify and prioritize aquatic resource restoration, establishment, and enhancement activities, and preservation of existing aquatic resources that are important for maintaining or improving ecological functions of the watershed. The identification and prioritization of resource needs should be as specific as possible, to enhance the usefulness of the approach in determining compensatory mitigation requirements.

(v) A watershed approach is not appropriate in areas where watershed boundaries do not exist, such as marine areas. In such cases, an appropriate spatial scale should be used to replace lost functions and services within the same ecological system (e.g., reef complex, littoral drift cell).

(3) *Information Needs.* (i) In the absence of a watershed plan determined by the district engineer under paragraph (c)(1) of this section to be appropriate for use in the watershed approach, the district engineer will use a watershed approach based on analysis of information regarding watershed conditions and needs, including potential sites for aquatic resource restoration activities and priorities for aquatic resource restoration and preservation. Such information includes: current trends in habitat loss or conversion; cumulative impacts of past development activities, current development trends, the presence and needs of sensitive species; site conditions that favor or hinder the success of compensatory mitigation projects; and chronic environmental problems such as flooding or poor water quality.

(ii) This information may be available from sources such as wetland maps; soil surveys; U.S. Geological Survey topographic and hydrologic maps; aerial photographs; information on rare, endangered and threatened species and critical habitat; local ecological reports or studies; and other information sources that could be used to identify locations for suitable compensatory mitigation projects in the watershed.

(iii) The level of information and analysis needed to support a watershed approach must be commensurate with the scope and scale of the proposed impacts requiring a DA permit, as well as the functions lost as a result of those impacts.

(4) *Watershed scale.* The size of watershed addressed using a watershed approach should not be larger than is appropriate to ensure that the aquatic resources provided through compensation activities will effectively compensate for adverse environmental impacts resulting from activities authorized by DA permits. The district engineer should consider relevant environmental factors and appropriate locally developed standards and criteria when determining the appropriate watershed scale in guiding compensation activities.

(d) *Site selection.* (1) The compensatory mitigation project site must be ecologically suitable for providing the desired aquatic resource functions. In determining the ecological suitability of the compensatory mitigation project site, the district engineer must consider, to the extent practicable, the following factors:

(i) Hydrological conditions, soil characteristics, and other physical and chemical characteristics;

(ii) Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions;

(iii) The size and location of the compensatory mitigation site relative to hydrologic sources (including the availability of water rights) and other ecological features;

(iv) Compatibility with adjacent land uses and watershed management plans;

(v) Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., shallow subtidal habitat, mature forests), cultural sites, or habitat for federally- or

state-listed threatened and endangered species; and

(vi) Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

(2) District engineers may require on-site, off-site, or a combination of on-site and off-site compensatory mitigation to replace permitted losses of aquatic resource functions and services.

(3) Applicants should propose compensation sites adjacent to existing aquatic resources or where aquatic resources previously existed.

(e) *Mitigation type.* (1) In general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for the functions and services lost at the impact site. For example, tidal wetland compensatory mitigation projects are most likely to compensate for unavoidable impacts to tidal wetlands, while perennial stream compensatory mitigation projects are most likely to compensate for unavoidable impacts to perennial streams. Thus, except as provided in paragraph (e)(2) of this section, the required compensatory mitigation shall be of a similar type to the affected aquatic resource.

(2) If the district engineer determines, using the watershed approach in accordance with paragraph (c) of this section that out-of-kind compensatory mitigation will serve the aquatic resource needs of the watershed, the district engineer may authorize the use of such out-of-kind compensatory mitigation. The basis for authorization of out-of-kind compensatory mitigation must be documented in the administrative record for the permit action.

(3) For difficult-to-replace resources (e.g., bogs, fens, springs, streams, Atlantic white cedar swamps) if further avoidance and minimization is not practicable, the required compensation should be provided, if practicable, through in-kind rehabilitation, enhancement, or preservation since there is greater certainty that these methods of compensation will successfully offset permitted impacts.

(f) *Amount of compensatory mitigation.* (1) If the district engineer determines that compensatory mitigation is necessary to offset unavoidable impacts to aquatic resources, the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratio must be used.

(2) The district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site. The rationale for the required replacement ratio must be documented in the administrative record for the permit action.

(3) If an in-lieu fee program will be used to provide the required compensatory mitigation, and the appropriate number and resource type of released credits are not available, the district engineer must require sufficient compensation to account for the risk and uncertainty associated with in-lieu fee projects that have not been implemented before the permitted impacts have occurred.

(g) *Use of mitigation banks and in-lieu fee programs.* Mitigation banks and in-lieu fee programs may be used to compensate for impacts to aquatic resources authorized by general permits and individual permits, including after-the-fact permits, in accordance with the preference hierarchy in paragraph (b) of this section.

(h) *Preservation.* (1) Preservation may be used to provide compensatory mitigation for activities authorized by DA permits when all the following criteria are met:

(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;

(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;

(iii) Preservation is determined by the district engineer to be appropriate and practicable;

(iv) The resources are under threat of destruction or adverse modifications; and

(v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

(2) Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approach described in paragraph (c) of this section, but compensation ratios shall be higher.

(i) *Buffers.* District engineers may require the restoration, establishment, enhancement, and preservation, as well as the maintenance, of riparian areas and/or buffers around aquatic resources where necessary to ensure the long-term viability of those resources. Buffers may also provide habitat or corridors necessary for the ecological functioning of aquatic resources. If buffers are required by the district engineer as part of the compensatory mitigation project, compensatory mitigation credit will be provided for those buffers.

(j) *Relationship to other federal, tribal, state, and local programs.* (1) Compensatory mitigation projects for DA permits may also be used to satisfy the environmental requirements of other programs, such as tribal, state, or local wetlands regulatory programs, other federal programs such as the Surface Mining Control and Reclamation Act, Corps civil works projects, and Department of Defense military construction projects, consistent with the terms and requirements of these programs and subject to the following considerations:

(i) The compensatory mitigation project must include appropriate compensation required by the DA permit for unavoidable impacts to aquatic resources authorized by that permit.

(ii) Under no circumstances may the same credits be used to provide mitigation for more than one permitted activity. However, where appropriate, compensatory mitigation projects, including mitigation banks and in-lieu fee projects, may be designed to

holistically address requirements under multiple programs and authorities for the same activity.

(2) Except for projects undertaken by federal agencies, or where federal funding is specifically authorized to provide compensatory mitigation, federally-funded aquatic resource restoration or conservation projects undertaken for purposes other than compensatory mitigation, such as the Wetlands Reserve Program, Conservation Reserve Program, and Partners for Wildlife Program activities, cannot be used for the purpose of generating compensatory mitigation credits for activities authorized by DA permits. However, compensatory mitigation credits may be generated by activities undertaken in conjunction with, but supplemental to, such programs in order to maximize the overall ecological benefits of the restoration or conservation project.

(3) Compensatory mitigation projects may also be used to provide compensatory mitigation under the Endangered Species Act or for Habitat Conservation Plans, as long as they comply with the requirements of paragraph (j)(1) of this section.

(k) *Permit conditions.* (1) The compensatory mitigation requirements for a DA permit, including the amount and type of compensatory mitigation, must be clearly stated in the special conditions of the individual permit or general permit verification (see 33 CFR 325.4 and 330.6(a)). The special conditions must be enforceable.

(2) For an individual permit that requires permittee-responsible mitigation, the special conditions must:

(i) Identify the party responsible for providing the compensatory mitigation;

(ii) Incorporate, by reference, the final mitigation plan approved by the district engineer;

(iii) State the objectives, performance standards, and monitoring required for the compensatory mitigation project, unless they are provided in the approved final mitigation plan; and

(iv) Describe any required financial assurances or long-term management provisions for the compensatory mitigation project, unless they are specified in the approved final mitigation plan.

(3) For a general permit activity that requires permittee-responsible compensatory mitigation, the special conditions must describe the compensatory mitigation proposal, which may be either conceptual or detailed. The general permit verification must also include a special condition that states that the permittee cannot commence work in waters of the United States until the district engineer approves the final mitigation plan, unless the district engineer determines that such a special condition is not practicable and not necessary to ensure timely completion of the required compensatory mitigation. To the extent appropriate and practicable, special conditions of the general permit verification should also address the requirements of paragraph (k)(2) of this section.

(4) If a mitigation bank or in-lieu fee program is used to provide the required compensatory mitigation, the special conditions must indicate whether a mitigation bank or in-lieu fee program will be used, and specify the number and resource type of credits the permittee is required to secure. In the case of an individual permit, the special condition must also identify the specific mitigation bank or in-lieu fee program that will be used. For general permit verifications, the special conditions may either identify the specific mitigation bank or in-lieu fee program, or state that the specific mitigation bank or in-lieu fee program used to provide the required compensatory mitigation must be approved by the district engineer before the credits are secured.

(l) *Party responsible for compensatory mitigation.* (1) For permittee-responsible mitigation, the special conditions of the DA permit must clearly indicate the party or parties responsible for the implementation, performance, and long-term management of the compensatory mitigation project.

(2) For mitigation banks and in-lieu fee programs, the instrument must clearly indicate the party or parties responsible for the implementation, performance, and long-term management of the compensatory mitigation project(s). The instrument must also contain a provision expressing the sponsor's agreement to assume responsibility for a permittee's compensatory mitigation requirements, once that permittee has secured the appropriate number and resource type of credits from the sponsor and the district engineer has received the documentation described in paragraph (l)(3) of this section.

(3) If use of a mitigation bank or in-lieu fee program is approved by the district engineer to provide part or all of the required compensatory mitigation for a DA permit, the permittee retains responsibility for providing the compensatory mitigation until the appropriate number and resource type of credits have been secured from a sponsor and the district engineer has received documentation that confirms that the sponsor has accepted the responsibility for providing the required compensatory mitigation. This documentation may consist of a letter or form signed by the sponsor, with the permit number and a statement indicating the number and resource type of credits that have been secured from the sponsor. Copies of this documentation will be retained in the administrative records for both the permit and the instrument. If the sponsor fails to provide the required compensatory mitigation, the district engineer may pursue measures against the sponsor to ensure compliance.

(m) *Timing.* Implementation of the compensatory mitigation project shall be, to the maximum extent practicable, in advance of or concurrent with the activity causing the authorized impacts. The district engineer shall require, to the extent appropriate and practicable, additional compensatory mitigation to offset temporal losses of aquatic functions that will result from the permitted activity.

(n) *Financial assurances.* (1) The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards. In cases where an alternate mechanism is available to ensure a high level of confidence that the compensatory mitigation will be provided and maintained (e.g., a formal, documented commitment from a government agency or public authority) the district engineer may determine that financial assurances are not necessary for that compensatory mitigation project.

(2) The amount of the required financial assurances must be determined by the district engineer, in consultation with the project sponsor, and must be based on the size and complexity of the compensatory mitigation project, the degree of completion of the project at the time of project approval, the likelihood of success, the past performance of the project sponsor, and any other factors the district engineer deems appropriate. Financial assurances may be in the form of performance bonds, escrow accounts, casualty insurance, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments, subject to the approval of the district engineer. The rationale for determining the amount of the required financial assurances must be documented in the administrative record for either the DA permit or the instrument. In determining the assurance amount, the district engineer shall consider the cost of providing

replacement mitigation, including costs for land acquisition, planning and engineering, legal fees, mobilization, construction, and monitoring.

(3) If financial assurances are required, the DA permit must include a special condition requiring the financial assurances to be in place prior to commencing the permitted activity.

(4) Financial assurances shall be phased out once the compensatory mitigation project has been determined by the district engineer to be successful in accordance with its performance standards. The DA permit or instrument must clearly specify the conditions under which the financial assurances are to be released to the permittee, sponsor, and/or other financial assurance provider, including, as appropriate, linkage to achievement of performance standards, adaptive management, or compliance with special conditions.

(5) A financial assurance must be in a form that ensures that the district engineer will receive notification at least 120 days in advance of any termination or revocation. For third-party assurance providers, this may take the form of a contractual requirement for the assurance provider to notify the district engineer at least 120 days before the assurance is revoked or terminated.

(6) Financial assurances shall be payable at the direction of the district engineer to his designee or to a standby trust agreement. When a standby trust is used (e.g., with performance bonds or letters of credit) all amounts paid by the financial assurance provider shall be deposited directly into the standby trust fund for distribution by the trustee in accordance with the district engineer's instructions.

(o) *Compliance with applicable law.* The compensatory mitigation project must comply with all applicable federal, state, and local laws. The DA permit, mitigation banking instrument, or in-lieu fee program instrument must not require participation by the Corps or any other federal agency in project management, including receipt or management of financial assurances or long-term financing mechanisms, except as determined by the Corps or other agency to be consistent with its statutory authority, mission, and priorities.

§ 332.4 Planning and documentation.

(a) *Pre-application consultations.* Potential applicants for standard permits are encouraged to participate in pre-application meetings with the Corps and appropriate agencies to discuss potential mitigation requirements and information needs.

(b) *Public review and comment.* (1) For an activity that requires a standard DA permit pursuant to section 404 of the Clean Water Act, the public notice for the proposed activity must contain a statement explaining how impacts associated with the proposed activity are to be avoided, minimized, and compensated for. This explanation shall address, to the extent that such information is provided in the mitigation statement required by § 325.1(d)(7) of this chapter, the proposed avoidance and minimization and the amount, type, and location of any proposed compensatory mitigation, including any out-of-kind compensation, or indicate an intention to use an approved mitigation bank or in-lieu fee program. The level of detail provided in the public notice must be commensurate with the scope and scale of the impacts. The notice shall not include information that the district engineer and the permittee believe should be kept confidential for business purposes, such as the exact location of a proposed mitigation site that has not yet been secured. The permittee must clearly identify any information being claimed as confidential in the mitigation statement when submitted. In such cases, the notice must still provide enough information to enable the public to provide meaningful comment on the proposed mitigation.

(2) For individual permits, district engineers must consider any timely comments and recommendations from other federal agencies; tribal, state, or local governments; and the public.

(3) For activities authorized by letters of permission or general permits, the review and approval process for compensatory mitigation proposals and plans must be conducted in accordance with the terms and conditions of those permits and applicable regulations including the applicable provisions of this part.

(c) *Mitigation plan.* (1) *Preparation and Approval.* (i) For individual permits, the permittee must prepare a draft mitigation plan and submit it to the district engineer for review. After addressing any comments provided by the district engineer, the permittee must prepare a final mitigation plan, which must be approved by the district engineer prior to issuing the individual permit. The approved final mitigation plan must be incorporated into the individual permit by reference. The final mitigation plan must include the items described in paragraphs (c)(2) through (c)(14) of this section, but the level of detail of the mitigation plan should be commensurate with the scale and scope of the impacts. As an alternative, the district engineer may determine that it would be more appropriate to address any of the items described in paragraphs (c)(2) through (c)(14) of this section as permit conditions, instead of components of a compensatory mitigation plan. For permittees who intend to fulfill their compensatory mitigation obligations by securing credits from approved mitigation banks or in-lieu fee programs, their mitigation plans need include only the items described in paragraphs (c)(5) and (c)(6) of this section, and the name of the specific mitigation bank or in-lieu fee program to be used.

(ii) For general permits, if compensatory mitigation is required, the district engineer may approve a conceptual or detailed compensatory mitigation plan to meet required time frames for general permit verifications, but a final mitigation plan incorporating the elements in paragraphs (c)(2) through (c)(14) of this section, at a level of detail commensurate with the scale and scope of the impacts, must be approved by the district engineer before the permittee commences work in waters of the United States. As an alternative, the district engineer may determine that it would be more appropriate to address any of the items described in paragraphs (c)(2) through (c)(14) of this section as permit conditions, instead of components of a compensatory mitigation plan. For permittees who intend to fulfill their compensatory mitigation obligations by securing credits from approved mitigation banks or in-lieu fee programs, their mitigation plans need include only the items described in paragraphs (c)(5) and (c)(6) of this section, and either the name of the specific mitigation bank or in-lieu fee program to be used or a statement indicating that a mitigation bank or in-lieu fee program will be used (contingent upon approval by the district engineer).

(iii) Mitigation banks and in-lieu fee programs must prepare a mitigation plan including the items in paragraphs (c)(2) through (c)(14) of this section for each separate compensatory mitigation project site. For mitigation banks and in-lieu fee programs, the preparation and approval process for mitigation plans is described in § 332.8.

(2) *Objectives.* A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed,

ecoregion, physiographic province, or other geographic area of interest.

(3) *Site selection.* A description of the factors considered during the site selection process. This should include consideration of watershed needs, on-site alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site. (See § 332.3(d).)

(4) *Site protection instrument.* A description of the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation project site (see § 332.7(a)).

(5) *Baseline information.* A description of the ecological characteristics of the proposed compensatory mitigation project site and, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of waters of the United States on the proposed compensatory mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site, not the mitigation bank or in-lieu fee project site.

(6) *Determination of credits.* A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. (See § 332.3(f).)

(i) For permittee-responsible mitigation, this should include an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.

(ii) For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

(7) *Mitigation work plan.* Detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

(8) *Maintenance plan.* A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

(9) *Performance standards.* Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives. (See § 332.5.)

(10) *Monitoring requirements.* A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included. (See § 332.6.)

(11) *Long-term management plan.* A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management. (See § 332.7(d).)

(12) *Adaptive management plan.* A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. (See § 332.7(c).)

(13) *Financial assurances.* A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards (see § 332.3(n)).

(14) *Other information.* The district engineer may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the compensatory mitigation project.

§ 332.5 Ecological performance standards.

(a) The approved mitigation plan must contain performance standards that will be used to assess whether the project is achieving its objectives. Performance standards should relate to the objectives of the compensatory mitigation project, so that the project can be objectively evaluated to determine if it is developing into the desired resource type, providing the expected functions, and attaining any other applicable metrics (e.g., acres).

(b) Performance standards must be based on attributes that are objective and verifiable. Ecological performance standards must be based on the best available science that can be measured or assessed in a practicable manner. Performance standards may be based on variables or measures of functional capacity described in functional assessment methodologies, measurements of hydrology or other aquatic resource characteristics, and/or comparisons to reference aquatic resources of similar type and landscape position. The use of reference aquatic resources to establish performance standards will help ensure that those performance standards are reasonably achievable, by reflecting the range of variability exhibited by the regional class of aquatic resources as a result of natural processes and anthropogenic disturbances. Performance standards based on measurements of hydrology should take into consideration the hydrologic variability exhibited by reference aquatic resources, especially wetlands. Where practicable, performance standards should take into account the expected stages of the aquatic resource development process, in order to allow early identification of potential problems and appropriate adaptive management.

§ 332.6 Monitoring.

(a) *General.* (1) Monitoring the compensatory mitigation project site is necessary to determine if the project is meeting its performance standards, and to determine if measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. The submission of monitoring reports to assess the development and condition of the compensatory mitigation project is required, but the content and level of detail for those monitoring reports must be commensurate with the scale and scope of the compensatory mitigation

project, as well as the compensatory mitigation project type. The mitigation plan must address the monitoring requirements for the compensatory mitigation project, including the parameters to be monitored, the length of the monitoring period, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the district engineer, and the party responsible for submitting those monitoring reports to the district engineer.

(2) The district engineer may conduct site inspections on a regular basis (e.g., annually) during the monitoring period to evaluate mitigation site performance.

(b) *Monitoring period.* The mitigation plan must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs). Following project implementation, the district engineer may reduce or waive the remaining monitoring requirements upon a determination that the compensatory mitigation project has achieved its performance standards. Conversely the district engineer may extend the original monitoring period upon a determination that performance standards have not been met or the compensatory mitigation project is not on track to meet them. The district engineer may also revise monitoring requirements when remediation and/or adaptive management is required.

(c) *Monitoring reports.* (1) The district engineer must determine the information to be included in monitoring reports. This information must be sufficient for the district engineer to determine how the compensatory mitigation project is progressing towards meeting its performance standards, and may include plans (such as as-built plans), maps, and photographs to illustrate site conditions. Monitoring reports may also include the results of functional, condition, or other assessments used to provide quantitative or qualitative measures of the functions provided by the compensatory mitigation project site.

(2) The permittee or sponsor is responsible for submitting monitoring reports in accordance with the special conditions of the DA permit or the terms of the instrument. Failure to submit monitoring reports in a timely manner may result in compliance action by the district engineer.

(3) Monitoring reports must be provided by the district engineer to interested federal, tribal, state, and local resource agencies, and the public, upon request.

§ 332.7 Management.

(a) *Site protection.* (1) The aquatic habitats, riparian areas, buffers, and uplands that comprise the overall compensatory mitigation project must be provided long-term protection through real estate instruments or other available mechanisms, as appropriate. Long-term protection may be provided through real estate instruments such as conservation easements held by entities such as federal, tribal, state, or local resource agencies, non-profit conservation organizations, or private land managers; the transfer of title to such entities; or by restrictive covenants. For government property, long-term protection may be provided through federal facility management plans or integrated natural resources management plans. When approving a method for long-term protection of non-government property other than transfer of title, the district engineer shall consider relevant legal constraints on the use of conservation easements and/or restrictive covenants in determining whether such mechanisms provide sufficient site protection. To provide sufficient site protection, a conservation easement or restrictive covenant should, where practicable, establish in an appropriate third party (e.g., governmental or non-profit resource management agency) the right to enforce site protections and provide the third party the resources necessary to monitor and enforce these site protections.

(2) The real estate instrument, management plan, or other mechanism providing long-term protection of the compensatory mitigation site must, to the extent appropriate and practicable, prohibit incompatible uses (e.g., clear cutting or mineral extraction) that might otherwise jeopardize the objectives of the compensatory mitigation project. Where appropriate, multiple instruments recognizing compatible uses (e.g., fishing or grazing rights) may be used.

(3) The real estate instrument, management plan, or other long-term protection mechanism must contain a provision requiring 60-day advance notification to the district engineer before any action is taken to void or modify the instrument, management plan, or long-term protection mechanism, including transfer of title to, or establishment of any other legal claims over, the compensatory mitigation site.

(4) For compensatory mitigation projects on public lands, where federal facility management plans or integrated natural resources management plans are used to provide long-term protection, and changes in statute, regulation, or agency needs or mission results in an incompatible use on public lands originally set aside for compensatory mitigation, the public agency authorizing the incompatible use is responsible for providing alternative compensatory mitigation that is acceptable to the district engineer for any loss in functions resulting from the incompatible use.

(5) A real estate instrument, management plan, or other long-term protection mechanism used for site protection of permittee-responsible mitigation must be approved by the district engineer in advance of, or concurrent with, the activity causing the authorized impacts.

(b) *Sustainability.* Compensatory mitigation projects shall be designed, to the maximum extent practicable, to be self-sustaining once performance standards have been achieved. This includes minimization of active engineering features (e.g., pumps) and appropriate siting to ensure that natural hydrology and landscape context will support long-term sustainability. Where active long-term management and maintenance are necessary to ensure long-term sustainability (e.g., prescribed burning, invasive species control, maintenance of water control structures, easement enforcement), the responsible party must provide for such management and maintenance. This includes the provision of long-term financing mechanisms where necessary. Where needed, the acquisition and protection of water rights must be secured and documented in the permit conditions or instrument.

(c) *Adaptive management.* (1) If the compensatory mitigation project cannot be constructed in accordance with the approved mitigation plans, the permittee or sponsor must notify the district engineer. A significant modification of the compensatory mitigation project requires approval from the district engineer.

(2) If monitoring or other information indicates that the compensatory mitigation project is not progressing towards meeting its performance standards as anticipated, the responsible party must notify the district engineer as soon as possible. The district engineer will evaluate and pursue measures to address deficiencies in the compensatory mitigation project. The district engineer will consider whether the compensatory mitigation project is

providing ecological benefits comparable to the original objectives of the compensatory mitigation project.

(3) The district engineer, in consultation with the responsible party (and other federal, tribal, state, and local agencies, as appropriate), will determine the appropriate measures. The measures may include site modifications, design changes, revisions to maintenance requirements, and revised monitoring requirements. The measures must be designed to ensure that the modified compensatory mitigation project provides aquatic resource functions comparable to those described in the mitigation plan objectives.

(4) Performance standards may be revised in accordance with adaptive management to account for measures taken to address deficiencies in the compensatory mitigation project. Performance standards may also be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved compensatory mitigation project. No other revisions to performance standards will be allowed except in the case of natural disasters.

(d) *Long-term management.* (1) The permit conditions or instrument must identify the party responsible for ownership and all long-term management of the compensatory mitigation project. The permit conditions or instrument may contain provisions allowing the permittee or sponsor to transfer the long-term management responsibilities of the compensatory mitigation project site to a land stewardship entity, such as a public agency, non-governmental organization, or private land manager, after review and approval by the district engineer. The land stewardship entity need not be identified in the original permit or instrument, as long as the future transfer of long-term management responsibility is approved by the district engineer.

(2) A long-term management plan should include a description of long-term management needs, annual cost estimates for these needs, and identify the funding mechanism that will be used to meet those needs.

(3) Any provisions necessary for long-term financing must be addressed in the original permit or instrument. The district engineer may require provisions to address inflationary adjustments and other contingencies, as appropriate. Appropriate long-term financing mechanisms include non-wasting endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments. In cases where the long-term management entity is a public authority or government agency, that entity must provide a plan for the long-term financing of the site.

(4) For permittee-responsible mitigation, any long-term financing mechanisms must be approved in advance of the activity causing the authorized impacts.

§ 332.8 Mitigation banks and in-lieu fee programs.

(a) *General considerations.* (1) All mitigation banks and in-lieu fee programs must have an approved instrument signed by the sponsor and the district engineer prior to being used to provide compensatory mitigation for DA permits.

(2) To the maximum extent practicable, mitigation banks and in-lieu fee project sites must be planned and designed to be self-sustaining over time, but some active management and maintenance may be required to ensure their long-term viability and sustainability. Examples of acceptable management activities include maintaining fire-dependent habitat communities in the absence of natural fire and controlling invasive exotic plant species.

(3) All mitigation banks and in-lieu fee programs must comply with the standards in this part, if they are to be used to provide compensatory mitigation for activities authorized by DA permits, regardless of whether they are sited on public or private lands and whether the sponsor is a governmental or private entity.

(b) *Interagency Review Team.* (1) The district engineer will establish an Interagency Review Team (IRT) to review documentation for the establishment and management of mitigation banks and in-lieu fee programs. The district engineer or his designated representative serves as Chair of the IRT. In cases where a mitigation bank or in-lieu fee program is proposed to satisfy the requirements of another federal, tribal, state, or local program, in addition to compensatory mitigation requirements of DA permits, it may be appropriate for the administering agency to serve as co-Chair of the IRT.

(2) In addition to the Corps, representatives from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, NOAA Fisheries, the Natural Resources Conservation Service, and other federal agencies, as appropriate, may participate in the IRT. The IRT may also include representatives from tribal, state, and local regulatory and resource agencies, where such agencies have authorities and/or mandates directly affecting, or affected by, the establishment, operation, or use of the mitigation bank or in-lieu fee program. The district engineer will seek to include all public agencies with a substantive interest in the establishment of the mitigation bank or in-lieu fee program on the IRT, but retains final authority over its composition.

(3) The primary role of the IRT is to facilitate the establishment of mitigation banks or in-lieu fee programs through the development of mitigation banking or in-lieu fee program instruments. The IRT will review the prospectus, instrument, and other appropriate documents and provide comments to the district engineer. The district engineer and the IRT should use a watershed approach to the extent practicable in reviewing proposed mitigation banks and in-lieu fee programs. Members of the IRT may also sign the instrument, if they so choose. By signing the instrument, the IRT members indicate their agreement with the terms of the instrument. As an alternative, a member of the IRT may submit a letter expressing concurrence with the instrument. The IRT will also advise the district engineer in assessing monitoring reports, recommending remedial or adaptive management measures, approving credit releases, and approving modifications to an instrument. In order to ensure timely processing of instruments and other documentation, comments from IRT members must be received by the district engineer within the time limits specified in this section. Comments received after these deadlines will only be considered at the discretion of the district engineer to the extent that doing so does not jeopardize the deadlines for district engineer action.

(4) The district engineer will give full consideration to any timely comments and advice of the IRT. The district engineer alone retains final authority for approval of the instrument in cases where the mitigation bank or in-lieu fee program is used to satisfy compensatory mitigation requirements of DA permits.

(5) *MOAs with other agencies.* The district engineer and members of the IRT may enter into a memorandum of agreement (MOA) with any other federal, state or local government agency to perform all or some of the IRT review functions described in this section. Such MOAs must include provisions for appropriate federal oversight of the review process. The district engineer retains sole authority for final approval of instruments and

other documentation required under this section.

(c) *Compensation planning framework for in-lieu fee programs.* (1) The approved instrument for an in-lieu fee program must include a compensation planning framework that will be used to select, secure, and implement aquatic resource restoration, establishment, enhancement, and/or preservation activities. The compensation planning framework must support a watershed approach to compensatory mitigation. All specific projects used to provide compensation for DA permits must be consistent with the approved compensation planning framework. Modifications to the framework must be approved as a significant modification to the instrument by the district engineer, after consultation with the IRT.

(2) The compensation planning framework must contain the following elements:

(i) The geographic service area(s), including a watershed-based rationale for the delineation of each service area;

(ii) A description of the threats to aquatic resources in the service area(s), including how the in-lieu fee program will help offset impacts resulting from those threats;

(iii) An analysis of historic aquatic resource loss in the service area(s);

(iv) An analysis of current aquatic resource conditions in the service area(s), supported by an appropriate level of field documentation;

(v) A statement of aquatic resource goals and objectives for each service area, including a description of the general amounts, types and locations of aquatic resources the program will seek to provide;

(vi) A prioritization strategy for selecting and implementing compensatory mitigation activities;

(vii) An explanation of how any preservation objectives identified in paragraph (c)(2)(v) of this section and addressed in the prioritization strategy in paragraph (c)(2)(vi) satisfy the criteria for use of preservation in § 332.3(h);

(viii) A description of any public and private stakeholder involvement in plan development and implementation, including, where appropriate, coordination with federal, state, tribal and local aquatic resource management and regulatory authorities;

(ix) A description of the long-term protection and management strategies for activities conducted by the in-lieu fee program sponsor;

(x) A strategy for periodic evaluation and reporting on the progress of the program in achieving the goals and objectives in paragraph (c)(2)(v) of this section, including a process for revising the planning framework as necessary; and

(xi) Any other information deemed necessary for effective compensation planning by the district engineer.

(3) The level of detail necessary for the compensation planning framework is at the discretion of the district engineer, and will take into account the characteristics of the service area(s) and the scope of the program. As part of the in-lieu fee program instrument, the compensation planning framework will be reviewed by the IRT, and will be a major factor in the district engineer's decision on whether to approve the instrument.

(d) *Review process.* (1) The sponsor is responsible for preparing all documentation associated with establishment of the mitigation bank or in-lieu fee program, including the prospectus, instrument, and other appropriate documents, such as mitigation plans for a mitigation bank. The prospectus provides an overview of the proposed mitigation bank or in-lieu fee program and serves as the basis for public and initial IRT comment. For a mitigation bank, the mitigation plan, as described in § 332.4(c), provides detailed plans and specifications for the mitigation bank site. For in-lieu fee programs, mitigation plans will be prepared as in-lieu fee project sites are identified after the instrument has been approved and the in-lieu fee program becomes operational. The instrument provides the authorization for the mitigation bank or in-lieu fee program to provide credits to be used as compensatory mitigation for DA permits.

(2) *Prospectus.* The prospectus must provide a summary of the information regarding the proposed mitigation bank or in-lieu fee program, at a sufficient level of detail to support informed public and IRT comment. The review process begins when the sponsor submits a complete prospectus to the district engineer. For modifications of approved instruments, submittal of a new prospectus is not required; instead, the sponsor must submit a written request for an instrument modification accompanied by appropriate documentation. The district engineer must notify the sponsor within 30 days whether or not a submitted prospectus is complete. A complete prospectus includes the following information:

(i) The objectives of the proposed mitigation bank or in-lieu fee program.

(ii) How the mitigation bank or in-lieu fee program will be established and operated.

(iii) The proposed service area.

(iv) The general need for and technical feasibility of the proposed mitigation bank or in-lieu fee program.

(v) The proposed ownership arrangements and long-term management strategy for the mitigation bank or in-lieu fee project sites.

(vi) The qualifications of the sponsor to successfully complete the type(s) of mitigation project(s) proposed, including information describing any past such activities by the sponsor.

(vii) For a proposed mitigation bank, the prospectus must also address:

(A) The ecological suitability of the site to achieve the objectives of the proposed mitigation bank, including the physical, chemical, and biological characteristics of the bank site and how that site will support the planned types of aquatic resources and functions; and

(B) Assurance of sufficient water rights to support the long-term sustainability of the mitigation bank.

(viii) For a proposed in-lieu fee program, the prospectus must also include:

(A) The compensation planning framework (see paragraph (c) of this section); and

(B) A description of the in-lieu fee program account required by paragraph (i) of this section.

(3) *Preliminary review of prospectus.* Prior to submitting a prospectus, the sponsor may elect to submit a draft prospectus to the district engineer for comment and consultation. The district engineer will provide copies of the draft prospectus to the IRT and will provide comments back to the sponsor within 30 days. Any comments from IRT members will also be forwarded to the sponsor. This preliminary review is optional but is strongly recommended. It is intended to identify potential issues early so that the sponsor may attempt to address those issues prior to the start of the formal review process.

(4) *Public review and comment.* Within 30 days of receipt of a complete prospectus or an instrument modification request that will be processed in accordance with paragraph (g)(1) of this section, the district engineer will provide public notice of the proposed mitigation bank or in-lieu fee program, in accordance with the public notice procedures at 33 CFR 325.3. The public notice must, at a minimum, include a summary of the prospectus and indicate that the full prospectus is available to the public for review upon request. For modifications of approved instruments, the public notice must instead summarize, and make available to the public upon request, whatever documentation is appropriate for the modification (e.g., a

new or revised mitigation plan). The comment period for public notice will be 30 days, unless the district engineer determines that a longer comment period is appropriate. The district engineer will notify the sponsor if the comment period is extended beyond 30 days, including an explanation of why the longer comment period is necessary. Copies of all comments received in response to the public notice must be distributed to the other IRT members and to the sponsor within 15 days of the close of the public comment period. The district engineer and IRT members may also provide comments to the sponsor at this time, and copies of any such comments will also be distributed to all IRT members. If the construction of a mitigation bank or an in-lieu fee program project requires a DA permit, the public notice requirement may be satisfied through the public notice provisions of the permit processing procedures, provided all of the relevant information is provided.

(5) *Initial evaluation.* (i) After the end of the comment period, the district engineer will review the comments received in response to the public notice, and make a written initial evaluation as to the potential of the proposed mitigation bank or in-lieu fee program to provide compensatory mitigation for activities authorized by DA permits. This initial evaluation letter must be provided to the sponsor within 30 days of the end of the public notice comment period.

(ii) If the district engineer determines that the proposed mitigation bank or in-lieu fee program has potential for providing appropriate compensatory mitigation for activities authorized by DA permits, the initial evaluation letter will inform the sponsor that he/she may proceed with preparation of the draft instrument (see paragraph (d)(6) of this section).

(iii) If the district engineer determines that the proposed mitigation bank or in-lieu fee program does not have potential for providing appropriate compensatory mitigation for DA permits, the initial evaluation letter must discuss the reasons for that determination. The sponsor may revise the prospectus to address the district engineer's concerns, and submit the revised prospectus to the district engineer. If the sponsor submits a revised prospectus, a revised public notice will be issued in accordance with paragraph (d)(4) of this section.

(iv) This initial evaluation procedure does not apply to proposed modifications of approved instruments.

(6) *Draft instrument.* (i) After considering comments from the district engineer, the IRT, and the public, if the sponsor chooses to proceed with establishment of the mitigation bank or in-lieu fee program, he must prepare a draft instrument and submit it to the district engineer. In the case of an instrument modification, the sponsor must prepare a draft amendment (e.g., a specific instrument provision, a new or modified mitigation plan), and submit it to the district engineer. The district engineer must notify the sponsor within 30 days of receipt, whether the draft instrument or amendment is complete. If the draft instrument or amendment is incomplete, the district engineer will request from the sponsor the information necessary to make the draft instrument or amendment complete. Once any additional information is submitted, the district engineer must notify the sponsor as soon as he determines that the draft instrument or amendment is complete. The draft instrument must be based on the prospectus and must describe in detail the physical and legal characteristics of the mitigation bank or in-lieu fee program and how it will be established and operated.

(ii) For mitigation banks and in-lieu fee programs, the draft instrument must include the following information:

(A) A description of the proposed geographic service area of the mitigation bank or in-lieu fee program. The service area is the watershed, ecoregion, physiographic province, and/or other geographic area within which the mitigation bank or in-lieu fee program is authorized to provide compensatory mitigation required by DA permits. The service area must be appropriately sized to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area. For example, in urban areas, a U.S. Geological Survey 8-digit hydrologic unit code (HUC) watershed or a smaller watershed may be an appropriate service area. In rural areas, several contiguous 8-digit HUCs or a 6-digit HUC watershed may be an appropriate service area. Delineation of the service area must also consider any locally-developed standards and criteria that may be applicable. The economic viability of the mitigation bank or in-lieu fee program may also be considered in determining the size of the service area. The basis for the proposed service area must be documented in the instrument. An in-lieu fee program or umbrella mitigation banking instrument may have multiple service areas governed by its instrument (e.g., each watershed within a state or Corps district may be a separate service area under the instrument); however, all impacts and compensatory mitigation must be accounted for by service area;

(B) Accounting procedures;

(C) A provision stating that legal responsibility for providing the compensatory mitigation lies with the sponsor once a permittee secures credits from the sponsor;

(D) Default and closure provisions;

(E) Reporting protocols; and

(F) Any other information deemed necessary by the district engineer.

(iii) For a mitigation bank, a complete draft instrument must include the following additional information:

(A) Mitigation plans that include all applicable items listed in § 332.4(c)(2) through (14); and

(B) A credit release schedule, which is tied to achievement of specific milestones. All credit releases must be approved by the district engineer, in consultation with the IRT, based on a determination that required milestones have been achieved. The district engineer, in consultation with the IRT, may modify the credit release schedule, including reducing the number of available credits or suspending credit sales or transfers altogether, where necessary to ensure that all credit sales or transfers remain tied to compensatory mitigation projects with a high likelihood of meeting performance standards;

(iv) For an in-lieu fee program, a complete draft instrument must include the following additional information:

(A) The compensation planning framework (see paragraph (c) of this section);

(B) Specification of the initial allocation of advance credits (see paragraph (n) of this section) and a draft fee schedule for these credits, by service area, including an explanation of the basis for the allocation and draft fee schedule;

(C) A methodology for determining future project-specific credits and fees; and

(D) A description of the in-lieu fee program account required by paragraph (i) of this section.

(7) *IRT review.* Upon receipt of notification by the district engineer that the draft instrument or amendment is complete, the sponsor must provide the district engineer with a sufficient number of copies of the draft instrument or amendment to distribute to the IRT members. The district engineer will promptly distribute copies of the draft instrument or amendment to the IRT members for a 30-day comment period. The 30-day comment period begins 5 days after the district engineer distributes the copies of the draft instrument or amendment to the IRT.

Following the comment period, the district engineer will discuss any comments with the appropriate agencies and with the sponsor. The district engineer will seek to resolve issues using a consensus based approach, to the extent practicable, while still meeting the decision-making time frames specified in this section. Within 90 days of receipt of the complete draft instrument or amendment by the IRT members, the district engineer must notify the sponsor of the status of the IRT review. Specifically, the district engineer must indicate to the sponsor if the draft instrument or amendment is generally acceptable and what changes, if any, are needed. If there are significant unresolved concerns that may lead to a formal objection from one or more IRT members to the final instrument or amendment, the district engineer will indicate the nature of those concerns.

(8) *Final instrument.* The sponsor must submit a final instrument to the district engineer for approval, with supporting documentation that explains how the final instrument addresses the comments provided by the IRT. For modifications of approved instruments, the sponsor must submit a final amendment to the district engineer for approval, with supporting documentation that explains how the final amendment addresses the comments provided by the IRT. The final instrument or amendment must be provided directly by the sponsor to all members of the IRT. Within 30 days of receipt of the final instrument or amendment, the district engineer will notify the IRT members whether or not he intends to approve the instrument or amendment. If no IRT member objects, by initiating the dispute resolution process in paragraph (e) of this section within 45 days of receipt of the final instrument or amendment, the district engineer will notify the sponsor of his final decision and, if the instrument or amendment is approved, arrange for it to be signed by the appropriate parties. If any IRT member initiates the dispute resolution process, the district engineer will notify the sponsor. Following conclusion of the dispute resolution process, the district engineer will notify the sponsor of his final decision, and if the instrument or amendment is approved, arrange for it to be signed by the appropriate parties. For mitigation banks, the final instrument must contain the information items listed in paragraphs (d)(6)(ii), and (iii) of this section. For in-lieu fee programs, the final instrument must contain the information items listed in paragraphs (d)(6)(ii) and (iv) of this section. For the modification of an approved instrument, the amendment must contain appropriate information, as determined by the district engineer. The final instrument or amendment must be made available to the public upon request.

(e) *Dispute resolution process.* (1) Within 15 days of receipt of the district engineer's notification of intent to approve an instrument or amendment, the Regional Administrator of the U.S. EPA, the Regional Director of the U.S. Fish and Wildlife Service, the Regional Director of the National Marine Fisheries Service, and/or other senior officials of agencies represented on the IRT may notify the district engineer and other IRT members by letter if they object to the approval of the proposed final instrument or amendment. This letter must include an explanation of the basis for the objection and, where feasible, offer recommendations for resolving the objections. If the district engineer does not receive any objections within this time period, he may proceed to final action on the instrument or amendment.

(2) The district engineer must respond to the objection within 30 days of receipt of the letter. The district engineer's response may indicate an intent to disapprove the instrument or amendment as a result of the objection, an intent to approve the instrument or amendment despite the objection, or may provide a modified instrument or amendment that attempts to address the objection. The district engineer's response must be provided to all IRT members.

(3) Within 15 days of receipt of the district engineer's response, if the Regional Administrator or Regional Director is not satisfied with the response he may forward the issue to the Assistant Administrator for Water of the U.S. EPA, the Assistant Secretary for Fish and Wildlife and Parks of the U.S. FWS, or the Undersecretary for Oceans and Atmosphere of NOAA, as appropriate, for review and must notify the district engineer by letter via electronic mail or facsimile machine (with copies to all IRT members) that the issue has been forwarded for Headquarters review. This step is available only to the IRT members representing these three federal agencies, however other IRT members who do not agree with the district engineer's final decision do not have to sign the instrument or amendment or recognize the mitigation bank or in-lieu fee program for purposes of their own programs and authorities. If an IRT member other than the one filing the original objection has a new objection based on the district engineer's response, he may use the first step in this procedure (paragraph (e)(1) of this section) to provide that objection to the district engineer.

(4) If the issue has not been forwarded to the objecting agency's Headquarters, then the district engineer may proceed with final action on the instrument or amendment. If the issue has been forwarded to the objecting agency's Headquarters, the district engineer must hold in abeyance the final action on the instrument or amendment, pending Headquarters level review described below.

(5) Within 20 days from the date of the letter requesting Headquarters level review, the Assistant Administrator for Water, the Assistant Secretary for Fish and Wildlife and Parks, or the Undersecretary for Oceans and Atmosphere must either notify the Assistant Secretary of the Army (Civil Works) (ASA(CW)) that further review will not be requested, or request that the ASA(CW) review the final instrument or amendment.

(6) Within 30 days of receipt of the letter from the objecting agency's Headquarters request for ASA(CW)'s review of the final instrument, the ASA(CW), through the Director of Civil Works, must review the draft instrument or amendment and advise the district engineer on how to proceed with final action on that instrument or amendment. The ASA(CW) must immediately notify the Assistant Administrator for Water, the Assistant Secretary for Fish and Wildlife and Parks, and/or the Undersecretary for Oceans and Atmosphere of the final decision.

(7) In cases where the dispute resolution procedure is used, the district engineer must notify the sponsor of his final decision within 150 days of receipt of the final instrument or amendment.

(f) *Extension of deadlines.* (1) The deadlines in paragraphs (d) and (e) of this section may be extended by the district engineer at his sole discretion in cases where:

(i) Compliance with other applicable laws, such as consultation under section 7 of the Endangered Species Act or section 106 of the National Historic Preservation Act, is required;

(ii) It is necessary to conduct government-to-government consultation with Indian tribes;

(iii) Timely submittal of information necessary for the review of the proposed mitigation bank or in-lieu fee program or the proposed modification of an approved instrument is not accomplished by the sponsor; or

(iv) Information that is essential to the district engineer's decision cannot be reasonably obtained within the specified time frame.

(2) In such cases, the district engineer must promptly notify the sponsor in writing of the extension and the reason for it. Such extensions shall be for the minimum time necessary to resolve the issue necessitating the extension.

(g) *Modification of instruments.* (1) *Approval of an amendment to an approved instrument.* Modification of an approved instrument, including the addition and approval of umbrella mitigation bank sites or in-lieu fee project sites or expansions of previously approved mitigation bank or in-lieu fee project sites, must follow the appropriate procedures in paragraph (d) of this section, unless the district engineer determines that the streamlined review process described in paragraph (g)(2) of this section is warranted.

(2) *Streamlined review process.* The streamlined modification review process may be used for the following modifications of instruments: changes reflecting adaptive management of the mitigation bank or in-lieu fee program, credit releases, changes in credit releases and credit release schedules, and changes that the district engineer determines are not significant. If the district engineer determines that the streamlined review process is warranted, he must notify the IRT members and the sponsor of this determination and provide them with copies of the proposed modification. IRT members and the sponsor have 30 days to notify the district engineer if they have concerns with the proposed modification. If IRT members or the sponsor notify the district engineer of such concerns, the district engineer shall attempt to resolve those concerns. Within 60 days of providing the proposed modification to the IRT, the district engineer must notify the IRT members of his intent to approve or disapprove the proposed modification. If no IRT member objects, by initiating the dispute resolution process in paragraph (e) of this section, within 15 days of receipt of this notification, the district engineer will notify the sponsor of his final decision and, if the modification is approved, arrange for it to be signed by the appropriate parties. If any IRT member initiates the dispute resolution process, the district engineer will so notify the sponsor. Following conclusion of the dispute resolution process, the district engineer will notify the sponsor of his final decision, and if the modification is approved, arrange for it to be signed by the appropriate parties.

(h) *Umbrella mitigation banking instruments.* A single mitigation banking instrument may provide for future authorization of additional mitigation bank sites. As additional sites are selected, they must be included in the mitigation banking instrument as modifications, using the procedures in paragraph (g)(1) of this section. Credit withdrawal from the additional bank sites shall be consistent with paragraph (m) of this section.

(i) *In-lieu fee program account.* (1) The in-lieu fee program sponsor must establish a program account after the instrument is approved by the district engineer, prior to accepting any fees from permittees. If the sponsor accepts funds from entities other than permittees, those funds must be kept in separate accounts. The program account must be established at a financial institution that is a member of the Federal Deposit Insurance Corporation. All interests and earnings accruing to the program account must remain in that account for use by the in-lieu fee program for the purposes of providing compensatory mitigation for DA permits. The program account may only be used for the selection, design, acquisition, implementation, and management of in-lieu fee compensatory mitigation projects, except for a small percentage (as determined by the district engineer in consultation with the IRT and specified in the instrument) that can be used for administrative costs.

(2) The sponsor must submit proposed in-lieu fee projects to the district engineer for funding approval. Disbursements from the program account may only be made upon receipt of written authorization from the district engineer, after the district engineer has consulted with the IRT. The terms of the program account must specify that the district engineer has the authority to direct those funds to alternative compensatory mitigation projects in cases where the sponsor does not provide compensatory mitigation in accordance with the time frame specified in paragraph (n)(4) of this section.

(3) The sponsor must provide annual reports to the district engineer and the IRT. The annual reports must include the following information:

(i) All income received, disbursements, and interest earned by the program account;

(ii) A list of all permits for which in-lieu fee program funds were accepted. This list shall include: The Corps permit number (or the state permit number if there is no corresponding Corps permit number, in cases of state programmatic general permits or other regional general permits), the service area in which the authorized impacts are located, the amount of authorized impacts, the amount of required compensatory mitigation, the amount paid to the in-lieu fee program, and the date the funds were received from the permittee;

(iii) A description of in-lieu fee program expenditures from the account, such as the costs of land acquisition, planning, construction, monitoring, maintenance, contingencies, adaptive management, and administration;

(iv) The balance of advance credits and released credits at the end of the report period for each service area; and

(v) Any other information required by the district engineer.

(4) The district engineer may audit the records pertaining to the program account. All books, accounts, reports, files, and other records relating to the in-lieu fee program account shall be available at reasonable times for inspection and audit by the district engineer.

(j) *In-lieu fee project approval.* (1) As in-lieu fee project sites are identified and secured, the sponsor must submit mitigation plans to the district engineer that include all applicable items listed in § 332.4(c)(2) through (14). The mitigation plan must also include a credit release schedule consistent with paragraph (o)(8) of this section that is tied to achievement of specific performance standards. The review and approval of in-lieu fee projects will be conducted in accordance with the procedures in paragraph (g)(1) of this section, as modifications of the in-lieu fee program instrument. This includes compensatory mitigation projects conducted by another party on behalf of the sponsor through requests for proposals and awarding of contracts.

(2) If a DA permit is required for an in-lieu fee project, the permit should not be issued until all relevant provisions of the mitigation plan have been substantively determined, to ensure that the DA permit accurately reflects all relevant provisions of the approved mitigation plan, such as performance standards.

(k) *Coordination of mitigation banking instruments and DA permit issuance.* In cases where initial establishment of the mitigation bank, or the development of a new project site under an umbrella banking instrument, involves activities requiring DA authorization, the permit should not be issued until all relevant provisions of the mitigation plan have been substantively determined. This is to

ensure that the DA permit accurately reflects all relevant provisions of the final instrument, such as performance standards.

(l) *Project implementation.* (1) The sponsor must have an approved instrument prior to collecting funds from permittees to satisfy compensatory mitigation requirements for DA permits.

(2) Authorization to sell credits to satisfy compensatory mitigation requirements in DA permits is contingent on compliance with all of the terms of the instrument. This includes constructing a mitigation bank or in-lieu fee project in accordance with the mitigation plan approved by the district engineer and incorporated by reference in the instrument. If the aquatic resource restoration, establishment, enhancement, and/or preservation activities cannot be implemented in accordance with the approved mitigation plan, the district engineer must consult with the sponsor and the IRT to consider modifications to the instrument, including adaptive management, revisions to the credit release schedule, and alternatives for providing compensatory mitigation to satisfy any credits that have already been sold.

(3) An in-lieu fee program sponsor is responsible for the implementation, long-term management, and any required remediation of the restoration, establishment, enhancement, and/or preservation activities, even though those activities may be conducted by other parties through requests for proposals or other contracting mechanisms.

(m) *Credit withdrawal from mitigation banks.* The mitigation banking instrument may allow for an initial debiting of a percentage of the total credits projected at mitigation bank maturity, provided the following conditions are satisfied: the mitigation banking instrument and mitigation plan have been approved, the mitigation bank site has been secured, appropriate financial assurances have been established, and any other requirements determined to be necessary by the district engineer have been fulfilled. The mitigation banking instrument must provide a schedule for additional credit releases as appropriate milestones are achieved (see paragraph (o)(8) of this section). Implementation of the approved mitigation plan shall be initiated no later than the first full growing season after the date of the first credit transaction.

(n) *Advance credits for in-lieu fee programs.* (1) The in-lieu fee program instrument may make a limited number of advance credits available to permittees when the instrument is approved. The number of advance credits will be determined by the district engineer, in consultation with the IRT, and will be specified for each service area in the instrument. The number of advance credits will be based on the following considerations:

(i) The compensation planning framework;

(ii) The sponsor's past performance for implementing aquatic resource restoration, establishment, enhancement, and/or preservation activities in the proposed service area or other areas; and

(iii) The projected financing necessary to begin planning and implementation of in-lieu fee projects.

(2) To determine the appropriate number of advance credits for a particular service area, the district engineer may require the sponsor to provide confidential supporting information that will not be made available to the general public. Examples of confidential supporting information may include prospective in-lieu fee project sites.

(3) As released credits are produced by in-lieu fee projects, they must be used to fulfill any advance credits that have already been provided within the project service area before any remaining released credits can be sold or transferred to permittees. Once previously provided advance credits have been fulfilled, an equal number of advance credits is re-allocated to the sponsor for sale or transfer to fulfill new mitigation requirements, consistent with the terms of the instrument. The number of advance credits available to the sponsor at any given time to sell or transfer to permittees in a given service area is equal to the number of advance credits specified in the instrument, minus any that have already been provided but not yet fulfilled.

(4) Land acquisition and initial physical and biological improvements must be completed by the third full growing season after the first advance credit in that service area is secured by a permittee, unless the district engineer determines that more or less time is needed to plan and implement an in-lieu fee project. If the district engineer determines that there is a compensatory mitigation deficit in a specific service area by the third growing season after the first advance credit in that service area is sold, and determines that it would not be in the public interest to allow the sponsor additional time to plan and implement an in-lieu fee project, the district engineer must direct the sponsor to disburse funds from the in-lieu fee program account to provide alternative compensatory mitigation to fulfill those compensation obligations.

(5) The sponsor is responsible for complying with the terms of the in-lieu fee program instrument. If the district engineer determines, as a result of review of annual reports on the operation of the in-lieu fee program (see paragraphs (p)(2) and (q)(1) of this section), that it is not performing in compliance with its instrument, the district engineer will take appropriate action, which may include suspension of credit sales, to ensure compliance with the in-lieu fee program instrument (see paragraph (o)(10) of this section). Permittees that secured credits from the in-lieu fee program are not responsible for in-lieu fee program compliance.

(o) *Determining credits.* (1) *Units of measure.* The principal units for credits and debits are acres, linear feet, functional assessment units, or other suitable metrics of particular resource types. Functional assessment units or other suitable metrics may be linked to acres or linear feet.

(2) *Assessment.* Where practicable, an appropriate assessment method (e.g., hydrogeomorphic approach to wetlands functional assessment, index of biological integrity) or other suitable metric must be used to assess and describe the aquatic resource types that will be restored, established, enhanced and/or preserved by the mitigation bank or in-lieu fee project.

(3) *Credit production.* The number of credits must reflect the difference between pre- and post-compensatory mitigation project site conditions, as determined by a functional or condition assessment or other suitable metric.

(4) *Credit value.* Once a credit is debited (sold or transferred to a permittee), its value cannot change.

(5) *Credit costs.* (i) The cost of compensatory mitigation credits provided by a mitigation bank or in-lieu fee program is determined by the sponsor.

(ii) For in-lieu fee programs, the cost per unit of credit must include the expected costs associated with the restoration, establishment, enhancement, and/or preservation of aquatic resources in that service area. These costs must be based on full cost accounting, and include, as appropriate, expenses such as land acquisition, project planning and design, construction, plant materials, labor, legal fees, monitoring, and remediation or adaptive management activities, as well as administration of the in-lieu fee program. The cost per unit credit must also take into account contingency costs appropriate to the stage of project planning, including uncertainties in

construction and real estate expenses. The cost per unit of credit must also take into account the resources necessary for the long-term management and protection of the in-lieu fee project. In addition, the cost per unit credit must include financial assurances that are necessary to ensure successful completion of in-lieu fee projects.

(6) *Credits provided by preservation.* These credits should be specified as acres, linear feet, or other suitable metrics of preservation of a particular resource type. In determining the compensatory mitigation requirements for DA permits using mitigation banks or in-lieu fee programs, the district engineer should apply a higher mitigation ratio if the requirements are to be met through the use of preservation credits. In determining this higher ratio, the district engineer must consider the relative importance of both the impacted and the preserved aquatic resources in sustaining watershed functions.

(7) *Credits provided by riparian areas, buffers, and uplands.* These credits should be specified as acres, linear feet, or other suitable metrics of riparian area, buffer, and uplands, respectively. Non-aquatic resources can only be used as compensatory mitigation for impacts to aquatic resources authorized by DA permits when those resources are essential to maintaining the ecological viability of adjoining aquatic resources. In determining the compensatory mitigation requirements for DA permits using mitigation banks and in-lieu fee programs, the district engineer may authorize the use of riparian area, buffer, and/or upland credits if he determines that these areas are essential to sustaining aquatic resource functions in the watershed and are the most appropriate compensation for the authorized impacts.

(8) *Credit release schedule.* (i) *General considerations.* Release of credits must be tied to performance-based milestones (e.g., construction, planting, establishment of specified plant and animal communities). The credit release schedule should reserve a significant share of the total credits for release only after full achievement of ecological performance standards. When determining the credit release schedule, factors to be considered may include, but are not limited to: The method of providing compensatory mitigation credits (e.g., restoration), the likelihood of success, the nature and amount of work needed to generate the credits, and the aquatic resource type(s) and function(s) to be provided by the mitigation bank or in-lieu fee project. The district engineer will determine the credit release schedule, including the share to be released only after full achievement of performance standards, after consulting with the IRT. Once released, credits may only be used to satisfy compensatory mitigation requirements of a DA permit if the use of credits for a specific permit has been approved by the district engineer.

(ii) For single-site mitigation banks, the terms of the credit release schedule must be specified in the mitigation banking instrument. The credit release schedule may provide for an initial debiting of a limited number of credits once the instrument is approved and other appropriate milestones are achieved (see paragraph (m) of this section).

(iii) For in-lieu fee projects and umbrella mitigation bank sites, the terms of the credit release schedule must be specified in the approved mitigation plan. When an in-lieu fee project or umbrella mitigation bank site is implemented and is achieving the performance-based milestones specified in the credit release schedule, credits are generated in accordance with the credit release schedule for the approved mitigation plan. If the in-lieu fee project or umbrella mitigation bank site does not achieve those performance-based milestones, the district engineer may modify the credit release schedule, including reducing the number of credits.

(9) *Credit release approval.* Credit releases for mitigation banks and in-lieu fee projects must be approved by the district engineer. In order for credits to be released, the sponsor must submit documentation to the district engineer demonstrating that the appropriate milestones for credit release have been achieved and requesting the release. The district engineer will provide copies of this documentation to the IRT members for review. IRT members must provide any comments to the district engineer within 15 days of receiving this documentation. However, if the district engineer determines that a site visit is necessary, IRT members must provide any comments to the district engineer within 15 days of the site visit. The district engineer must schedule the site visit so that it occurs as soon as it is practicable, but the site visit may be delayed by seasonal considerations that affect the ability of the district engineer and the IRT to assess whether the applicable credit release milestones have been achieved. After full consideration of any comments received, the district engineer will determine whether the milestones have been achieved and the credits can be released. The district engineer shall make a decision within 30 days of the end of that comment period, and notify the sponsor and the IRT.

(10) *Suspension and termination.* If the district engineer determines that the mitigation bank or in-lieu fee program is not meeting performance standards or complying with the terms of the instrument, appropriate action will be taken. Such actions may include, but are not limited to, suspending credit sales, adaptive management, decreasing available credits, utilizing financial assurances, and terminating the instrument.

(p) *Accounting procedures.* (1) For mitigation banks, the instrument must contain a provision requiring the sponsor to establish and maintain a ledger to account for all credit transactions. Each time an approved credit transaction occurs, the sponsor must notify the district engineer.

(2) For in-lieu fee programs, the instrument must contain a provision requiring the sponsor to establish and maintain an annual report ledger in accordance with paragraph (i)(3) of this section, as well as individual ledgers that track the production of released credits for each in-lieu fee project.

(q) *Reporting.* (1) *Ledger account.* The sponsor must compile an annual ledger report showing the beginning and ending balance of available credits and permitted impacts for each resource type, all additions and subtractions of credits, and any other changes in credit availability (e.g., additional credits released, credit sales suspended). The ledger report must be submitted to the district engineer, who will distribute copies to the IRT members. The ledger report is part of the administrative record for the mitigation bank or in-lieu fee program. The district engineer will make the ledger report available to the public upon request.

(2) *Monitoring reports.* The sponsor is responsible for monitoring the mitigation bank site or the in-lieu fee project site in accordance with the approved monitoring requirements to determine the level of success and identify problems requiring remedial action or adaptive management measures. Monitoring must be conducted in accordance with the requirements in § 332.6, and at time intervals appropriate for the particular project type and until such time that the district engineer, in consultation with the IRT, has determined that the performance standards have been attained. The instrument must include requirements for periodic monitoring reports to be submitted to the district engineer, who will provide copies to other IRT members.

(3) *Financial assurance and long-term management funding report.* The district engineer may require the sponsor to provide an annual report showing beginning and ending balances, including deposits into and any withdrawals from, the accounts providing funds for financial assurances and long-term management activities. The report should also include information on the amount of required financial assurances and the status of those assurances, including their potential expiration.

(r) *Use of credits.* Except as provided below, all activities authorized by DA permits are eligible, at the discretion of the district engineer, to use mitigation banks or in-lieu fee programs to fulfill compensatory mitigation requirements for DA permits. The district engineer will determine the number and type(s) of credits required to compensate for the authorized impacts. Permit applicants may propose to use a particular mitigation bank or in-lieu fee program to provide the required compensatory mitigation. In such cases, the sponsor must provide the permit applicant with a statement of credit availability. The district engineer must review the permit applicant's compensatory mitigation proposal, and notify the applicant of his determination regarding the acceptability of using that mitigation bank or in-lieu fee program.

(s) *IRT concerns with use of credits.* If, in the view of a member of the IRT, an issued permit or series of issued permits raises concerns about how credits from a particular mitigation bank or in-lieu fee program are being used to satisfy compensatory mitigation requirements (including concerns about whether credit use is consistent with the terms of the instrument), the IRT member may notify the district engineer in writing of the concern. The district engineer shall promptly consult with the IRT to address the concern. Resolution of the concern is at the discretion of the district engineer, consistent with applicable statutes, regulations, and policies regarding compensatory mitigation requirements for DA permits. Nothing in this section limits the authorities designated to IRT agencies under existing statutes or regulations.

(t) *Site protection.* (1) For mitigation bank sites, real estate instruments, management plans, or other long-term mechanisms used for site protection must be finalized before any credits can be released.

(2) For in-lieu fee project sites, real estate instruments, management plans, or other long-term protection mechanisms used for site protection must be finalized before advance credits can become released credits.

(u) *Long-term management.* (1) The legal mechanisms and the party responsible for the long-term management and the protection of the mitigation bank site must be documented in the instrument or, in the case of umbrella mitigation banking instruments and in-lieu fee programs, the approved mitigation plans. The responsible party should make adequate provisions for the operation, maintenance, and long-term management of the compensatory mitigation project site. The long-term management plan should include a description of long-term management needs and identify the funding mechanism that will be used to meet those needs.

(2) The instrument may contain provisions for the sponsor to transfer long-term management responsibilities to a land stewardship entity, such as a public agency, non-governmental organization, or private land manager.

(3) The instrument or approved mitigation plan must address the financial arrangements and timing of any necessary transfer of long-term management funds to the steward.

(4) Where needed, the acquisition and protection of water rights should be secured and documented in the instrument or, in the case of umbrella mitigation banking instruments and in-lieu fee programs, the approved mitigation site plan.

(v) *Grandfathering of existing instruments.* (1) *Mitigation banking instruments.* All mitigation banking instruments approved on or after July 9, 2008 must meet the requirements of this part. Mitigation banks approved prior to July 9, 2008 may continue to operate under the terms of their existing instruments. However, any modification to such a mitigation banking instrument on or after July 9, 2008, including authorization of additional sites under an umbrella mitigation banking instrument, expansion of an existing site, or addition of a different type of resource credits (e.g., stream credits to a wetland bank) must be consistent with the terms of this part.

(2) *In-lieu fee program instruments.* All in-lieu fee program instruments approved on or after July 9, 2008 must meet the requirements of this part. In-lieu fee programs operating under instruments approved prior to July 9, 2008 may continue to operate under those instruments for two years after the effective date of this rule, after which time they must meet the requirements of this part, unless the district engineer determines that circumstances warrant an extension of up to three additional years. The district engineer must consult with the IRT before approving such extensions. Any revisions made to the in-lieu fee program instrument on or after July 9, 2008 must be consistent with the terms of this part. Any approved project for which construction was completed under the terms of a previously approved instrument may continue to operate indefinitely under those terms if the district engineer determines that the project is providing appropriate mitigation substantially consistent with the terms of this part.

Dated: March 28, 2008.

John Paul Woodley, Jr.,

Assistant Secretary of the Army, (Civil Works), Department of the Army.

Environmental Protection Agency

40 CFR Chapter I

■ For the reasons stated in the preamble, the Environmental Protection Agency amends 40 CFR part 230 as set forth below:

PART 230—SECTION 404(b)(1) GUIDELINES FOR SPECIFICATION OF DISPOSAL SITES FOR DREDGED OR FILL MATERIAL

■ 1. The authority citation for part 230 continues to read as follows:

Authority: Secs. 404(b) and 501(a) of the Clean Water Act of 1977 (33 U.S.C. 1344(b) and 1361(a)).

§ 230.12 [Amended]

■ 2. In § 230.12(a)(2) remove the reference ''subpart H'' and add in its place the reference ''subparts H and J''.

Subpart H—[Amended]

■ 3. In subpart H the Note following the subpart heading is amended by adding a sentence to the end to read as follows:

Subpart H—Actions To Minimize Adverse Effects

Note: * * * Additional criteria for compensation measures are provided in subpart J of this part.

■ 4. In § 230.75 add a new sentence after the second sentence in paragraph (d) to read as follows:

§ 230.75 Actions affecting plant and animal populations.

* * * * *

(d) * * * Additional criteria for compensation measures are provided in subpart J of this part. * * *

* * * * *

■ 5. Add Subpart J to part 230 to read as follows:

Subpart J—Compensatory Mitigation for Losses of Aquatic Resources

Subpart J—Compensatory Mitigation for Losses of Aquatic Resources

§ 230.91 Purpose and general considerations.

(a) *Purpose.* (1) The purpose of this subpart is to establish standards and criteria for the use of all types of compensatory mitigation, including on-site and off-site permittee-responsible mitigation, mitigation banks, and in-lieu fee mitigation to offset unavoidable impacts to waters of the United States authorized through the issuance of permits by the U.S. Army Corps of Engineers (Corps) pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344). This subpart implements section 314(b) of the 2004 National Defense Authorization Act (Pub. L. 108–136), which directs that the standards and criteria shall, to the maximum extent practicable, maximize available credits and opportunities for mitigation, provide for regional variations in wetland conditions, functions, and values, and apply equivalent standards and criteria to each type of compensatory mitigation. This subpart is intended to further clarify mitigation requirements established under the Corps and EPA regulations at 33 CFR part 320 and this part, respectively.

(2) This subpart has been jointly developed by the Secretary of the Army, acting through the Chief of Engineers, and the Administrator of the Environmental Protection Agency. From time to time guidance on interpreting and implementing this subpart may be prepared jointly by EPA and the Corps at the national or regional level. No modifications to the basic application, meaning, or intent of this subpart will be made without further joint rulemaking by the Secretary of the Army, acting through the Chief of Engineers and the Administrator of the Environmental Protection Agency, pursuant to the Administrative Procedure Act (5 U.S.C. 551 *et seq.*).

(b) *Applicability.* This subpart does not alter the circumstances under which compensatory mitigation is required or the definition of ''waters of the United States,'' which is provided at § 230.3(s). Use of resources as compensatory mitigation that are not otherwise subject to regulation under section 404 of the Clean Water Act does not in and of itself make them subject to such regulation.

(c) *Sequencing.* (1) Nothing in this section affects the requirement that all DA permits subject to section 404 of the Clean Water Act comply with applicable provisions of this part.

(2) Pursuant to these requirements, the district engineer will issue an individual section 404 permit only upon a determination that the proposed discharge complies with applicable provisions of 40 CFR part 230, including those which require the permit applicant to take all appropriate and practicable steps to avoid and minimize adverse impacts to waters of the United States. Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines.

(3) Compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a section 404 permit complies with the Section 404(b)(1) Guidelines. During the 404(b)(1) Guidelines compliance analysis, the district engineer may determine that a DA permit for the proposed activity cannot be issued because of the lack of appropriate and practicable compensatory mitigation options.

(d) *Accounting for regional variations.* Where appropriate, district engineers shall account for regional characteristics of aquatic resource types, functions and services when determining performance standards and monitoring requirements for compensatory mitigation projects.

(e) *Relationship to other guidance documents.* (1) This subpart applies instead of the ''Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks,'' which was issued on November 28, 1995, the ''Federal Guidance on the Use of In-Lieu Fee Arrangements for Compensatory Mitigation Under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act,'' which was issued on November 7, 2000, and Regulatory Guidance Letter 02–02, ''Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899'' which was issued on December 24, 2002. These guidance documents are no longer to be used as compensatory mitigation policy in the Corps Regulatory Program.

(2) In addition, this subpart also applies instead of the provisions relating to the amount, type, and location of compensatory mitigation projects, including the use of preservation, in the February 6, 1990, Memorandum of Agreement (MOA) between the Department of the Army and the Environmental Protection Agency on the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines. All other provisions of this MOA remain in effect.

§ 230.92 Definitions.

For the purposes of this subpart, the following terms are defined:

Adaptive management means the development of a management strategy that anticipates likely challenges associated with compensatory mitigation projects and provides for the implementation of actions to address those challenges, as well as unforeseen changes to those projects. It requires consideration of the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. It includes the selection of appropriate measures that will ensure that the aquatic resource functions are provided and involves analysis of monitoring results to identify potential problems of a compensatory mitigation project and the identification and implementation of measures to rectify those problems.

Advance credits means any credits of an approved in-lieu fee program that are available for sale prior to being fulfilled in accordance with an approved mitigation project plan. Advance credit sales require an approved in-lieu fee program instrument that meets all applicable requirements including a specific allocation of advance credits, by service area where applicable. The instrument must also contain a schedule for fulfillment of advance credit sales.

Buffer means an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses.

Compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and

practicable avoidance and minimization has been achieved.

Compensatory mitigation project means compensatory mitigation implemented by the permittee as a requirement of a DA permit (i.e., permittee-responsible mitigation), or by a mitigation bank or an in-lieu fee program.

Condition means the relative ability of an aquatic resource to support and maintain a community of organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region.

Credit means a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the accrual or attainment of aquatic functions at a compensatory mitigation site. The measure of aquatic functions is based on the resources restored, established, enhanced, or preserved.

DA means Department of the Army.

Days means calendar days.

Debit means a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the loss of aquatic functions at an impact or project site. The measure of aquatic functions is based on the resources impacted by the authorized activity.

Enhancement means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation) means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

Fulfillment of advance credit sales of an in-lieu fee program means application of credits released in accordance with a credit release schedule in an approved mitigation project plan to satisfy the mitigation requirements represented by the advance credits. Only after any advance credit sales within a service area have been fulfilled through the application of released credits from an in-lieu fee project (in accordance with the credit release schedule for an approved mitigation project plan), may additional released credits from that project be sold or transferred to permittees. When advance credits are fulfilled, an equal number of new advance credits is restored to the program sponsor for sale or transfer to permit applicants.

Functional capacity means the degree to which an area of aquatic resource performs a specific function.

Functions means the physical, chemical, and biological processes that occur in ecosystems.

Impact means adverse effect.

In-kind means a resource of a similar structural and functional type to the impacted resource.

In-lieu fee program means a program involving the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for DA permits. Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. However, the rules governing the operation and use of in-lieu fee programs are somewhat different from the rules governing operation and use of mitigation banks. The operation and use of an in-lieu fee program are governed by an in-lieu fee program instrument.

In-lieu fee program instrument means the legal document for the establishment, operation, and use of an in-lieu fee program.

Instrument means mitigation banking instrument or in-lieu fee program instrument.

Interagency Review Team (IRT) means an interagency group of federal, tribal, state, and/or local regulatory and resource agency representatives that reviews documentation for, and advises the district engineer on, the establishment and management of a mitigation bank or an in-lieu fee program.

Mitigation bank means a site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by DA permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of a mitigation bank are governed by a mitigation banking instrument.

Mitigation banking instrument means the legal document for the establishment, operation, and use of a mitigation bank.

Off-site means an area that is neither located on the same parcel of land as the impact site, nor on a parcel of land contiguous to the parcel containing the impact site.

On-site means an area located on the same parcel of land as the impact site, or on a parcel of land contiguous to the impact site.

Out-of-kind means a resource of a different structural and functional type from the impacted resource.

Performance standards are observable or measurable physical (including hydrological), chemical and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives.

Permittee-responsible mitigation means an aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

Preservation means the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Reference aquatic resources are a set of aquatic resources that represent the full range of variability exhibited by a regional class of aquatic resources as a result of natural processes and anthropogenic disturbances.

Rehabilitation means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Release of credits means a determination by the district engineer, in consultation with the IRT, that credits associated with an approved mitigation plan are available for sale or transfer, or in the case of an in-lieu fee program, for fulfillment of advance credit sales. A proportion of projected credits for a specific mitigation bank or in-lieu fee project may be released upon

approval of the mitigation plan, with additional credits released as milestones specified in the credit release schedule are achieved.

Restoration means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riparian areas are lands adjacent to streams, rivers, lakes, and estuarine-marine shorelines. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality.

Service area means the geographic area within which impacts can be mitigated at a specific mitigation bank or an in-lieu fee program, as designated in its instrument.

Services mean the benefits that human populations receive from functions that occur in ecosystems.

Sponsor means any public or private entity responsible for establishing, and in most circumstances, operating a mitigation bank or in-lieu fee program.

Standard permit means a standard, individual permit issued under the authority of section 404 of the Clean Water Act.

Temporal loss is the time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site. Higher compensation ratios may be required to compensate for temporal loss. When the compensatory mitigation project is initiated prior to, or concurrent with, the permitted impacts, the district engineer may determine that compensation for temporal loss is not necessary, unless the resource has a long development time.

Watershed means a land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean.

Watershed approach means an analytical process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. It involves consideration of watershed needs, and how locations and types of compensatory mitigation projects address those needs. A landscape perspective is used to identify the types and locations of compensatory mitigation projects that will benefit the watershed and offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The watershed approach may involve consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for DA permits.

Watershed plan means a plan developed by federal, tribal, state, and/or local government agencies or appropriate non-governmental organizations, in consultation with relevant stakeholders, for the specific goal of aquatic resource restoration, establishment, enhancement, and preservation. A watershed plan addresses aquatic resource conditions in the watershed, multiple stakeholder interests, and land uses. Watershed plans may also identify priority sites for aquatic resource restoration and protection. Examples of watershed plans include special area management plans, advance identification programs, and wetland management plans.

§ 230.93 General compensatory mitigation requirements.

(a) *General considerations.* (1) The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by DA permits. The district engineer must determine the compensatory mitigation to be required in a DA permit, based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity. When evaluating compensatory mitigation options, the district engineer will consider what would be environmentally preferable. In making this determination, the district engineer must assess the likelihood for ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project. In many cases, the environmentally preferable compensatory mitigation may be provided through mitigation banks or in-lieu fee programs because they usually involve consolidating compensatory mitigation projects where ecologically appropriate, consolidating resources, providing financial planning and scientific expertise (which often is not practical for permittee-responsible compensatory mitigation projects), reducing temporal losses of functions, and reducing uncertainty over project success. Compensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular DA permit. Permit applicants are responsible for proposing an appropriate compensatory mitigation option to offset unavoidable impacts.

(2) Compensatory mitigation may be performed using the methods of restoration, enhancement, establishment, and in certain circumstances preservation. Restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are reduced compared to establishment, and the potential gains in terms of aquatic resource functions are greater, compared to enhancement and preservation.

(3) Compensatory mitigation projects may be sited on public or private lands. Credits for compensatory mitigation projects on public land must be based solely on aquatic resource functions provided by the compensatory mitigation project, over and above those provided by public programs already planned or in place. All compensatory mitigation projects must comply with the standards in this part, if they are to be used to provide compensatory mitigation for activities authorized by DA permits, regardless of whether they are sited on public or private lands and whether the sponsor is a governmental or private entity.

(b) *Type and location of compensatory mitigation.* (1) When considering options for successfully providing the required compensatory mitigation, the district engineer shall consider the type and location options in the order presented in paragraphs (b)(2) through (b)(6) of this section. In general, the required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources (including the availability of water rights), trends in land use, ecological benefits, and compatibility with adjacent land uses. When compensating for impacts to marine resources, the location of the compensatory mitigation site should be chosen to replace lost functions and services within the same marine ecological system (e.g., reef complex, littoral drift cell). Compensation for impacts to aquatic resources in coastal watersheds (watersheds that include a tidal water body) should also be located in a coastal watershed where practicable. Compensatory mitigation projects

should not be located where they will increase risks to aviation by attracting wildlife to areas where aircraft-wildlife strikes may occur (e.g., near airports).

(2) *Mitigation bank credits.* When permitted impacts are located within the service area of an approved mitigation bank, and the bank has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits from the sponsor. Since an approved instrument (including an approved mitigation plan and appropriate real estate and financial assurances) for a mitigation bank is required to be in place before its credits can begin to be used to compensate for authorized impacts, use of a mitigation bank can help reduce risk and uncertainty, as well as temporal loss of resource functions and services. Mitigation bank credits are not released for debiting until specific milestones associated with the mitigation bank site's protection and development are achieved, thus use of mitigation bank credits can also help reduce risk that mitigation will not be fully successful. Mitigation banks typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. Also, development of a mitigation bank requires site identification in advance, project-specific planning, and significant investment of financial resources that is often not practicable for many in-lieu fee programs. For these reasons, the district engineer should give preference to the use of mitigation bank credits when these considerations are applicable. However, these same considerations may also be used to override this preference, where appropriate, as, for example, where an in-lieu fee program has released credits available from a specific approved in-lieu fee project, or a permittee-responsible project will restore an outstanding resource based on rigorous scientific and technical analysis.

(3) *In-lieu fee program credits.* Where permitted impacts are located within the service area of an approved in-lieu fee program, and the sponsor has the appropriate number and resource type of credits available, the permittee's compensatory mitigation requirements may be met by securing those credits from the sponsor. Where permitted impacts are not located in the service area of an approved mitigation bank, or the approved mitigation bank does not have the appropriate number and resource type of credits available to offset those impacts, in-lieu fee mitigation, if available, is generally preferable to permittee-responsible mitigation. In-lieu fee projects typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning and implementation than permittee-responsible mitigation. They also devote significant resources to identifying and addressing high-priority resource needs on a watershed scale, as reflected in their compensation planning framework. For these reasons, the district engineer should give preference to in-lieu fee program credits over permittee-responsible mitigation, where these considerations are applicable. However, as with the preference for mitigation bank credits, these same considerations may be used to override this preference where appropriate. Additionally, in cases where permittee-responsible mitigation is likely to successfully meet performance standards before advance credits secured from an in-lieu fee program are fulfilled, the district engineer should also give consideration to this factor in deciding between in-lieu fee mitigation and permittee-responsible mitigation.

(4) *Permittee-responsible mitigation under a watershed approach.* Where permitted impacts are not in the service area of an approved mitigation bank or in-lieu fee program that has the appropriate number and resource type of credits available, permittee-responsible mitigation is the only option. Where practicable and likely to be successful and sustainable, the resource type and location for the required permittee-responsible compensatory mitigation should be determined using the principles of a watershed approach as outlined in paragraph (c) of this section.

(5) *Permittee-responsible mitigation through on-site and in-kind mitigation.* In cases where a watershed approach is not practicable, the district engineer should consider opportunities to offset anticipated aquatic resource impacts by requiring on-site and in-kind compensatory mitigation. The district engineer must also consider the practicability of on-site compensatory mitigation and its compatibility with the proposed project.

(6) *Permittee-responsible mitigation through off-site and/or out-of-kind mitigation.* If, after considering opportunities for on-site, in-kind compensatory mitigation as provided in paragraph (b)(5) of this section, the district engineer determines that these compensatory mitigation opportunities are not practicable, are unlikely to compensate for the permitted impacts, or will be incompatible with the proposed project, and an alternative, practicable off-site and/or out-of-kind mitigation opportunity is identified that has a greater likelihood of offsetting the permitted impacts or is environmentally preferable to on-site or in-kind mitigation, the district engineer should require that this alternative compensatory mitigation be provided.

(c) *Watershed approach to compensatory mitigation.* (1) The district engineer must use a watershed approach to establish compensatory mitigation requirements in DA permits to the extent appropriate and practicable. Where a watershed plan is available, the district engineer will determine whether the plan is appropriate for use in the watershed approach for compensatory mitigation. In cases where the district engineer determines that an appropriate watershed plan is available, the watershed approach should be based on that plan. Where no such plan is available, the watershed approach should be based on information provided by the project sponsor or available from other sources. The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites.

(2) *Considerations.* (i) A watershed approach to compensatory mitigation considers the importance of landscape position and resource type of compensatory mitigation projects for the sustainability of aquatic resource functions within the watershed. Such an approach considers how the types and locations of compensatory mitigation projects will provide the desired aquatic resource functions, and will continue to function over time in a changing landscape. It also considers the habitat requirements of important species, habitat loss or conversion trends, sources of watershed impairment, and current development trends, as well as the requirements of other regulatory and non-regulatory programs that affect the watershed, such as storm water management or habitat conservation programs. It includes the protection and maintenance of terrestrial resources, such as non-wetland riparian areas and uplands, when those resources contribute to or improve the overall ecological functioning of aquatic resources in the watershed. Compensatory mitigation requirements determined through the watershed approach should not focus exclusively on specific functions (e.g., water quality or habitat for certain species), but should provide, where practicable, the

suite of functions typically provided by the affected aquatic resource.

(ii) Locational factors (e.g., hydrology, surrounding land use) are important to the success of compensatory mitigation for impacted habitat functions and may lead to siting of such mitigation away from the project area. However, consideration should also be given to functions and services (e.g., water quality, flood control, shoreline protection) that will likely need to be addressed at or near the areas impacted by the permitted impacts.

(iii) A watershed approach may include on-site compensatory mitigation, off-site compensatory mitigation (including mitigation banks or in-lieu fee programs), or a combination of on-site and off-site compensatory mitigation.

(iv) A watershed approach to compensatory mitigation should include, to the extent practicable, inventories of historic and existing aquatic resources, including identification of degraded aquatic resources, and identification of immediate and long-term aquatic resource needs within watersheds that can be met through permittee-responsible mitigation projects, mitigation banks, or in-lieu fee programs. Planning efforts should identify and prioritize aquatic resource restoration, establishment, and enhancement activities, and preservation of existing aquatic resources that are important for maintaining or improving ecological functions of the watershed. The identification and prioritization of resource needs should be as specific as possible, to enhance the usefulness of the approach in determining compensatory mitigation requirements.

(v) A watershed approach is not appropriate in areas where watershed boundaries do not exist, such as marine areas. In such cases, an appropriate spatial scale should be used to replace lost functions and services within the same ecological system (e.g., reef complex, littoral drift cell).

(3) *Information Needs.* (i) In the absence of a watershed plan determined by the district engineer under paragraph (c)(1) of this section to be appropriate for use in the watershed approach, the district engineer will use a watershed approach based on analysis of information regarding watershed conditions and needs, including potential sites for aquatic resource restoration activities and priorities for aquatic resource restoration and preservation. Such information includes: Current trends in habitat loss or conversion; cumulative impacts of past development activities, current development trends, the presence and needs of sensitive species; site conditions that favor or hinder the success of compensatory mitigation projects; and chronic environmental problems such as flooding or poor water quality.

(ii) This information may be available from sources such as wetland maps; soil surveys; U.S. Geological Survey topographic and hydrologic maps; aerial photographs; information on rare, endangered and threatened species and critical habitat; local ecological reports or studies; and other information sources that could be used to identify locations for suitable compensatory mitigation projects in the watershed.

(iii) The level of information and analysis needed to support a watershed approach must be commensurate with the scope and scale of the proposed impacts requiring a DA permit, as well as the functions lost as a result of those impacts.

(4) *Watershed Scale.* The size of watershed addressed using a watershed approach should not be larger than is appropriate to ensure that the aquatic resources provided through compensation activities will effectively compensate for adverse environmental impacts resulting from activities authorized by DA permits. The district engineer should consider relevant environmental factors and appropriate locally-developed standards and criteria when determining the appropriate watershed scale in guiding compensation activities.

(d) *Site selection.* (1) The compensatory mitigation project site must be ecologically suitable for providing the desired aquatic resource functions. In determining the ecological suitability of the compensatory mitigation project site, the district engineer must consider, to the extent practicable, the following factors:

(i) Hydrological conditions, soil characteristics, and other physical and chemical characteristics;

(ii) Watershed-scale features, such as aquatic habitat diversity, habitat connectivity, and other landscape scale functions;

(iii) The size and location of the compensatory mitigation site relative to hydrologic sources (including the availability of water rights) and other ecological features;

(iv) Compatibility with adjacent land uses and watershed management plans;

(v) Reasonably foreseeable effects the compensatory mitigation project will have on ecologically important aquatic or terrestrial resources (e.g., shallow subtidal habitat, mature forests), cultural sites, or habitat for federally- or state-listed threatened and endangered species; and

(vi) Other relevant factors including, but not limited to, development trends, anticipated land use changes, habitat status and trends, the relative locations of the impact and mitigation sites in the stream network, local or regional goals for the restoration or protection of particular habitat types or functions (e.g., re-establishment of habitat corridors or habitat for species of concern), water quality goals, floodplain management goals, and the relative potential for chemical contamination of the aquatic resources.

(2) District engineers may require on-site, off-site, or a combination of on-site and off-site compensatory mitigation to replace permitted losses of aquatic resource functions and services.

(3) Applicants should propose compensation sites adjacent to existing aquatic resources or where aquatic resources previously existed.

(e) *Mitigation type.* (1) In general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for the functions and services lost at the impact site. For example, tidal wetland compensatory mitigation projects are most likely to compensate for unavoidable impacts to tidal wetlands, while perennial stream compensatory mitigation projects are most likely to compensate for unavoidable impacts to perennial streams. Thus, except as provided in paragraph (e)(2) of this section, the required compensatory mitigation shall be of a similar type to the affected aquatic resource.

(2) If the district engineer determines, using the watershed approach in accordance with paragraph (c) of this section that out-of-kind compensatory mitigation will serve the aquatic resource needs of the watershed, the district engineer may authorize the use of such out-of-kind compensatory mitigation. The basis for authorization of out-of-kind compensatory mitigation must be documented in the administrative record for the permit action.

(3) For difficult-to-replace resources (e.g., bogs, fens, springs, streams, Atlantic white cedar swamps) if further avoidance and minimization is not practicable, the required compensation should be provided, if practicable, through in-kind rehabilitation, enhancement, or preservation since there is greater certainty that these methods of compensation will successfully offset permitted impacts.

(f) *Amount of compensatory mitigation.* (1) If the district engineer

determines that compensatory mitigation is necessary to offset unavoidable impacts to aquatic resources, the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratio must be used.

(2) The district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site. The rationale for the required replacement ratio must be documented in the administrative record for the permit action.

(3) If an in-lieu fee program will be used to provide the required compensatory mitigation, and the appropriate number and resource type of released credits are not available, the district engineer must require sufficient compensation to account for the risk and uncertainty associated with in-lieu fee projects that have not been implemented before the permitted impacts have occurred.

(g) *Use of mitigation banks and in-lieu fee programs.* Mitigation banks and in-lieu fee programs may be used to compensate for impacts to aquatic resources authorized by general permits and individual permits, including after-the-fact permits, in accordance with the preference hierarchy in paragraph (b) of this section. Mitigation banks and in-lieu fee programs may also be used to satisfy requirements arising out of an enforcement action, such as supplemental environmental projects.

(h) *Preservation.* (1) Preservation may be used to provide compensatory mitigation for activities authorized by DA permits when all the following criteria are met:

(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;

(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;

(iii) Preservation is determined by the district engineer to be appropriate and practicable;

(iv) The resources are under threat of destruction or adverse modifications; and

(v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

(2) Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approach described in paragraph (c) of this section, but compensation ratios shall be higher.

(i) *Buffers.* District engineers may require the restoration, establishment, enhancement, and preservation, as well as the maintenance, of riparian areas and/or buffers around aquatic resources where necessary to ensure the long-term viability of those resources. Buffers may also provide habitat or corridors necessary for the ecological functioning of aquatic resources. If buffers are required by the district engineer as part of the compensatory mitigation project, compensatory mitigation credit will be provided for those buffers.

(j) *Relationship to other federal, tribal, state, and local programs.* (1) Compensatory mitigation projects for DA permits may also be used to satisfy the environmental requirements of other programs, such as tribal, state, or local wetlands regulatory programs, other federal programs such as the Surface Mining Control and Reclamation Act, Corps civil works projects, and Department of Defense military construction projects, consistent with the terms and requirements of these programs and subject to the following considerations:

(i) The compensatory mitigation project must include appropriate compensation required by the DA permit for unavoidable impacts to aquatic resources authorized by that permit.

(ii) Under no circumstances may the same credits be used to provide mitigation for more than one permitted activity. However, where appropriate, compensatory mitigation projects, including mitigation banks and in-lieu fee projects, may be designed to holistically address requirements under multiple programs and authorities for the same activity.

(2) Except for projects undertaken by federal agencies, or where federal funding is specifically authorized to provide compensatory mitigation, federally-funded aquatic resource restoration or conservation projects undertaken for purposes other than compensatory mitigation, such as the Wetlands Reserve Program, Conservation Reserve Program, and Partners for Wildlife Program activities, cannot be used for the purpose of generating compensatory mitigation credits for activities authorized by DA permits. However, compensatory mitigation credits may be generated by activities undertaken in conjunction with, but supplemental to, such programs in order to maximize the overall ecological benefits of the restoration or conservation project.

(3) Compensatory mitigation projects may also be used to provide compensatory mitigation under the Endangered Species Act or for Habitat Conservation Plans, as long as they comply with the requirements of paragraph (j)(1) of this section.

(k) *Permit conditions.* (1) The compensatory mitigation requirements for a DA permit, including the amount and type of compensatory mitigation, must be clearly stated in the special conditions of the individual permit or general permit verification (see 33 CFR 325.4 and 330.6(a)). The special conditions must be enforceable.

(2) For an individual permit that requires permittee-responsible mitigation, the special conditions must:

(i) Identify the party responsible for providing the compensatory mitigation;

(ii) Incorporate, by reference, the final mitigation plan approved by the district engineer;

(iii) State the objectives, performance standards, and monitoring required for the compensatory mitigation project, unless they are provided in the approved final mitigation plan; and

(iv) Describe any required financial assurances or long-term management provisions for the compensatory mitigation project, unless they are specified in the approved final mitigation plan.

(3) For a general permit activity that requires permittee-responsible compensatory mitigation, the special conditions must describe the compensatory mitigation proposal,

which may be either conceptual or detailed. The general permit verification must also include a special condition that states that the permittee cannot commence work in waters of the United States until the district engineer approves the final mitigation plan, unless the district engineer determines that such a special condition is not practicable and not necessary to ensure timely completion of the required compensatory mitigation. To the extent appropriate and practicable, special conditions of the general permit verification should also address the requirements of paragraph (k)(2) of this section.

(4) If a mitigation bank or in-lieu fee program is used to provide the required compensatory mitigation, the special conditions must indicate whether a mitigation bank or in-lieu fee program will be used, and specify the number and resource type of credits the permittee is required to secure. In the case of an individual permit, the special condition must also identify the specific mitigation bank or in-lieu fee program that will be used. For general permit verifications, the special conditions may either identify the specific mitigation bank or in-lieu fee program, or state that the specific mitigation bank or in-lieu fee program used to provide the required compensatory mitigation must be approved by the district engineer before the credits are secured.

(l) *Party responsible for compensatory mitigation.* (1) For permittee-responsible mitigation, the special conditions of the DA permit must clearly indicate the party or parties responsible for the implementation, performance, and long-term management of the compensatory mitigation project.

(2) For mitigation banks and in-lieu fee programs, the instrument must clearly indicate the party or parties responsible for the implementation, performance, and long-term management of the compensatory mitigation project(s). The instrument must also contain a provision expressing the sponsor's agreement to assume responsibility for a permittee's compensatory mitigation requirements, once that permittee has secured the appropriate number and resource type of credits from the sponsor and the district engineer has received the documentation described in paragraph (l)(3) of this section.

(3) If use of a mitigation bank or in-lieu fee program is approved by the district engineer to provide part or all of the required compensatory mitigation for a DA permit, the permittee retains responsibility for providing the compensatory mitigation until the appropriate number and resource type of credits have been secured from a sponsor and the district engineer has received documentation that confirms that the sponsor has accepted the responsibility for providing the required compensatory mitigation. This documentation may consist of a letter or form signed by the sponsor, with the permit number and a statement indicating the number and resource type of credits that have been secured from the sponsor. Copies of this documentation will be retained in the administrative records for both the permit and the instrument. If the sponsor fails to provide the required compensatory mitigation, the district engineer may pursue measures against the sponsor to ensure compliance.

(m) *Timing.* Implementation of the compensatory mitigation project shall be, to the maximum extent practicable, in advance of or concurrent with the activity causing the authorized impacts. The district engineer shall require, to the extent appropriate and practicable, additional compensatory mitigation to offset temporal losses of aquatic functions that will result from the permitted activity.

(n) *Financial assurances.* (1) The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards. In cases where an alternate mechanism is available to ensure a high level of confidence that the compensatory mitigation will be provided and maintained (e.g., a formal, documented commitment from a government agency or public authority) the district engineer may determine that financial assurances are not necessary for that compensatory mitigation project.

(2) The amount of the required financial assurances must be determined by the district engineer, in consultation with the project sponsor, and must be based on the size and complexity of the compensatory mitigation project, the degree of completion of the project at the time of project approval, the likelihood of success, the past performance of the project sponsor, and any other factors the district engineer deems appropriate. Financial assurances may be in the form of performance bonds, escrow accounts, casualty insurance, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments, subject to the approval of the district engineer. The rationale for determining the amount of the required financial assurances must be documented in the administrative record for either the DA permit or the instrument. In determining the assurance amount, the district engineer shall consider the cost of providing replacement mitigation, including costs for land acquisition, planning and engineering, legal fees, mobilization, construction, and monitoring.

(3) If financial assurances are required, the DA permit must include a special condition requiring the financial assurances to be in place prior to commencing the permitted activity.

(4) Financial assurances shall be phased out once the compensatory mitigation project has been determined by the district engineer to be successful in accordance with its performance standards. The DA permit or instrument must clearly specify the conditions under which the financial assurances are to be released to the permittee, sponsor, and/or other financial assurance provider, including, as appropriate, linkage to achievement of performance standards, adaptive management, or compliance with special conditions.

(5) A financial assurance must be in a form that ensures that the district engineer will receive notification at least 120 days in advance of any termination or revocation. For third-party assurance providers, this may take the form of a contractual requirement for the assurance provider to notify the district engineer at least 120 days before the assurance is revoked or terminated.

(6) Financial assurances shall be payable at the direction of the district engineer to his designee or to a standby trust agreement. When a standby trust is used (*e.g.*, with performance bonds or letters of credit) all amounts paid by the financial assurance provider shall be deposited directly into the standby trust fund for distribution by the trustee in accordance with the district engineer's instructions.

(o) *Compliance with applicable law.* The compensatory mitigation project must comply with all applicable federal, state, and local laws. The DA permit, mitigation banking instrument, or in-lieu fee program instrument must not require participation by the Corps or any other federal agency in project management, including receipt or management of financial assurances or long-term financing mechanisms, except as determined by the Corps or other agency to be consistent with its statutory authority, mission, and priorities.

§ 230.94 Planning and documentation.

(a) *Pre-application consultations.* Potential applicants for standard

permits are encouraged to participate in pre-application meetings with the Corps and appropriate agencies to discuss potential mitigation requirements and information needs.

(b) *Public review and comment.* (1) For an activity that requires a standard DA permit pursuant to section 404 of the Clean Water Act, the public notice for the proposed activity must contain a statement explaining how impacts associated with the proposed activity are to be avoided, minimized, and compensated for. This explanation shall address, to the extent that such information is provided in the mitigation statement required by 33 CFR 325.1(d)(7), the proposed avoidance and minimization and the amount, type, and location of any proposed compensatory mitigation, including any out-of-kind compensation, or indicate an intention to use an approved mitigation bank or in-lieu fee program. The level of detail provided in the public notice must be commensurate with the scope and scale of the impacts. The notice shall not include information that the district engineer and the permittee believe should be kept confidential for business purposes, such as the exact location of a proposed mitigation site that has not yet been secured. The permittee must clearly identify any information being claimed as confidential in the mitigation statement when submitted. In such cases, the notice must still provide enough information to enable the public to provide meaningful comment on the proposed mitigation.

(2) For individual permits, district engineers must consider any timely comments and recommendations from other federal agencies; tribal, state, or local governments; and the public.

(3) For activities authorized by letters of permission or general permits, the review and approval process for compensatory mitigation proposals and plans must be conducted in accordance with the terms and conditions of those permits and applicable regulations including the applicable provisions of this part.

(c) *Mitigation plan.* (1) *Preparation and Approval.* (i) For individual permits, the permittee must prepare a draft mitigation plan and submit it to the district engineer for review. After addressing any comments provided by the district engineer, the permittee must prepare a final mitigation plan, which must be approved by the district engineer prior to issuing the individual permit. The approved final mitigation plan must be incorporated into the individual permit by reference. The final mitigation plan must include the items described in paragraphs (c)(2) through (c)(14) of this section, but the level of detail of the mitigation plan should be commensurate with the scale and scope of the impacts. As an alternative, the district engineer may determine that it would be more appropriate to address any of the items described in paragraphs (c)(2) through (c)(14) of this section as permit conditions, instead of components of a compensatory mitigation plan. For permittees who intend to fulfill their compensatory mitigation obligations by securing credits from approved mitigation banks or in-lieu fee programs, their mitigation plans need include only the items described in paragraphs (c)(5) and (c)(6) of this section, and the name of the specific mitigation bank or in-lieu fee program to be used.

(ii) For general permits, if compensatory mitigation is required, the district engineer may approve a conceptual or detailed compensatory mitigation plan to meet required time frames for general permit verifications, but a final mitigation plan incorporating the elements in paragraphs (c)(2) through (c)(14) of this section, at a level of detail commensurate with the scale and scope of the impacts, must be approved by the district engineer before the permittee commences work in waters of the United States. As an alternative, the district engineer may determine that it would be more appropriate to address any of the items described in paragraphs (c)(2) through (c)(14) of this section as permit conditions, instead of components of a compensatory mitigation plan. For permittees who intend to fulfill their compensatory mitigation obligations by securing credits from approved mitigation banks or in-lieu fee programs, their mitigation plans need include only the items described in paragraphs (c)(5) and (c)(6) of this section, and either the name of the specific mitigation bank or in-lieu fee program to be used or a statement indicating that a mitigation bank or in-lieu fee program will be used (contingent upon approval by the district engineer).

(iii) Mitigation banks and in-lieu fee programs must prepare a mitigation plan including the items in paragraphs (c)(2) through (c)(14) of this section for each separate compensatory mitigation project site. For mitigation banks and in-lieu fee programs, the preparation and approval process for mitigation plans is described in § 230.98.

(2) *Objectives.* A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest.

(3) *Site selection.* A description of the factors considered during the site selection process. This should include consideration of watershed needs, on-site alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site. (See § 230.93(d).)

(4) *Site protection instrument.* A description of the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation project site (see § 230.97(a)).

(5) *Baseline information.* A description of the ecological characteristics of the proposed compensatory mitigation project site and, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of waters of the United States on the proposed compensatory mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site, not the mitigation bank or in-lieu fee project site.

(6) *Determination of credits.* A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. (See § 230.93(f).)

(i) For permittee-responsible mitigation, this should include an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.

(ii) For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

(7) *Mitigation work plan.* Detailed written specifications and work descriptions for the compensatory

mitigation project, including, but not limited to, the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

(8) *Maintenance plan.* A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

(9) *Performance standards.* Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives. (See § 230.95.)

(10) *Monitoring requirements.* A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included. (See § 230.96.)

(11) *Long-term management plan.* A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management. (See § 230.97(d).)

(12) *Adaptive management plan.* A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. (See § 230.97(c).)

(13) *Financial assurances.* A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards (see § 230.93(n)).

(14) *Other information.* The district engineer may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the compensatory mitigation project.

§ 230.95 Ecological performance standards.

(a) The approved mitigation plan must contain performance standards that will be used to assess whether the project is achieving its objectives. Performance standards should relate to the objectives of the compensatory mitigation project, so that the project can be objectively evaluated to determine if it is developing into the desired resource type, providing the expected functions, and attaining any other applicable metrics (e.g., acres).

(b) Performance standards must be based on attributes that are objective and verifiable. Ecological performance standards must be based on the best available science that can be measured or assessed in a practicable manner. Performance standards may be based on variables or measures of functional capacity described in functional assessment methodologies, measurements of hydrology or other aquatic resource characteristics, and/or comparisons to reference aquatic resources of similar type and landscape position. The use of reference aquatic resources to establish performance standards will help ensure that those performance standards are reasonably achievable, by reflecting the range of variability exhibited by the regional class of aquatic resources as a result of natural processes and anthropogenic disturbances. Performance standards based on measurements of hydrology should take into consideration the hydrologic variability exhibited by reference aquatic resources, especially wetlands. Where practicable, performance standards should take into account the expected stages of the aquatic resource development process, in order to allow early identification of potential problems and appropriate adaptive management.

§ 230.96 Monitoring.

(a) *General.* (1) Monitoring the compensatory mitigation project site is necessary to determine if the project is meeting its performance standards, and to determine if measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. The submission of monitoring reports to assess the development and condition of the compensatory mitigation project is required, but the content and level of detail for those monitoring reports must be commensurate with the scale and scope of the compensatory mitigation project, as well as the compensatory mitigation project type. The mitigation plan must address the monitoring requirements for the compensatory mitigation project, including the parameters to be monitored, the length of the monitoring period, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the district engineer, and the party responsible for submitting those monitoring reports to the district engineer.

(2) The district engineer may conduct site inspections on a regular basis (e.g., annually) during the monitoring period to evaluate mitigation site performance.

(b) *Monitoring period.* The mitigation plan must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs). Following project implementation, the district engineer may reduce or waive the remaining monitoring requirements upon a determination that the compensatory mitigation project has achieved its performance standards. Conversely the district engineer may extend the original monitoring period upon a determination that performance standards have not been met or the compensatory mitigation project is not on track to meet them. The district engineer may also revise monitoring requirements when remediation and/or adaptive management is required.

(c) *Monitoring reports.* (1) The district engineer must determine the information to be included in monitoring reports. This information must be sufficient for the district engineer to determine how the compensatory mitigation project is progressing towards meeting its performance standards, and may include plans (such as as-built plans), maps, and photographs to illustrate site conditions. Monitoring reports may also include the results of functional, condition, or other assessments used to provide quantitative or qualitative measures of the functions provided by the compensatory mitigation project site.

(2) The permittee or sponsor is responsible for submitting monitoring reports in accordance with the special conditions of the DA permit or the terms

of the instrument. Failure to submit monitoring reports in a timely manner may result in compliance action by the district engineer.

(3) Monitoring reports must be provided by the district engineer to interested federal, tribal, state, and local resource agencies, and the public, upon request.

§ 230.97 Management.

(a) *Site protection.* (1) The aquatic habitats, riparian areas, buffers, and uplands that comprise the overall compensatory mitigation project must be provided long-term protection through real estate instruments or other available mechanisms, as appropriate. Long-term protection may be provided through real estate instruments such as conservation easements held by entities such as federal, tribal, state, or local resource agencies, non-profit conservation organizations, or private land managers; the transfer of title to such entities; or by restrictive covenants. For government property, long-term protection may be provided through federal facility management plans or integrated natural resources management plans. When approving a method for long-term protection of non-government property other than transfer of title, the district engineer shall consider relevant legal constraints on the use of conservation easements and/or restrictive covenants in determining whether such mechanisms provide sufficient site protection. To provide sufficient site protection, a conservation easement or restrictive covenant should, where practicable, establish in an appropriate third party (e.g., governmental or non-profit resource management agency) the right to enforce site protections and provide the third party the resources necessary to monitor and enforce these site protections.

(2) The real estate instrument, management plan, or other mechanism providing long-term protection of the compensatory mitigation site must, to the extent appropriate and practicable, prohibit incompatible uses (e.g., clear cutting or mineral extraction) that might otherwise jeopardize the objectives of the compensatory mitigation project. Where appropriate, multiple instruments recognizing compatible uses (e.g., fishing or grazing rights) may be used.

(3) The real estate instrument, management plan, or other long-term protection mechanism must contain a provision requiring 60-day advance notification to the district engineer before any action is taken to void or modify the instrument, management plan, or long-term protection mechanism, including transfer of title to, or establishment of any other legal claims over, the compensatory mitigation site.

(4) For compensatory mitigation projects on public lands, where Federal facility management plans or integrated natural resources management plans are used to provide long-term protection, and changes in statute, regulation, or agency needs or mission results in an incompatible use on public lands originally set aside for compensatory mitigation, the public agency authorizing the incompatible use is responsible for providing alternative compensatory mitigation that is acceptable to the district engineer for any loss in functions resulting from the incompatible use.

(5) A real estate instrument, management plan, or other long-term protection mechanism used for site protection of permittee-responsible mitigation must be approved by the district engineer in advance of, or concurrent with, the activity causing the authorized impacts.

(b) *Sustainability.* Compensatory mitigation projects shall be designed, to the maximum extent practicable, to be self-sustaining once performance standards have been achieved. This includes minimization of active engineering features (e.g., pumps) and appropriate siting to ensure that natural hydrology and landscape context will support long-term sustainability. Where active long-term management and maintenance are necessary to ensure long-term sustainability (e.g., prescribed burning, invasive species control, maintenance of water control structures, easement enforcement), the responsible party must provide for such management and maintenance. This includes the provision of long-term financing mechanisms where necessary. Where needed, the acquisition and protection of water rights must be secured and documented in the permit conditions or instrument.

(c) *Adaptive management.* (1) If the compensatory mitigation project cannot be constructed in accordance with the approved mitigation plans, the permittee or sponsor must notify the district engineer. A significant modification of the compensatory mitigation project requires approval from the district engineer.

(2) If monitoring or other information indicates that the compensatory mitigation project is not progressing towards meeting its performance standards as anticipated, the responsible party must notify the district engineer as soon as possible. The district engineer will evaluate and pursue measures to address deficiencies in the compensatory mitigation project. The district engineer will consider whether the compensatory mitigation project is providing ecological benefits comparable to the original objectives of the compensatory mitigation project.

(3) The district engineer, in consultation with the responsible party (and other federal, tribal, state, and local agencies, as appropriate), will determine the appropriate measures. The measures may include site modifications, design changes, revisions to maintenance requirements, and revised monitoring requirements. The measures must be designed to ensure that the modified compensatory mitigation project provides aquatic resource functions comparable to those described in the mitigation plan objectives.

(4) Performance standards may be revised in accordance with adaptive management to account for measures taken to address deficiencies in the compensatory mitigation project. Performance standards may also be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved compensatory mitigation project. No other revisions to performance standards will be allowed except in the case of natural disasters.

(d) *Long-term management.* (1) The permit conditions or instrument must identify the party responsible for ownership and all long-term management of the compensatory mitigation project. The permit conditions or instrument may contain provisions allowing the permittee or sponsor to transfer the long-term management responsibilities of the compensatory mitigation project site to a land stewardship entity, such as a public agency, non-governmental organization, or private land manager, after review and approval by the district engineer. The land stewardship entity need not be identified in the original permit or instrument, as long as the future transfer of long-term management responsibility is approved by the district engineer.

(2) A long-term management plan should include a description of long-term management needs, annual cost estimates for these needs, and identify the funding mechanism that will be used to meet those needs.

(3) Any provisions necessary for long-term financing must be addressed in the original permit or instrument. The district engineer may require provisions to address inflationary adjustments and other contingencies, as appropriate. Appropriate long-term financing

mechanisms include non-wasting endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments. In cases where the long-term management entity is a public authority or government agency, that entity must provide a plan for the long-term financing of the site.

(4) For permittee-responsible mitigation, any long-term financing mechanisms must be approved in advance of the activity causing the authorized impacts.

§ 230.98 Mitigation banks and in-lieu fee programs.

(a) *General considerations.* (1) All mitigation banks and in-lieu fee programs must have an approved instrument signed by the sponsor and the district engineer prior to being used to provide compensatory mitigation for DA permits.

(2) To the maximum extent practicable, mitigation banks and in-lieu fee project sites must be planned and designed to be self-sustaining over time, but some active management and maintenance may be required to ensure their long-term viability and sustainability. Examples of acceptable management activities include maintaining fire dependent habitat communities in the absence of natural fire and controlling invasive exotic plant species.

(3) All mitigation banks and in-lieu fee programs must comply with the standards in this part, if they are to be used to provide compensatory mitigation for activities authorized by DA permits, regardless of whether they are sited on public or private lands and whether the sponsor is a governmental or private entity.

(b) *Interagency Review Team.* (1) The district engineer will establish an Interagency Review Team (IRT) to review documentation for the establishment and management of mitigation banks and in-lieu fee programs. The district engineer or his designated representative serves as Chair of the IRT. In cases where a mitigation bank or in-lieu fee program is proposed to satisfy the requirements of another federal, tribal, state, or local program, in addition to compensatory mitigation requirements of DA permits, it may be appropriate for the administering agency to serve as co-Chair of the IRT.

(2) In addition to the Corps, representatives from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, NOAA Fisheries, the Natural Resources Conservation Service, and other federal agencies, as appropriate, may participate in the IRT. The IRT may also include representatives from tribal, state, and local regulatory and resource agencies, where such agencies have authorities and/or mandates directly affecting, or affected by, the establishment, operation, or use of the mitigation bank or in-lieu fee program. The district engineer will seek to include all public agencies with a substantive interest in the establishment of the mitigation bank or in-lieu fee program on the IRT, but retains final authority over its composition.

(3) The primary role of the IRT is to facilitate the establishment of mitigation banks or in-lieu fee programs through the development of mitigation banking or in-lieu fee program instruments. The IRT will review the prospectus, instrument, and other appropriate documents and provide comments to the district engineer. The district engineer and the IRT should use a watershed approach to the extent practicable in reviewing proposed mitigation banks and in-lieu fee programs. Members of the IRT may also sign the instrument, if they so choose. By signing the instrument, the IRT members indicate their agreement with the terms of the instrument. As an alternative, a member of the IRT may submit a letter expressing concurrence with the instrument. The IRT will also advise the district engineer in assessing monitoring reports, recommending remedial or adaptive management measures, approving credit releases, and approving modifications to an instrument. In order to ensure timely processing of instruments and other documentation, comments from IRT members must be received by the district engineer within the time limits specified in this section. Comments received after these deadlines will only be considered at the discretion of the district engineer to the extent that doing so does not jeopardize the deadlines for district engineer action.

(4) The district engineer will give full consideration to any timely comments and advice of the IRT. The district engineer alone retains final authority for approval of the instrument in cases where the mitigation bank or in-lieu fee program is used to satisfy compensatory mitigation requirements of DA permits.

(5) *MOAs with other agencies.* The district engineer and members of the IRT may enter into a memorandum of agreement (MOA) with any other federal, state or local government agency to perform all or some of the IRT review functions described in this section. Such MOAs must include provisions for appropriate federal oversight of the review process. The district engineer retains sole authority for final approval of instruments and other documentation required under this section.

(c) *Compensation planning framework for in-lieu fee programs.* (1) The approved instrument for an in-lieu fee program must include a compensation planning framework that will be used to select, secure, and implement aquatic resource restoration, establishment, enhancement, and/or preservation activities. The compensation planning framework must support a watershed approach to compensatory mitigation. All specific projects used to provide compensation for DA permits must be consistent with the approved compensation planning framework. Modifications to the framework must be approved as a significant modification to the instrument by the district engineer, after consultation with the IRT.

(2) The compensation planning framework must contain the following elements:

(i) The geographic service area(s), including a watershed-based rationale for the delineation of each service area;

(ii) A description of the threats to aquatic resources in the service area(s), including how the in-lieu fee program will help offset impacts resulting from those threats;

(iii) An analysis of historic aquatic resource loss in the service area(s);

(iv) An analysis of current aquatic resource conditions in the service area(s), supported by an appropriate level of field documentation;

(v) A statement of aquatic resource goals and objectives for each service area, including a description of the general amounts, types and locations of aquatic resources the program will seek to provide;

(vi) A prioritization strategy for selecting and implementing compensatory mitigation activities;

(vii) An explanation of how any preservation objectives identified in paragraph (c)(2)(v) of this section and addressed in the prioritization strategy in paragraph (c)(2)(vi) satisfy the criteria for use of preservation in § 230.93(h);

(viii) A description of any public and private stakeholder involvement in plan development and implementation, including, where appropriate, coordination with federal, state, tribal and local aquatic resource management and regulatory authorities;

(ix) A description of the long-term protection and management strategies for activities conducted by the in-lieu fee program sponsor;

(x) A strategy for periodic evaluation and reporting on the progress of the program in achieving the goals and objectives in paragraph (c)(2)(v) of this section, including a process for revising the planning framework as necessary; and

(xi) Any other information deemed necessary for effective compensation planning by the district engineer.

(3) The level of detail necessary for the compensation planning framework is at the discretion of the district engineer, and will take into account the characteristics of the service area(s) and the scope of the program. As part of the in-lieu fee program instrument, the compensation planning framework will be reviewed by the IRT, and will be a major factor in the district engineer's decision on whether to approve the instrument.

(d) *Review process.* (1) The sponsor is responsible for preparing all documentation associated with establishment of the mitigation bank or in-lieu fee program, including the prospectus, instrument, and other appropriate documents, such as mitigation plans for a mitigation bank. The prospectus provides an overview of the proposed mitigation bank or in-lieu fee program and serves as the basis for public and initial IRT comment. For a mitigation bank, the mitigation plan, as described in § 230.94(c), provides detailed plans and specifications for the mitigation bank site. For in-lieu fee programs, mitigation plans will be prepared as in-lieu fee project sites are identified after the instrument has been approved and the in-lieu fee program becomes operational. The instrument provides the authorization for the mitigation bank or in-lieu fee program to provide credits to be used as compensatory mitigation for DA permits.

(2) *Prospectus.* The prospectus must provide a summary of the information regarding the proposed mitigation bank or in-lieu fee program, at a sufficient level of detail to support informed public and IRT comment. The review process begins when the sponsor submits a complete prospectus to the district engineer. For modifications of approved instruments, submittal of a new prospectus is not required; instead, the sponsor must submit a written request for an instrument modification accompanied by appropriate documentation. The district engineer must notify the sponsor within 30 days whether or not a submitted prospectus is complete. A complete prospectus includes the following information:

(i) The objectives of the proposed mitigation bank or in-lieu fee program.

(ii) How the mitigation bank or in-lieu fee program will be established and operated.

(iii) The proposed service area.

(iv) The general need for and technical feasibility of the proposed mitigation bank or in-lieu fee program.

(v) The proposed ownership arrangements and long-term management strategy for the mitigation bank or in-lieu fee project sites.

(vi) The qualifications of the sponsor to successfully complete the type(s) of mitigation project(s) proposed, including information describing any past such activities by the sponsor.

(vii) For a proposed mitigation bank, the prospectus must also address:

(A) The ecological suitability of the site to achieve the objectives of the proposed mitigation bank, including the physical, chemical, and biological characteristics of the bank site and how that site will support the planned types of aquatic resources and functions; and

(B) Assurance of sufficient water rights to support the long-term sustainability of the mitigation bank.

(viii) For a proposed in-lieu fee program, the prospectus must also include:

(A) The compensation planning framework (see paragraph (c) of this section); and

(B) A description of the in-lieu fee program account required by paragraph (i) of this section.

(3) *Preliminary review of prospectus.* Prior to submitting a prospectus, the sponsor may elect to submit a draft prospectus to the district engineer for comment and consultation. The district engineer will provide copies of the draft prospectus to the IRT and will provide comments back to the sponsor within 30 days. Any comments from IRT members will also be forwarded to the sponsor. This preliminary review is optional but is strongly recommended. It is intended to identify potential issues early so that the sponsor may attempt to address those issues prior to the start of the formal review process.

(4) *Public review and comment.* Within 30 days of receipt of a complete prospectus or an instrument modification request that will be processed in accordance with paragraph (g)(1) of this section, the district engineer will provide public notice of the proposed mitigation bank or in-lieu fee program, in accordance with the public notice procedures at 33 CFR 325.3. The public notice must, at a minimum, include a summary of the prospectus and indicate that the full prospectus is available to the public for review upon request. For modifications of approved instruments, the public notice must instead summarize, and make available to the public upon request, whatever documentation is appropriate for the modification (e.g., a new or revised mitigation plan). The comment period for public notice will be 30 days, unless the district engineer determines that a longer comment period is appropriate. The district engineer will notify the sponsor if the comment period is extended beyond 30 days, including an explanation of why the longer comment period is necessary. Copies of all comments received in response to the public notice must be distributed to the other IRT members and to the sponsor within 15 days of the close of the public comment period. The district engineer and IRT members may also provide comments to the sponsor at this time, and copies of any such comments will also be distributed to all IRT members. If the construction of a mitigation bank or an in-lieu fee program project requires a DA permit, the public notice requirement may be satisfied through the public notice provisions of the permit processing procedures, provided all of the relevant information is provided.

(5) *Initial evaluation.* (i) After the end of the comment period, the district engineer will review the comments received in response to the public notice, and make a written initial evaluation as to the potential of the proposed mitigation bank or in-lieu fee program to provide compensatory mitigation for activities authorized by DA permits. This initial evaluation letter must be provided to the sponsor within 30 days of the end of the public notice comment period.

(ii) If the district engineer determines that the proposed mitigation bank or in-lieu fee program has potential for providing appropriate compensatory mitigation for activities authorized by DA permits, the initial evaluation letter will inform the sponsor that he/she may proceed with preparation of the draft instrument (see paragraph (d)(6) of this section).

(iii) If the district engineer determines that the proposed mitigation bank or in-lieu fee program does not have potential for providing appropriate compensatory mitigation for DA permits, the initial evaluation letter must discuss the reasons for that determination. The sponsor may revise the prospectus to address the district engineer's concerns, and submit the revised prospectus to the district engineer. If the sponsor submits a revised prospectus, a revised public notice will be issued in accordance with paragraph (d)(4) of this section.

(iv) This initial evaluation procedure does not apply to proposed modifications of approved instruments.

(6) *Draft instrument.* (i) After considering comments from the district engineer, the IRT, and the public, if the sponsor chooses to proceed with establishment of the mitigation bank or in-lieu fee program, he must prepare a draft instrument and submit it to the district engineer. In the case of an instrument modification, the sponsor must prepare a draft amendment (e.g., a specific instrument provision, a new or modified mitigation plan), and submit it to the district engineer. The district engineer must notify the sponsor within 30 days of receipt, whether the draft instrument or amendment is complete. If the draft instrument or amendment is incomplete, the district engineer will request from the sponsor the information necessary to make the draft instrument or amendment complete. Once any additional information is submitted, the district engineer must notify the sponsor as soon as he determines that the draft instrument or amendment is complete. The draft instrument must be based on the prospectus and must describe in detail the physical and legal characteristics of the mitigation bank or in-lieu fee program and how it will be established and operated.

(ii) For mitigation banks and in-lieu fee programs, the draft instrument must include the following information:

(A) A description of the proposed geographic service area of the mitigation bank or in-lieu fee program. The service area is the watershed, ecoregion, physiographic province, and/or other geographic area within which the mitigation bank or in-lieu fee program is authorized to provide compensatory mitigation required by DA permits. The service area must be appropriately sized to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area. For example, in urban areas, a U.S. Geological Survey 8-digit hydrologic unit code (HUC) watershed or a smaller watershed may be an appropriate service area. In rural areas, several contiguous 8-digit HUCs or a 6-digit HUC watershed may be an appropriate service area. Delineation of the service area must also consider any locally-developed standards and criteria that may be applicable. The economic viability of the mitigation bank or in-lieu fee program may also be considered in determining the size of the service area. The basis for the proposed service area must be documented in the instrument. An in-lieu fee program or umbrella mitigation banking instrument may have multiple service areas governed by its instrument (e.g., each watershed within a State or Corps district may be a separate service area under the instrument); however, all impacts and compensatory mitigation must be accounted for by service area;

(B) Accounting procedures;

(C) A provision stating that legal responsibility for providing the compensatory mitigation lies with the sponsor once a permittee secures credits from the sponsor;

(D) Default and closure provisions;

(E) Reporting protocols; and

(F) Any other information deemed necessary by the district engineer.

(iii) For a mitigation bank, a complete draft instrument must include the following additional information:

(A) Mitigation plans that include all applicable items listed in § 230.94(c)(2) through (14); and

(B) A credit release schedule, which is tied to achievement of specific milestones. All credit releases must be approved by the district engineer, in consultation with the IRT, based on a determination that required milestones have been achieved. The district engineer, in consultation with the IRT, may modify the credit release schedule, including reducing the number of available credits or suspending credit sales or transfers altogether, where necessary to ensure that all credits sales or transfers remain tied to compensatory mitigation projects with a high likelihood of meeting performance standards;

(iv) For an in-lieu fee program, a complete draft instrument must include the following additional information:

(A) The compensation planning framework (see paragraph (c) of this section);

(B) Specification of the initial allocation of advance credits (see paragraph (n) of this section) and a draft fee schedule for these credits, by service area, including an explanation of the basis for the allocation and draft fee schedule;

(C) A methodology for determining future project-specific credits and fees; and

(D) A description of the in-lieu fee program account required by paragraph (i) of this section.

(7) *IRT review.* Upon receipt of notification by the district engineer that the draft instrument or amendment is complete, the sponsor must provide the district engineer with a sufficient number of copies of the draft instrument or amendment to distribute to the IRT members. The district engineer will promptly distribute copies of the draft instrument or amendment to the IRT members for a 30 day comment period. The 30-day comment period begins 5 days after the district engineer distributes the copies of the draft instrument or amendment to the IRT. Following the comment period, the district engineer will discuss any comments with the appropriate agencies and with the sponsor. The district engineer will seek to resolve issues using a consensus based approach, to the extent practicable, while still meeting the decision-making time frames specified in this section. Within 90 days of receipt of the complete draft instrument or amendment by the IRT members, the district engineer must notify the sponsor of the status of the IRT review. Specifically, the district engineer must indicate to the sponsor if the draft instrument or amendment is generally acceptable and what changes, if any, are needed. If there are significant unresolved concerns that may lead to a formal objection from one or more IRT members to the final instrument or amendment, the district engineer will indicate the nature of those concerns.

(8) *Final instrument.* The sponsor must submit a final instrument to the district engineer for approval, with supporting documentation that explains how the final instrument addresses the comments provided by the IRT. For modifications of approved instruments, the sponsor must submit a final amendment to the district engineer for approval, with supporting documentation that explains how the final amendment addresses the comments provided by the IRT. The final instrument or amendment must be provided directly by the sponsor to all members of the IRT. Within 30 days of receipt of the final instrument or amendment, the district engineer will notify the IRT members whether or not he intends to approve the instrument or amendment. If no IRT member objects, by initiating the dispute resolution process in paragraph (e) of this section within 45 days of receipt of the final instrument or amendment, the district engineer will notify the sponsor of his final decision and, if the instrument or amendment is approved, arrange for it to be signed by the appropriate parties. If any IRT member initiates the dispute resolution process, the district engineer will notify the sponsor. Following conclusion of the dispute resolution process, the district engineer will notify the sponsor of his final decision, and if the instrument or amendment is approved, arrange for it to be signed by the appropriate parties. For mitigation banks, the final instrument must contain

the information items listed in paragraphs (d)(6)(ii), and (iii) of this section. For in-lieu fee programs, the final instrument must contain the information items listed in paragraphs (d)(6)(ii) and (iv) of this section. For the modification of an approved instrument, the amendment must contain appropriate information, as determined by the district engineer. The final instrument or amendment must be made available to the public upon request.

(e) *Dispute resolution process.* (1) Within 15 days of receipt of the district engineer's notification of intent to approve an instrument or amendment, the Regional Administrator of the U.S. EPA, the Regional Director of the U.S. Fish and Wildlife Service, the Regional Director of the National Marine Fisheries Service, and/or other senior officials of agencies represented on the IRT may notify the district engineer and other IRT members by letter if they object to the approval of the proposed final instrument or amendment. This letter must include an explanation of the basis for the objection and, where feasible, offer recommendations for resolving the objections. If the district engineer does not receive any objections within this time period, he may proceed to final action on the instrument or amendment.

(2) The district engineer must respond to the objection within 30 days of receipt of the letter. The district engineer's response may indicate an intent to disapprove the instrument or amendment as a result of the objection, an intent to approve the instrument or amendment despite the objection, or may provide a modified instrument or amendment that attempts to address the objection. The district engineer's response must be provided to all IRT members.

(3) Within 15 days of receipt of the district engineer's response, if the Regional Administrator or Regional Director is not satisfied with the response he may forward the issue to the Assistant Administrator for Water of the U.S. EPA, the Assistant Secretary for Fish and Wildlife and Parks of the U.S. FWS, or the Undersecretary for Oceans and Atmosphere of NOAA, as appropriate, for review and must notify the district engineer by letter via electronic mail or facsimile machine (with copies to all IRT members) that the issue has been forwarded for Headquarters review. This step is available only to the IRT members representing these three federal agencies, however, other IRT members who do not agree with the district engineer's final decision do not have to sign the instrument or amendment or recognize the mitigation bank or in-lieu fee program for purposes of their own programs and authorities. If an IRT member other than the one filing the original objection has a new objection based on the district engineer's response, he may use the first step in this procedure (paragraph (e)(1) of this section) to provide that objection to the district engineer.

(4) If the issue has not been forwarded to the objecting agency's Headquarters, then the district engineer may proceed with final action on the instrument or amendment. If the issue has been forwarded to the objecting agency's Headquarters, the district engineer must hold in abeyance the final action on the instrument or amendment, pending Headquarters level review described below.

(5) Within 20 days from the date of the letter requesting Headquarters level review, the Assistant Administrator for Water, the Assistant Secretary for Fish and Wildlife and Parks, or the Undersecretary for Oceans and Atmosphere must either notify the Assistant Secretary of the Army (Civil Works) (ASA(CW)) that further review will not be requested, or request that the ASA(CW) review the final instrument or amendment.

(6) Within 30 days of receipt of the letter from the objecting agency's Headquarters request for ASA(CW)'s review of the final instrument, the ASA(CW), through the Director of Civil Works, must review the draft instrument or amendment and advise the district engineer on how to proceed with final action on that instrument or amendment. The ASA(CW) must immediately notify the Assistant Administrator for Water, the Assistant Secretary for Fish and Wildlife and Parks, and/or the Undersecretary for Oceans and Atmosphere of the final decision.

(7) In cases where the dispute resolution procedure is used, the district engineer must notify the sponsor of his final decision within 150 days of receipt of the final instrument or amendment.

(f) *Extension of deadlines.* (1) The deadlines in paragraphs (d) and (e) of this section may be extended by the district engineer at his sole discretion in cases where:

(i) Compliance with other applicable laws, such as consultation under section 7 of the Endangered Species Act or section 106 of the National Historic Preservation Act, is required;

(ii) It is necessary to conduct government-to-government consultation with Indian tribes;

(iii) Timely submittal of information necessary for the review of the proposed mitigation bank or in-lieu fee program or the proposed modification of an approved instrument is not accomplished by the sponsor; or

(iv) Information that is essential to the district engineer's decision cannot be reasonably obtained within the specified time frame.

(2) In such cases, the district engineer must promptly notify the sponsor in writing of the extension and the reason for it. Such extensions shall be for the minimum time necessary to resolve the issue necessitating the extension.

(g) *Modification of instruments.* (1) *Approval of an amendment to an approved instrument.* Modification of an approved instrument, including the addition and approval of umbrella mitigation bank sites or in-lieu fee project sites or expansions of previously approved mitigation bank or in-lieu fee project sites, must follow the appropriate procedures in paragraph (d) of this section, unless the district engineer determines that the streamlined review process described in paragraph (g)(2) of this section is warranted.

(2) *Streamlined review process.* The streamlined modification review process may be used for the following modifications of instruments: changes reflecting adaptive management of the mitigation bank or in-lieu fee program, credit releases, changes in credit releases and credit release schedules, and changes that the district engineer determines are not significant. If the district engineer determines that the streamlined review process is warranted, he must notify the IRT members and the sponsor of this determination and provide them with copies of the proposed modification. IRT members and the sponsor have 30 days to notify the district engineer if they have concerns with the proposed modification. If IRT members or the sponsor notify the district engineer of such concerns, the district engineer shall attempt to resolve those concerns. Within 60 days of providing the proposed modification to the IRT, the district engineer must notify the IRT members of his intent to approve or disapprove the proposed modification. If no IRT member objects, by initiating the dispute resolution process in paragraph (e) of this section, within 15 days of receipt of this notification, the district engineer will notify the sponsor of his final decision and, if the modification is approved, arrange for it to be signed by the appropriate parties. If any IRT member initiates the dispute resolution process, the district engineer will so notify the sponsor. Following conclusion of the dispute resolution

process, the district engineer will notify the sponsor of his final decision, and if the modification is approved, arrange for it to be signed by the appropriate parties.

(h) *Umbrella mitigation banking instruments.* A single mitigation banking instrument may provide for future authorization of additional mitigation bank sites. As additional sites are selected, they must be included in the mitigation banking instrument as modifications, using the procedures in paragraph (g)(1) of this section. Credit withdrawal from the additional bank sites shall be consistent with paragraph (m) of this section.

(i) *In-lieu fee program account.* (1) The in-lieu fee program sponsor must establish a program account after the instrument is approved by the district engineer, prior to accepting any fees from permittees. If the sponsor accepts funds from entities other than permittees, those funds must be kept in separate accounts. The program account must be established at a financial institution that is a member of the Federal Deposit Insurance Corporation. All interests and earnings accruing to the program account must remain in that account for use by the in-lieu fee program for the purposes of providing compensatory mitigation for DA permits. The program account may only be used for the selection, design, acquisition, implementation, and management of in-lieu fee compensatory mitigation projects, except for a small percentage (as determined by the district engineer in consultation with the IRT and specified in the instrument) that can be used for administrative costs.

(2) The sponsor must submit proposed in-lieu fee projects to the district engineer for funding approval. Disbursements from the program account may only be made upon receipt of written authorization from the district engineer, after the district engineer has consulted with the IRT. The terms of the program account must specify that the district engineer has the authority to direct those funds to alternative compensatory mitigation projects in cases where the sponsor does not provide compensatory mitigation in accordance with the time frame specified in paragraph (n)(4) of this section.

(3) The sponsor must provide annual reports to the district engineer and the IRT. The annual reports must include the following information:

(i) All income received, disbursements, and interest earned by the program account;

(ii) A list of all permits for which in-lieu fee program funds were accepted. This list shall include: the Corps permit number (or the state permit number if there is no corresponding Corps permit number, in cases of state programmatic general permits or other regional general permits), the service area in which the authorized impacts are located, the amount of authorized impacts, the amount of required compensatory mitigation, the amount paid to the in-lieu fee program, and the date the funds were received from the permittee;

(iii) A description of in-lieu fee program expenditures from the account, such as the costs of land acquisition, planning, construction, monitoring, maintenance, contingencies, adaptive management, and administration;

(iv) The balance of advance credits and released credits at the end of the report period for each service area; and

(v) Any other information required by the district engineer.

(4) The district engineer may audit the records pertaining to the program account. All books, accounts, reports, files, and other records relating to the in-lieu fee program account shall be available at reasonable times for inspection and audit by the district engineer.

(j) *In-lieu fee project approval.* (1) As in-lieu fee project sites are identified and secured, the sponsor must submit mitigation plans to the district engineer that include all applicable items listed in § 230.94(c)(2) through (14). The mitigation plan must also include a credit release schedule consistent with paragraph (o)(8) of this section that is tied to achievement of specific performance standards. The review and approval of in-lieu fee projects will be conducted in accordance with the procedures in paragraph (g)(1) of this section, as modifications of the in-lieu fee program instrument. This includes compensatory mitigation projects conducted by another party on behalf of the sponsor through requests for proposals and awarding of contracts.

(2) If a DA permit is required for an in-lieu fee project, the permit should not be issued until all relevant provisions of the mitigation plan have been substantively determined, to ensure that the DA permit accurately reflects all relevant provisions of the approved mitigation plan, such as performance standards.

(k) *Coordination of mitigation banking instruments and DA permit issuance.* In cases where initial establishment of the mitigation bank, or the development of a new project site under an umbrella banking instrument, involves activities requiring DA authorization, the permit should not be issued until all relevant provisions of the mitigation plan have been substantively determined. This is to ensure that the DA permit accurately reflects all relevant provisions of the final instrument, such as performance standards.

(l) *Project implementation.* (1) The sponsor must have an approved instrument prior to collecting funds from permittees to satisfy compensatory mitigation requirements for DA permits.

(2) Authorization to sell credits to satisfy compensatory mitigation requirements in DA permits is contingent on compliance with all of the terms of the instrument. This includes constructing a mitigation bank or in-lieu fee project in accordance with the mitigation plan approved by the district engineer and incorporated by reference in the instrument. If the aquatic resource restoration, establishment, enhancement, and/or preservation activities cannot be implemented in accordance with the approved mitigation plan, the district engineer must consult with the sponsor and the IRT to consider modifications to the instrument, including adaptive management, revisions to the credit release schedule, and alternatives for providing compensatory mitigation to satisfy any credits that have already been sold.

(3) An in-lieu fee program sponsor is responsible for the implementation, long-term management, and any required remediation of the restoration, establishment, enhancement, and/or preservation activities, even though those activities may be conducted by other parties through requests for proposals or other contracting mechanisms.

(m) *Credit withdrawal from mitigation banks.* The mitigation banking instrument may allow for an initial debiting of a percentage of the total credits projected at mitigation bank maturity, provided the following conditions are satisfied: the mitigation banking instrument and mitigation plan have been approved, the mitigation bank site has been secured, appropriate financial assurances have been established, and any other requirements determined to be necessary by the district engineer have been fulfilled. The mitigation banking instrument must provide a schedule for additional credit releases as appropriate milestones are achieved (see paragraph (o)(8) of this section). Implementation of the approved mitigation plan shall be initiated no later than the first full growing season after the date of the first credit transaction.

(n) *Advance credits for in-lieu fee programs.* (1) The in-lieu fee program instrument may make a limited number of advance credits available to permittees when the instrument is approved. The number of advance credits will be determined by the district engineer, in consultation with the IRT, and will be specified for each service area in the instrument. The number of advance credits will be based on the following considerations:

(i) The compensation planning framework;

(ii) The sponsor's past performance for implementing aquatic resource restoration, establishment, enhancement, and/or preservation activities in the proposed service area or other areas; and

(iii) The projected financing necessary to begin planning and implementation of in-lieu fee projects.

(2) To determine the appropriate number of advance credits for a particular service area, the district engineer may require the sponsor to provide confidential supporting information that will not be made available to the general public. Examples of confidential supporting information may include prospective in-lieu fee project sites.

(3) As released credits are produced by in-lieu fee projects, they must be used to fulfill any advance credits that have already been provided within the project service area before any remaining released credits can be sold or transferred to permittees. Once previously provided advance credits have been fulfilled, an equal number of advance credits is re-allocated to the sponsor for sale or transfer to fulfill new mitigation requirements, consistent with the terms of the instrument. The number of advance credits available to the sponsor at any given time to sell or transfer to permittees in a given service area is equal to the number of advance credits specified in the instrument, minus any that have already been provided but not yet fulfilled.

(4) Land acquisition and initial physical and biological improvements must be completed by the third full growing season after the first advance credit in that service area is secured by a permittee, unless the district engineer determines that more or less time is needed to plan and implement an in-lieu fee project. If the district engineer determines that there is a compensatory mitigation deficit in a specific service area by the third growing season after the first advance credit in that service area is sold, and determines that it would not be in the public interest to allow the sponsor additional time to plan and implement an in-lieu fee project, the district engineer must direct the sponsor to disburse funds from the in-lieu fee program account to provide alternative compensatory mitigation to fulfill those compensation obligations.

(5) The sponsor is responsible for complying with the terms of the in-lieu fee program instrument. If the district engineer determines, as a result of review of annual reports on the operation of the in-lieu fee program (see paragraphs (p)(2) and (q)(1) of this section), that it is not performing in compliance with its instrument, the district engineer will take appropriate action, which may include suspension of credit sales, to ensure compliance with the in-lieu fee program instrument (see paragraph (o)(10) of this section). Permittees that secured credits from the in-lieu fee program are not responsible for in-lieu fee program compliance.

(o) *Determining credits.* (1) *Units of measure.* The principal units for credits and debits are acres, linear feet, functional assessment units, or other suitable metrics of particular resource types. Functional assessment units or other suitable metrics may be linked to acres or linear feet.

(2) *Assessment.* Where practicable, an appropriate assessment method (e.g., hydrogeomorphic approach to wetlands functional assessment, index of biological integrity) or other suitable metric must be used to assess and describe the aquatic resource types that will be restored, established, enhanced and/or preserved by the mitigation bank or in-lieu fee project.

(3) *Credit production.* The number of credits must reflect the difference between pre- and post-compensatory mitigation project site conditions, as determined by a functional or condition assessment or other suitable metric.

(4) *Credit value.* Once a credit is debited (sold or transferred to a permittee), its value cannot change.

(5) *Credit costs.* (i) The cost of compensatory mitigation credits provided by a mitigation bank or in-lieu fee program is determined by the sponsor.

(ii) For in-lieu fee programs, the cost per unit of credit must include the expected costs associated with the restoration, establishment, enhancement, and/or preservation of aquatic resources in that service area. These costs must be based on full cost accounting, and include, as appropriate, expenses such as land acquisition, project planning and design, construction, plant materials, labor, legal fees, monitoring, and remediation or adaptive management activities, as well as administration of the in-lieu fee program. The cost per unit credit must also take into account contingency costs appropriate to the stage of project planning, including uncertainties in construction and real estate expenses. The cost per unit of credit must also take into account the resources necessary for the long-term management and protection of the in-lieu fee project. In addition, the cost per unit credit must include financial assurances that are necessary to ensure successful completion of in-lieu fee projects.

(6) *Credits provided by preservation.* These credits should be specified as acres, linear feet, or other suitable metrics of preservation of a particular resource type. In determining the compensatory mitigation requirements for DA permits using mitigation banks or in-lieu fee programs, the district engineer should apply a higher mitigation ratio if the requirements are to be met through the use of preservation credits. In determining this higher ratio, the district engineer must consider the relative importance of both the impacted and the preserved aquatic resources in sustaining watershed functions.

(7) *Credits provided by riparian areas, buffers, and uplands.* These credits should be specified as acres, linear feet, or other suitable metrics of riparian area, buffer, and uplands respectively. Non-aquatic resources can only be used as compensatory mitigation for impacts to aquatic resources authorized by DA permits when those resources are essential to maintaining the ecological viability of adjoining aquatic resources. In determining the compensatory mitigation requirements for DA permits using mitigation banks and in-lieu fee programs, the district engineer may authorize the use of riparian area, buffer, and/or upland credits if he determines that these areas are essential to sustaining aquatic resource functions in the watershed and are the most appropriate compensation for the authorized impacts.

(8) *Credit release schedule.* (i) *General considerations.* Release of credits must be tied to performance based milestones (*e.g.*, construction, planting, establishment of specified plant and animal communities). The credit release schedule should reserve a significant share of the total credits for release only after full achievement of ecological performance standards. When determining the credit release schedule, factors to be considered may include, but are not limited to: The method of providing compensatory mitigation credits (e.g., restoration), the likelihood of success, the nature and amount of work needed to generate the credits, and

the aquatic resource type(s) and function(s) to be provided by the mitigation bank or in-lieu fee project. The district engineer will determine the credit release schedule, including the share to be released only after full achievement of performance standards, after consulting with the IRT. Once released, credits may only be used to satisfy compensatory mitigation requirements of a DA permit if the use of credits for a specific permit has been approved by the district engineer.

(ii) For single-site mitigation banks, the terms of the credit release schedule must be specified in the mitigation banking instrument. The credit release schedule may provide for an initial debiting of a limited number of credits once the instrument is approved and other appropriate milestones are achieved (see paragraph (m) of this section).

(iii) For in-lieu fee projects and umbrella mitigation bank sites, the terms of the credit release schedule must be specified in the approved mitigation plan. When an in-lieu fee project or umbrella mitigation bank site is implemented and is achieving the performance-based milestones specified in the credit release schedule, credits are generated in accordance with the credit release schedule for the approved mitigation plan. If the in-lieu fee project or umbrella mitigation bank site does not achieve those performance-based milestones, the district engineer may modify the credit release schedule, including reducing the number of credits.

(9) *Credit release approval.* Credit releases for mitigation banks and in-lieu fee projects must be approved by the district engineer. In order for credits to be released, the sponsor must submit documentation to the district engineer demonstrating that the appropriate milestones for credit release have been achieved and requesting the release. The district engineer will provide copies of this documentation to the IRT members for review. IRT members must provide any comments to the district engineer within 15 days of receiving this documentation. However, if the district engineer determines that a site visit is necessary, IRT members must provide any comments to the district engineer within 15 days of the site visit. The district engineer must schedule the site visit so that it occurs as soon as it is practicable, but the site visit may be delayed by seasonal considerations that affect the ability of the district engineer and the IRT to assess whether the applicable credit release milestones have been achieved. After full consideration of any comments received, the district engineer will determine whether the milestones have been achieved and the credits can be released. The district engineer shall make a decision within 30 days of the end of that comment period, and notify the sponsor and the IRT.

(10) *Suspension and termination.* If the district engineer determines that the mitigation bank or in-lieu fee program is not meeting performance standards or complying with the terms of the instrument, appropriate action will be taken. Such actions may include, but are not limited to, suspending credit sales, adaptive management, decreasing available credits, utilizing financial assurances, and terminating the instrument.

(p) *Accounting procedures.* (1) For mitigation banks, the instrument must contain a provision requiring the sponsor to establish and maintain a ledger to account for all credit transactions. Each time an approved credit transaction occurs, the sponsor must notify the district engineer.

(2) For in-lieu fee programs, the instrument must contain a provision requiring the sponsor to establish and maintain an annual report ledger in accordance with paragraph (i)(3) of this section, as well as individual ledgers that track the production of released credits for each in-lieu fee project.

(q) *Reporting.* (1) *Ledger account.* The sponsor must compile an annual ledger report showing the beginning and ending balance of available credits and permitted impacts for each resource type, all additions and subtractions of credits, and any other changes in credit availability (e.g., additional credits released, credit sales suspended). The ledger report must be submitted to the district engineer, who will distribute copies to the IRT members. The ledger report is part of the administrative record for the mitigation bank or in-lieu fee program. The district engineer will make the ledger report available to the public upon request.

(2) *Monitoring reports.* The sponsor is responsible for monitoring the mitigation bank site or the in-lieu fee project site in accordance with the approved monitoring requirements to determine the level of success and identify problems requiring remedial action or adaptive management measures. Monitoring must be conducted in accordance with the requirements in § 230.96, and at time intervals appropriate for the particular project type and until such time that the district engineer, in consultation with the IRT, has determined that the performance standards have been attained. The instrument must include requirements for periodic monitoring reports to be submitted to the district engineer, who will provide copies to other IRT members.

(3) *Financial assurance and long-term management funding report.* The district engineer may require the sponsor to provide an annual report showing beginning and ending balances, including deposits into and any withdrawals from, the accounts providing funds for financial assurances and long-term management activities. The report should also include information on the amount of required financial assurances and the status of those assurances, including their potential expiration.

(r) *Use of credits.* Except as provided below, all activities authorized by DA permits are eligible, at the discretion of the district engineer, to use mitigation banks or in-lieu fee programs to fulfill compensatory mitigation requirements for DA permits. The district engineer will determine the number and type(s) of credits required to compensate for the authorized impacts. Permit applicants may propose to use a particular mitigation bank or in-lieu fee program to provide the required compensatory mitigation. In such cases, the sponsor must provide the permit applicant with a statement of credit availability. The district engineer must review the permit applicant's compensatory mitigation proposal, and notify the applicant of his determination regarding the acceptability of using that mitigation bank or in-lieu fee program.

(s) *IRT concerns with use of credits.* If, in the view of a member of the IRT, an issued permit or series of issued permits raises concerns about how credits from a particular mitigation bank or in-lieu fee program are being used to satisfy compensatory mitigation requirements (including concerns about whether credit use is consistent with the terms of the instrument), the IRT member may notify the district engineer in writing of the concern. The district engineer shall promptly consult with the IRT to address the concern. Resolution of the concern is at the discretion of the district engineer, consistent with applicable statutes, regulations, and policies regarding compensatory mitigation requirements for DA permits. Nothing in this section limits the authorities designated to IRT agencies under existing statutes or regulations.

(t) *Site protection.* (1) For mitigation bank sites, real estate instruments, management plans, or other long-term mechanisms used for site protection must be finalized before any credits can be released.

(2) For in-lieu fee project sites, real estate instruments, management plans, or other long-term protection mechanisms used for site protection must be finalized before advance credits can become released credits.

(u) *Long-term management.* (1) The legal mechanisms and the party responsible for the long-term management and the protection of the mitigation bank site must be documented in the instrument or, in the case of umbrella mitigation banking instruments and in-lieu fee programs, the approved mitigation plans. The responsible party should make adequate provisions for the operation, maintenance, and long-term management of the compensatory mitigation project site. The long-term management plan should include a description of long-term management needs and identify the funding mechanism that will be used to meet those needs.

(2) The instrument may contain provisions for the sponsor to transfer long-term management responsibilities to a land stewardship entity, such as a public agency, non-governmental organization, or private land manager.

(3) The instrument or approved mitigation plan must address the financial arrangements and timing of any necessary transfer of long-term management funds to the steward.

(4) Where needed, the acquisition and protection of water rights should be secured and documented in the instrument or, in the case of umbrella mitigation banking instruments and in-lieu fee programs, the approved mitigation site plan.

(v) *Grandfathering of existing instruments.* (1) *Mitigation banking instruments.* All mitigation banking instruments approved on or after July 9, 2008 must meet the requirements of this part. Mitigation banks approved prior to July 9, 2008 may continue to operate under the terms of their existing instruments. However, any modification to such a mitigation banking instrument on or after July 9, 2008, including authorization of additional sites under an umbrella mitigation banking instrument, expansion of an existing site, or addition of a different type of resource credits (e.g., stream credits to a wetland bank) must be consistent with the terms of this part.

(2) *In-lieu fee program instruments.* All in-lieu fee program instruments approved on or after July 9, 2008 must meet the requirements of this part. In-lieu fee programs operating under instruments approved prior to July 9, 2008 may continue to operate under those instruments for two years after the effective date of this rule, after which time they must meet the requirements of this part, unless the district engineer determines that circumstances warrant an extension of up to three additional years. The district engineer must consult with the IRT before approving such extensions. Any revisions made to the in-lieu-fee program instrument on or after July 9, 2008 must be consistent with the terms of this part. Any approved project for which construction was completed under the terms of a previously approved instrument may continue to operate indefinitely under those terms if the district engineer determines that the project is providing appropriate mitigation substantially consistent with the terms of this part.

Dated: March 28, 2008.

Stephen L. Johnson,

Administrator, U.S. Environmental Protection Agency.

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