4.0 ENVIRONMENTAL ANALYSIS

The environmental consequence of constructing and operating the proposed Cove Point Expansion Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. Temporary impact generally occurs during construction with the resource returning to preconstruction condition almost immediately afterward. Short-term impact could continue for up to 3 years following construction. Impact was considered long term if the resource would require more that 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the Project, such as the construction of an above ground facility, such as a compressor station. We considered an impact to be significant or substantial if it would result in a substantial adverse change in the physical environment.

In this section, we discuss the affected environment, general construction and operational impact, and proposed mitigation for each resource. Dominion, as part of its proposal, agreed to implement certain measures to reduce impact. We evaluated Dominion's proposed mitigation to determine whether additional measures are necessary to reduce impact. These additional measures appear as bulleted, boldfaced paragraphs in the text. We will recommend that these measures be included as specific conditions to the authorization and Certificate that may be issued to Dominion for its project.

Conclusions in this EIS are based on our analysis of the environmental impact and the following assumptions:

- Dominion would comply with all applicable laws and regulations;
- The proposed facilities would be constructed as described in section 2.0 of this document; and
- Dominion would implement the mitigation measures included in its applications and supplemental filings to the FERC.

This section of the EIS contains discussion and analysis of the existing environment and potential environmental consequences of the proposed Project. The section is organized by environmental resource. For most resources, the scope of our analysis is limited to the construction and operation of the proposed facilities, which are limited to onshore facilities at the Cove Point Terminal, and the various pipelines and aboveground facilities associated with the pipelines. For some resources within the Chesapeake Bay we also include analysis of potential impacts from additional LNG ship deliveries to the Cove Point Terminal. The EIS also includes detailed discussion of LNG and natural gas pipeline reliability and safety (see section 4.12).

The transit corridor for the LNG carriers calling on the Cove Point Terminal would traverse open water and estuarine habitats. Nearly the entire length of the transit corridor (approximately 100 miles) are within confined waters (from the mouth of the Chesapeake Bay in Virginia Beach, Virginia, to Little Cove Bay). Portions of the transit corridor are proximal to shoreline habitats. Shoreline habitats adjacent to the transit corridor include salt marsh, emergent wetlands, forested wetlands, grasslands, and shrublands. Many of the habitats along the Chesapeake Bay are previously disturbed because of residential, agricultural, industrial, commercial, and maritime

development. The aquatic and shoreline habitats support a variety of wildlife which are described in sections 4.6 and 4.7.

LNG is less dense than fresh or sea water, so it floats on the surface. Immediately upon contact with any warmer surface such as water or air, it begins to evaporate. As the LNG vaporizes, a vapor cloud may form which is initially heavier than air but then becomes lighter as it absorbs more heat. The vapor cloud rises and is dispersed by wind. An LNG vapor cloud cannot explode in the open atmosphere, but it could burn.

Since LNG is a cryogenic liquid, the greatest threat to aquatic life from an LNG spill would be thermal stress. Any aquatic life that came into direct contact with the LNG would probably experience a sudden cold shock, and, depending in what context that contact occurred, the exposure could be lethal. Most motile underwater organisms would detect the temperature change and avoid the area. Wildlife occupying the water's surface near the release could intercept the vapor cloud and suffer asphyxiation. However, the duration of this exposure is short, as noted below.

Impacts to shoreline habitats and associated wildlife could occur, primarily, through the subsequent ignition of the LNG. The potential damage could involve the combustion of both vegetation and wildlife. However, based on the extensive operational experience of LNG shipping, the structural design of an LNG vessel, and the operational controls imposed by the Coast Guard and local pilots, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty – collision, grounding, or allision[5] – is highly unlikely.

The history of LNG shipping has been free of major incidents, and none have resulted in significant quantities of LNG being released. No incidents have occurred at existing LNG terminals during the 50 years of operation that resulted in any significant quantities of cargoes being released. However, the possibility of an LNG spill from a ship over the duration of the proposed Project must be considered.

Historically, the events most likely to cause a significant release of LNG were a ship casualty such as collisions, allisions, or groundings. Any event causing a release of LNG would have to occur with sufficient impact to breach the LNG ship's double hull and cargo tanks. However, during the 40,000 voyages that have been completed since the inception of LNG maritime transportation, there have been only eight significant incidents involving LNG ships, none of which resulted in spills due to rupturing of the cargo tanks.

The December 2004 Sandia Report, in section 4.12.5.4 "LNG Ship Safety", included an analysis of potential LNG cargo tank breaches due to accidental causes. The report found that accidental groundings, collisions with small vessels and low speed collisions with large vessels could cause minor ship damage but would not result in a cargo spill. This is due to the protection provided by the double hull structure, the insulation layer and the primary cargo tank of an LNG vessel. We do not believe that there would be any environmental significance attributed to these types of accidents.

[5] "Allision" is the action of dashing against or striking upon a stationary object (e.g., the running of one ship upon another ship that is docked) – distinguished from "collision," which is used to refer to two moving ships striking one another.

High speed collisions with large vessels striking at 90 degrees were found to potentially cause cargo tank breach areas of 0.5 to 1.5 m^2. For the resulting LNG spill and pool fire on water, the report determined that the most substantial impact to public safety and property would exist within about 800 feet, with minimal impact beyond 2,400 feet. Depending on the actual size of the cargo tank breach, the duration of the spill and ensuing pool fire could range from approximately 1 to 2½ hours.

However, it must also be recognized that the operational controls imposed by the Coast Guard and local pilots, such as a moving LNG vessel safety/security zone and one-way traffic in narrow channels, are specifically designed to prevent the collision scenarios that could result in an LNG cargo tank breach. As a result, the likelihood of an LNG spill from accidental causes is considered to be negligible. Although greater hazard distances are identified for intentional breaches in section 4.12.5.4, such scenarios are associated with the desire to inflict damage to major infrastructure, population and commercial centers, rather than to environmentally sensitive areas along the vessel route.

In the unlikely event of an LNG spill, the physical properties of LNG would limit any potential impacts. If spilled into water, the cryogenic liquid would vaporize rapidly upon contact with the warm air and water over a period of approximately 1 to 2½ hours. Being less dense than water, LNG would float on the surface prior to vaporizing. Because LNG is not soluble in water and the LNG would completely vaporize shortly after being spilled, there would be no liquid left that could mix with and/or contaminate the water.

In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In the unlikely event that ignition did not occur, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site, rather than outward towards shoreline habitats.

Given these considerations, impacts to shoreline habitats as a result of an LNG spill is both unlikely to occur and unlikely to result in substantial impacts to shoreline habitats and wildlife which occur along the transit route. Also, given the navigation controls and safety and security procedures in place to specifically prevent such accidents and intentional spill scenarios, we believe that spill events and their locations are not reasonably foreseeable in the context of the NEPA review.

4.1 GEOLOGIC RESOURCES

4.1.1 Geologic Setting

4.1.1.1 Existing Environment

The general geology, topography, and landforms in which the project components would be located can be described by physiographic province. Table 4.1-1 lists facilities, by state, and the physiographic province and section of physiographic province where applicable, that each facility would be within. The physiographic provinces are described below.

TABLE 4.1-1 **Physiographic Provinces of Project Facilities**				
State	**Facility**	**Facility Component**	**Physiographic Province(s)**	**Section of Physiographic Province**
Maryland				
	Cove Point LNG Terminal Expansion	All	Coastal Plain	
	TL-532 Pipeline	All	Coastal Plain	
Pennsylvania				
	PL-1 EXT2 Pipeline	S1MP0.0-S2MP25.1	Ridge and Valley	Appalachian Mountain
		S2MP25.1-S3MP8.9	Appalachian Plateau	Allegheny Front
		S3MP8.9-S3MP8.9-S3MP25.5	Appalachian Plateau	Deep Valley
	TL-453 EXT1 Pipeline	All	Appalachian Plateau	Glaciated High Plateau
	TL-492 EXT3 Pipeline	All	Appalachian Plateau	
	TL-536 Pipeline	All	Appalachian Plateau	Glaciated High Plateau
	PL-1 Pressure Restoration Sites	All	Ridge and Valley	
	Perulack Compressor Station	All	Ridge and Valley	Appalachian Mountain
	Centre Relay Compressor Station	All	Appalachian Plateau	Allegheny Front
	Leidy M&R Station Upgrade	All	Appalachian Plateau	Deep Valley
West Virginia				
	Wolf Run Compressor Station Expansion	All	Appalachian Plateau	
	TL-492 EXT3 Pipeline	All	Appalachian Plateau	

Coastal Plain Physiographic Province

The Coastal Plain Physiographic Province is underlain by a wedge-shaped mass of unconsolidated sediment deposits consisting of lenses and layers of gravel, sand, silt, and clay. The deposits are of Tertiary and Quaternary age, and pinch out against crystalline rocks of the Eastern Piedmont Province. The Coastal Plain Province sediments were deposited in non-marine, marginal marine, and marine environments, causing the interbedding of the fine-grained and coarse-grained sediments. The sediments strike northeast and thicken to over 8,000 feet toward the southeast (MDNR, 2004a).

The Coastal Plain Province is a relatively low-lying region with elevations reaching a few hundred feet. Much of the flat terrain is dissected by numerous stream channels that easily erode. Streams from the Appalachian and Piedmont regions deposit sediments as alluvial fans, deltas, estuaries, and marine mud layers. The Calvert Cliffs, located along the western shore of the Chesapeake Bay in Calvert County, are a series of wave-cut cliffs up to 100 feet high and constitute the most complete section of Miocene deposits in the Eastern United States. The cliffs extend between Chesapeake Beach and Drum Point, located at the southern tip of the county (MDNR, 2004a).

Appalachian Plateau Physiographic Province

The Appalachian Plateau consists of steep and narrow hilltops and steep-sloped, narrow valleys. The local relief is moderate, with elevations ranging from 848 to 1,638 feet. The oldest rocks range in age from late-Ordovician up through Mississippian. The majority of the rocks are comprised of Pennsylvanian and Permian aged strata. Rock formations range from flat to folded and faulted. Rock types in this section include sandstone, shale, redbeds, limestone and coal (PADCNR, 2004a). These rock types have variable erodibility. Limestone formations may form cave and karst formations from dissolution by soil water or precipitation, as described in section 4.3.1.

The Allegheny Front section of the Appalachian Plateau Physiographic Province consists of rounded to linear hills which are cut by valleys rising to an escarpment. West of the escarpment, hills slope away. Relief is moderate to high, with elevations ranging from 540 to 2,980 feet. Sandstone, shale, and siltstone are the dominant rock types, which vary in their erodibility. The geologic structure consists of broad folds in the south, and low northwest dipping beds elsewhere. Most Drainage patterns parallel the valley.

The Deep Valleys section of the Appalachian Plateau Physiographic Province consists of very deep, angular valleys (valleys with straight slopes), separated by broad to narrow uplands. Relief is moderate to high, with elevations ranging from 560 to 2,560 feet. The rock types vary in their erodibility. Very resistant sandstones form very steep slopes, while the less resistant shales form shallower slopes. Some valleys have a stair-step appearance from the combination of the two rock types. The geologic structures consist of open folds that control the valley orientations. This structure controls stream orientation as a result. The overall pattern of the stream network is rectangular, with streams following joints and fractures that control passes between valleys at right angles, with the result that the network lacks regional continuity (Bloom, 1978).

The Glaciated High Plateau section of the Appalachian Plateau Physiographic Province consists of high plateaus dissected by steep to shallow valleys. Local relief is low to high, ranging from 620 to 2,560 feet. Most of the streams and tributaries along the pipeline route have dendritic drainage patterns, due to the sedimentary rocks at the surface (dominantly till and eroded materials from till) having uniform erodibility and a uniform slope. The geologic structure consists of open folds and relatively flat-lying sedimentary rocks that have been slightly modified by glacial erosion and deposition (PADCNR, 2004a). Many of the larger stream valleys have glacial till deposits along the lower parts of the valley walls that reflect a change in slope where the bedrock changes into glacial till. The Olean Till, which covers 25 percent to 50 percent of the ground surface, is very thin and is composed of pieces of the underlying bedrock. Sandstones, siltstones, shales, conglomerates, and some coal are dominant rock types. These rock types, including glacial till formations, have variable erodibility.

Ridge and Valley Physiographic Province

The Ridge and Valley Physiographic Province consists of a sequence of folded and faulted sedimentary formations of Paleozoic age. The folded rocks form parallel valleys separated by steep ridges. Local relief is low to high, ranging from 140 to 2,775 feet (PADCNR, 2004a). Sandstone, shale, and carbonate rocks are the dominant rock types in the area (PADCNR,

2004a). These rock types have variable erodibility. Carbonate rocks may form cave and karst formations from dissolution by soil water or precipitation, as described in section 4.3.1.

The Appalachian Mountain section of the Ridge and Valley Physiographic Province consists of a variety of faults, as well as long and narrow mountain ridges separated by broad to narrow valleys. Relief is moderate to very high, with elevations ranging from 440 to 2,775 feet. Very resistant sandstones occur at the crests of the ridges. Soft shales and siltstones, which are less resistant to erosion, occur in the valleys. The valleys are underlain by limestone and dolomite, which can be dissolved by soil water or rainwater to form caves and karst topography, as described in section 4.3.1. The geologic structure consists of many faults, and open and closed plunging folds having narrow hinges and planar limbs (PADCNR, 2004a). Most of the streams and tributaries form a trellis drainage pattern (PADCNR, 2004a), with streams following parallel valleys, and cutting through ridges at gaps or passes. Small tributaries are essentially the same size on opposite sides of long, parallel streams.

4.1.1.2 Environmental Consequences

Construction and operation of the Cove Point Expansion Project would not materially alter the geologic conditions of the project area. The primary effects from construction would include disturbances to the natural topography along the pipeline rights-of-way and new aboveground facilities due to grading and trenching during construction.

Much of the proposed pipeline routes in Pennsylvania cross areas of thin soil cover and shallow bedrock that would likely be encountered within the trench depth. In some instances rock excavation can be accomplished by ripping or by mechanical breakdown of relatively soft, weathered, or broken rock with the use of toothed tools in conjunction with bulldozers, trench excavators, and/or backhoes. Where mechanical removal is not possible, blasting would be required. Dominion estimates that shallow depth to bedrock may be encountered for about 54.3 miles of its proposed pipelines, all along proposed pipelines in Pennsylvania (see table D-1 in appendix D). These areas were identified from soil series depth to bedrock from NRCS county soil surveys. Exact locations where blasting may be required would be determined during construction.

If blasting is not controlled properly, it could cause damage to structures, existing pipelines, wells, and springs. Other potential effects of blasting could include hazards posed by uncontrolled fly-rock, and nuisances caused by noise, increased dust, and venting of gasses following blasts. Dominion would minimize the potential impact of blasting by adhering to applicable federal, state and local blasting regulations. These regulations include limitations on size of explosive charges, safe handling, shipping and storage, and proximity to houses and other structures. In general, existing regulations that cover blasting are adequate to minimize the impact of blasting on structures and water supplies, and generally limit any impact to the construction work area. Dominion has also prepared a blasting plan that it would follow where blasting would be required. Blasting would be performed by licensed contractors in accordance with these procedures. Matting would be used to contain fly rock, and a seismograph would be used to monitor the strength of any blast. Blasting would not occur in the vicinity of residential areas. Dominion would make every effort to avoid damage to personal property during blasting. However, should any damage occur, Dominion would reimburse the affected party for any damages. With the landowners' permission, Dominion would conduct pre-water and post-water

quality testing of wells within 150 feet of the construction work area where blasting is required. Pre-blasting and post-blasting surveys would be conducted as required.

Rock excavated by blasting may not be suitable for pipeline backfill and may require disposal on the surface of the right-of-way or by hauling away from the right-of-way. Proper disposal of excess blast rock would necessitate coordination with affected landowners and local officials to determine the most appropriate disposal options.

Construction on steep slopes greater than 50 percent or steep side hill areas would also require special construction techniques. Although Dominion has attempted to avoid steep terrain to the extent possible, much of the pipeline routes in Pennsylvania would follow existing pipeline rights-of-way that currently traverse steep terrain. Construction on steep slopes could involve use of winch tractors to hold construction equipment and dead man cables to hold pipe sections in place until welded together and installed. Areas of side hill construction may require terracing, or "two-toned" right-of-way in which the side slope is cut and graded to provide two levels of work areas to allow for safe operation of equipment. Additional construction right-of-way width may be required in areas of side slope. These areas will be identified during initial right-of-way clearing and grading.

4.1.2 Mineral Resources

4.1.2.1 Existing Environment

Hydrocarbon Resources

Oil and natural gas are common commercially extractable natural resources within the Appalachian Plateau Physiographic Province. These resources are concentrated in sedimentary rocks well below the zone of influence of the pipeline or facilities. Hydrocarbon resources in the vicinity of the proposed pipeline routes and near associated facilities were located by accessing eMapPA, a Geographic Information System (GIS) mapping tool provided by the Pennsylvania Department of Environmental Protection (PADEP) (PADEP, 2003).

The proposed PL-1 EXT2 Pipeline route crosses two oil and gas fields, and is located within 0 to 1,500 feet of five other oil and gas fields. The PL-1 EXT2 Pipeline would also be within about 0.4 mile of 6 inactive and 16 active oil and gas wells. Approximately 7 miles of the proposed route for the TL-492 Pipeline would cross an oil and gas field, and would be within 60 to 161 feet of three active oil or gas wells.

Approximately 7 miles of the TL-536 Pipeline would cross or be within 150 feet of 7 oil and gas fields, and would be within 200 to 865 feet of 4 active oil or gas wells. Approximately 11 miles of the TL-453 Pipeline would cross 3 oil and gas fields.

A list of oil and gas fields crossed by the proposed pipelines and within 1,500 feet of aboveground facilities is included in table D-2 in appendix D. A list of oil and gas wells and their distance from the proposed pipelines and aboveground facilities is included in table D-3 in appendix D.

Mining Resources, including Coal Mines

The proposed facilities would be in the vicinity of several existing or past borrow pits, quarries, or mines. The closets of these would be a sand and gravel pit located approximately 40 feet from the proposed work area at S2MP 9.22 of the TL-532 Pipeline. Known mineral resource operations in the vicinity of the proposed facilities are listed in table 4.1.2.1-1.

TABLE 4.1.2.1-1

Mineral Resources Crossed or in the Vicinity of Proposed Facilities

State	Facility	Milepost	Mining Activity	Mine Type	Distance from Facility (feet)
Maryland					
	Cove Point LNG Terminal	NA	Zirconium and Titanium	Raw	2,558
	TL-532	S2MP9.22	Sand and Gravel	Surface-Borrow Pit	44
		S2MP9.40	Sand and Gravel	Surface-Borrow Pit	1,483
		S2MP22.00	Sand and Gravel	Surface-Borrow Pit	1,431
Pennsylvania					
	PL-1 EXT2	S1MP15.4 to S1MP15.70	Sand and Gravel	Quarry	780
		S2MP12.6 to S2MP13.10	Limestone	Quarry	200-550
		S2MP12.6 to S2MP13.10	Limestone	Quarry	150-700
		S2MP13.74	Limestone	Underground	5,174
		S2MP13.85	Limestone	Quarry	5,800
		S2MP15.60	Iron	Surface	592
		S3MP16.50	Coal	Surface	1,269
	TL-492 EXT3	6.84	Coal	Deep	15,000
	TL-453 EXT1	6.13 to 6.52	Stone	Surface	100
	Perulack Compressor Station	NA	Limestone	Quarry	1,100

Sources: PADEP (2003a), USGS (2004c), WVGES (2004), Black (2004) and Construction Alignment Sheets PADCNR (2004d, 2004e) and O'Neill (1964)

4.1.2.2 Environmental Consequences

Hydrocarbon Resources

Construction and operation of the proposed pipelines and aboveground facilities generally would not interfere with current and future exploitation of oil and natural gas resources due to the depth at which these resources occur. Impact would be limited to the preclusion of future drilling in close proximity to the new pipeline. This impact would be minimal since the majority of the proposed pipelines in areas of oil and gas development would be adjacent to existing pipelines, where restrictions on use of the pipeline rights-of-way are already in place. Blasting that may be required for the installation of pipelines in Pennsylvania is not expected to affect adjacent oil and natural gas wells. The blasting work would be designed to only impact near-surface materials and would be limited in intensity to that necessary to fracture shallow rock in the immediate vicinity of pipeline routes.

Mining Resources, including Coal Mines

Impact on any mineral resource production crossed by or immediately adjacent to proposed facilities could include a reduction in the reserves of the area, together with attendant economic losses to the owner caused by limitations on the possible future expansion of the affected quarry, pit, or mine. During right-of-way acquisition, if a landowner feels that compensation is due for lost mineral resources, core samples of the land in question could be collected to determine the depth and grade of the resource. This information would be used to calculate a product value of exploitable mineral resources that would be lost by land use restrictions placed on the right-of-way. Product value would be reduced by costs associated with mining the resource to yield a compensation value to landowners in addition to the value of their easement. Parties would have to agree during right-of-way acquisition on adequate compensation and clearance between the proposed right-of-way and the boundary of future mining activity.

4.1.3 Geologic Hazards

4.1.3.1 Existing Environment

Geologic hazards that have the potential to affect the construction or operation of the proposed Project within the projected project lifetime (50 years) include landslides, seismicity and soil liquefaction, karst terrain, and mine subsidence.

Landslides

The project area does contain regions that have the potential for slope failure (landslides). Slope failure potential is considered to be especially high in areas with steep topography, dipping strata and high angle rock fracture and cleavage typically associated with folded rocks and/or stream and river valley slopes. Slope failure problems can be initiated by seismic activity (including earthquakes, blasting, etc.), natural weathering, and erosional processes. Coincidence of steep slope orientations with bedding planes and rock fracture surfaces increases the potential for slope failure. Weathering effects on rock strength and the effects of water saturation of soils or increased runoff can also affect slope stability. Improper grading or construction procedures (undercutting or overloading slopes) can increase risk of slope failure. Finally, the removal of vegetation on potentially unstable slopes can increase risk of landslide by removing root strength and reducing the amount of water taken up by plants.

Maryland

The proposed facilities in Maryland are within a relatively low region consisting of unconsolidated gravels, sands, silts, and clays. Based on USGS landslide data (USGS, 2004a), the project area is within an area of low to moderate landslide incidence. This is based on response of the soils to natural and artificial cutting, loading of slopes, and high precipitation. Landslides in the area occur primarily along the western Chesapeake shoreline and the Calvert Cliffs area. Landslides are typically caused by weakening of slope material by the action of rainwater, snow melt, mechanical vibration, earthquakes, and changes in groundwater flow. The susceptibility to landslides is proportional to the placement of pressure in sloped areas.

For the proposed expansion facilities at the Cove Point Terminal, the proposed post-construction grade for the new LNG tank area represents no substantial differences from grades that already

exist at Cove Point; therefore, no new landslide risk is anticipated. There is a man-made slope at the western edge of the new facilities along a proposed road, but due to the slope construction, soil densities, and proposed engineering controls, the landslide risk for this man-made slope is minimal. Additional detailed information regarding the area soil conditions (soil boring, groundwater, and geotechnical data) is contained in the GZA GeoEnvironmental of New York Geotechnical Report filed as part of the Project (GZA, 2004a).

Along the proposed TL-532 Pipeline, landslide susceptibility is considered to be high in areas where river valley walls contain unconsolidated deposits and clay-rich erodible soils, which caused these areas to be susceptible to earth flows and slumps.

Pennsylvania

The Perulack and Centre Relay Compressor Stations are in a region where landslide susceptibility is generally low, but includes local areas of high to moderate landslide severity (PADCNR, 2004b). The Perulack Compressor Station overlies folded sedimentary rocks with colluvial (landslide deposit) soil on the slopes. Dominion states that it selected the site of the Perulack Compressor Station on a location within the property to minimize landslide potential. The Centre Relay Compressor Station is situated on gently sloping topography, and landslide susceptibility is low.

Sections 1 and 2 of the proposed PL-1 EXT2 Pipeline overlie folded sedimentary rocks with colluvial soil on the slopes. Rockslides, debris slides, and debris avalanches are prone to this region. Slumps mostly occur on lower slopes and streambanks. Section 3 of the proposed pipeline overlies flat-lying sedimentary rocks within soil cover on steep slopes. Debris avalanches, debris flows and debris slides are prone to this area. Slumps mostly occur in thick soils (PADCNR, 2004b).

The proposed TL-453 EXT1 Pipeline and TL-536 Pipeline are located in an area where landslide susceptibility is generally low, but includes local areas that are high to moderate for landslide incidence (PADCNR, 2004b). Landslide potential is highest in upland areas where relief is greatest, but slumps and debris flows are also prone to occur along rivers and streams where valley walls contain unconsolidated deposits and clay-rich erodible rock. The proposed TL-492 EXT3 Pipeline is located in an area where landslide incidence is highest (USGS, 2004B).

West Virginia

The Wolf Run Compressor Station is sited in a region where landslide susceptibility is reasonably high. The site topography of the station site itself is a broad ridge area with moderate to sharp slopes extending downhill to the northwest, west and south from the general area where the aboveground facilities are to be constructed. Site grading would include a substantial cut across the majority of the ridge which extends in a generally north to south orientation across the site.

Seismic Hazards: Seismicity and Liquefaction

The project area crosses numerous geologic fault zones; however, all faults in the project area are believed to be inactive, meaning that earthquakes are believed not to have occurred on these faults for at least the last 10,000 years, and possibly hundreds of millions of years.

The Northeast does occasionally experience earthquakes, however, and parts of Pennsylvania have experienced mild shaking from large historical earthquakes as far away as Missouri (PADCNR, 2003b).

Areas with water-saturated, generally silty or sandy soils, and areas where bedrock can focus earthquake energy, generally experience more intense shaking and damage than areas that are situated on stable bedrock, due to effects of wave interference and liquefaction. Liquefaction means that soils become liquefied during large intensity earthquake events. This can cause some building foundations to become unstable and tilt or sink, and pipelines may float upward in the soil and possibly be ruptured.

The USGS compiles information on known earthquakes and the resulting intensity frequency data that has been collected for the United States on its Seismic Zonal Map of the United States, which is a ground motion hazard map for a given level of event probability. This map has been revised over time as more information becomes available on previous earthquakes, and as active faults are discovered. The map is used by states and localities to determine building codes based on seismic zones. The zones on this map correspond to a probability of a given seismic hazard level, with increasing numbers indicating increased hazard. This map indicates that portions of this project area are located in Seismic Zones 2-4.

Maryland

Dominion prepared a Seismicity Report for the Cove Point LNG Terminal, which concludes that there is little possibility that seismic activity in the project area could induce surface faulting at the site. The potential for liquefaction of the subsurface soils at the proposed LNG tank site is insignificant, and the risk of loss of bearing capacity and the potential for dynamic soil compaction (settlement) at the proposed tank site are negligible (URS, 2000).

Along the TL-532 Pipeline route, there is a 10 percent probability within a 50-year time period of horizontal shaking motions exceeding 2 to 3 percent of the acceleration of gravity.

Pennsylvania

According to USGS seismic information summarized by Dominion for the project area, the seismic hazards in Pennsylvania along portions of proposed pipeline routes are a 10 percent probability within a 50-year time period of horizontal shaking motions exceeding 6 to 10 percent of gravity. The PADEP requires that structures built in areas that can expect peak horizontal ground acceleration to exceed 10 percent gravity with a probability of 2 percent in 50 years incorporate specific seismic safety design features (PADCNR, 2003), which indicates that specific seismic safety design features would be required by PADEP for the Project in these areas.

Karst Terrain: Karst Topography, Sinkholes and Caves

Carbonate rocks can be dissolved by mildly acidic soil water or rainwater to create caves as well as karst topography, such as pinnacled bedrock and sinkholes. If a large cave collapses, a sinkhole may result. In karst areas, much of the drainage is below ground, making assessment of actual drainage patterns and cave locations challenging.

Maryland

No potential karstic terrain occurs in the vicinity of proposed facilities in Maryland (MDNR, 2000).

Pennsylvania

Dominion did not identify any subsidence during field surveys of its proposed facilities. However, based on the Geologic Map of Pennsylvania (1980) and the USGS (2004b), 17.59 miles of potential karstic terrain would be crossed by the PL-1 EXT2 Pipeline (table 4.1.3.1-1).

TABLE 4.1.3.1-1

Potential Cave and Karst Areas Crossed by the PL-1 EXT2 Pipeline

Beginning Milepost	Ending Milepost	Total Distance (miles)
S1MP3.55	S1MP5.56	2.01
S1MP11.62	S1MP13.64	2.02
S1MP14.65	S1MP15.04	0.39
S1MP15.97	S1MP16.64	0.67
S1MP18.62	S1MP22.61	3.99
S2MP6.49	S2MP10.18	3.69
S2MP12.63	S2MP16.22	3.59
S2MP16.46	S2MP17.30	0.86
S3MP16.61	S3MP16.66	0.05
S3MP19.64	S3MP19.82	0.18
S3MP20.25	S3MP20.39	0.14
	Total	**17.59**

The proposed TL-453 EXT1 and TL-536 Pipelines do not cross potential karstic rock units (PADCNR, 2004c). No karstic features or sinkholes are known to occur along the pipeline route for the proposed TL-492 EXT3 Pipeline (PADCNR, 2004c).

The Centre Relay Compressor Station overlies formations identified as potentially karstic (USGS, 2004b), although no evidence of subsidence has been observed at the site. Dominion has begun geotechnical investigations at the site to determine if karstic conditions exist that would affect station design. The Perulack Compressor Station lies within 1,100 feet of a limestone quarry, but the information provided by Dominion does not indicate that it is located in an area of potentially karstic terrain. The PL-1 pressure restoration sites and the Leidy M&R do not cross potential karstic units (PADCNR, 2004c).

Mine Subsidence, Reclamation and Expansion

The Appalachian Plateau Physiographic Province has a long history of underground mining operations. Primary subsurface mining in Pennsylvania is associated with numerous coal seams contained within Pennsylvanian and Mississippian Period formations. Mine subsidence is the main hazard associated with underground mining. The potential for surficial effects resulting from mine collapse is dependent on several conditions, including the type of mining conducted,

the thickness of the coal unit mined, the percentage of coal removed, the depth of the mine below ground surface, and the competency of the overlying rock.

Maryland

Based on data from the USGS (2004), there are no active underground coal mines in the vicinity of the TL-532 Pipeline.

Pennsylvania

Based on data from the USGS (2004c) and PADEP (2003a), there are no active underground coal mines in the vicinity of the PL-1 pressure restoration sites, the Leidy M&R, the Perulack or Centre Relay Compressor Stations, or the TL-536 Pipeline.

Based on data collected from eMapPA (PADEP, 2003) and the WV Geological and Economic Survey (WVGES, 2004b), there is one active underground coal mine in the vicinity of the proposed TL-492 EXT3 Pipeline route, but the proposed pipeline is not in the vicinity of any known abandoned mine lands (PADEP, 2003).

Section 3 of the Pl-1 EXT2 Pipeline crosses three abandoned mine lands in short segments totaling 0.5 miles, and would be from 50 to 2,210 feet of 6 other abandoned mine lands (PADEP, 2003).

Complete information regarding the location of historical underground mining is not available. If any information regarding previously unidentified mines is discovered prior to construction, an evaluation of the effects of the mine on the Project will be completed.

4.1.3.2 Environmental Consequences

Landslides

For project components that are located in areas with potential landslides, Dominion would conduct additional pre-construction investigation to determine if slope stabilization measures would be required during construction. Results of the investigation and any stabilization measures would be addressed and included in each of the ESC Plans that Dominion would prepare at the state and/or local level. These plans would be submitted to the NRCS offices for review and comment by local resource specialists.

For the Wolf Run Compressor Station site, Dominion conducted a geotechnical study for its Northeast Storage Project (Docket No. CP04-365-000), which is currently under construction (Northeast Storage Project, FERC, 2003). The study was recommended since the conditions at the site needed to be evaluated for potential slope stabilization measures to enable the compressor station to be sited at that location. Dominion has agreed to implement the recommendation measures in the study, which includes re-grading of the existing slopes and periodic inspections of newly created slopes. Dominion would cut and level the existing slopes (generally between 2.5:1 and 3:1) to as steep as 2:1 through placement of new, side-hill fill. This is necessary to support the compressor station facilities and ancillary equipment, in addition to the expansion facilities proposed at the Wolf Run station in this proceeding.

For the current Project, Dominion has agreed to implement the measures recommended in the geotechnical study for the Northeast Storage Project. We believe the measures in the study adequately address and mitigate for the potential slope instability and landslide occurrences in the area of the Wolf Run Compressor Station expansion.

Seismic Hazards: Seismicity and Liquefaction

Since modern natural gas pipelines exhibit good inherent ductility, seismic hazard would be limited to a large scale catastrophic earthquake. The likelihood of such an earthquake during the design life of the project facilities is very remote. In addition, Dominion would construct the proposed pipelines and aboveground facilities to meet all required federal, state, and local safety standards and building codes based on earthquake hazard zones. These requirements are meant to protect human life and resources in the event of an earthquake, therefore minimizing injuries and environmental consequences as a result of seismic hazards.

Karst Terrain: Karst topography, Sinkholes and Caves

Although no direct evidence of karst topography, sinkholes, or caves have been reported for the project area during initial investigations by Dominion, some of the project area (approximately 17.9 miles of pipeline in Pennsylvania) would cross rock units that have potential for karstic terrain. Only very large, rapidly forming sinkholes would be a substantial concern to welded steel pipelines. Such sinkholes were not identified along the pipeline route.

Dominion would conduct core borings at each of the compressor station sites prior to construction to ensure that subsidence would not interfere with the compressor station designs. We are concerned, however, with the potential for subsidence at the proposed Centre Relay site.

Depending on what features are encountered at the proposed Centre Relay Compressor Station, mitigation may be required for karst features. Therefore, **we recommend that:**

- **Dominion should provide in its comments on the draft EIS, or in a separate document submitted at the same time, the results of its geotechnical studies of the proposed Centre Relay Compressor Station site. The results should include a discussion of the potential presence of karst features at the station site, and any special design features that may be required as a result of karst features.**

Mine Subsidence, Reclamation and Expansion

Significant indications of subsidence were not observed by Dominion during the site reconnaissance of any of the proposed routes or facility locations. As a result, subsidence resulting from underground mining operations is not anticipated to affect the proposed pipelines or facilities. Dominion states that if new information regarding previously unidentified mines is discovered prior to construction, it would conduct an evaluation of the effects of the mine on the Project. Dominion also states that if blasting is required in the vicinity of any of the permitted underground mines, the mining company would be notified prior to blasting.

4.1.4 Paleontological Resources

Significant paleontological resources are known to occur in the vicinity of the Cove Point LNG Terminal and the southern end of the TL-532 Pipeline. The Calvert Cliffs, located along the western shore of the Chesapeake Bay in Calvert County, contain fossils of Miocene age (MDNR, 2004). Although these paleontological resources are located in the vicinity of the existing LNG terminal and proposed TL-532 Pipeline route, no impacts to these resources are expected. Most substantial fossils are found in the Miocene-aged St. Mary's, Choptauk, and Calvert formations. Dominion would contact the Maryland State Geologist if any substantial paleontological resources are discovered. Significant paleontological resources would include bones or rare plant or animal species, but not shark teeth and shells (Shelton, 2004).

4.2 SOILS

4.2.1 Existing Environment

U.S. Department of Agriculture (USDA), NRCS soil surveys and databases were used to characterize the soil types that would be affected by the proposed Project. Soils that would be affected by each proposed facility, listed by the NRCS soil series and major soil limitations, are included in appendix E. A discussion of general soil types and their major soil limitations, including erosion potential, compaction potential, shallow soils/depth to bedrock, and revegetation potential, is included below by state.

<u>Maryland</u>

Soils that would be affected by the expansion facilities within the Cove Point Terminal are moderately well drained to well drained soils, ranging from very fine to moderately fine silts to sands and gravel. Much of the soils on the site are highly erodible. No shallow depth to bedrock would be encountered on the site. Compaction potential ranges from good to fair, and revegetation potential ranges from good to poor. NRCS soil series and major soil limitations of soils within the Cove Point Terminal expansion facilities area are listed in table E-1 in appendix E. Soil types within the fenceline of the Cove Point Terminal include soils designated by NRCS as prime farmland soils, however these soils are currently precluded from agricultural use.

Soils that would be crossed by the 47.8 miles of proposed TL-532 Pipeline are highly variable, with textures ranging from very fine clays to mixed gravel deposits on level to steep slopes, with erosion potential ranging from low to high. Compaction potential ranges from fair to severe, and revegetation potential ranges from good to poor. The pipeline would cross about 35 miles of soils with shallow depth to rock (rock within the anticipated excavation depth), although Dominion does not anticipate that any blasting would be required to excavate the trench. NRCS soil series and major soil limitations of soils crossed by the TL-532 Pipeline, by milepost location, are listed in table E-2 in appendix E. The total distance of soils with major limitations that would be crossed by the TL-532 Pipeline are listed in table 4.2.1-1. The TL-532 Pipeline would cross about 7.5 miles of soils classified as prime farmland soils, including 3.9 miles in Calvert County, 1.4 miles in Prince Georges County, and 2.2 miles in Charles County.

TABLE 4.2.1-1

Major Soil Limitations Crossed by Proposed Pipelines

Pipeline	Length of Major Soil Limitation Crossed			
	High or Severe Erosion Hazard (mi)	Poor Compaction Potential (mi)	Potentially Shallow Rock (mi) a/	Poor or Very Poor Revegetation Potential (mi)
TL-532	33.5	4.8	34.7	12.0
PL-1 EXT2	1.4	27.4	73.5	33.6
TL-492 EXT3	7.2	10.0	10.5	7.2
TL-536	0.0	7.1	9.4	3.2
TL-453	0.0	8.9	12.5	0.0
PL-1 Pressure Restoration Sites	0.0	0.0	1.0	0.3

a/ Soil depths and ranges that include soil depths less than or equal to 72 inches are included. This is extremely conservative, since many soil survey information data sets only include soil depths less than or equal to 60 inches, and many soils range widely in soil depth, especially in glaciated, sloping or eroded areas.

Pennsylvania and West Virginia

Soils that would be crossed by the 113 miles of proposed pipelines in Pennsylvania and West Virginia are highly variable due to the differences in regions in which facilities would be located, as well as to the variety of terrain that would be crossed by each facility. Soils range from very fine clays and silts on level land to rubble land on very steep slopes. Erosion potential ranges from slight to severe, compaction potential ranges from poor to good, and revegetation potential ranges from good to very poor. A number of the soils that would be crossed by the proposed pipelines in Pennsylvania and West Virginia have shallow depth to rock or bedrock, and approximately 54.3 miles of those pipelines would require mechanical excavation or blasting for excavation of the pipeline trench (see table D-1 in appendix D). NRCS soil series and major soil limitations of soils crossed by the proposed pipelines in Pennsylvania and West Virginia, by milepost location, are listed in tables E-3 through E-6 in appendix E. The total distance of soils with major limitations that would be crossed by the proposed pipelines in Pennsylvania and West Virginia are listed in table 4.2.1-1. Proposed pipelines in Pennsylvania and West Virginia would cross about 25.6 miles of soils classified as prime farmland soils, including 17.5 miles along PL1-EXT2, 0.3 mile along TL-492 EXT3, 2.7 miles along TL-453 EXT1, 5.1 miles along TL-536, and less than 0.1 mile along the PL-1 Pressure Restoration Sites.

The Centre Relay Compressor Station would be located on Opequon and Hagerstown series soils, with the major limitations for Opequon soils being clayey subsoils and shallowness of soil. The Hagerstown soils are deep, well-drained soils with no major limitations. The proposed site of the Centre Relay Compressor Station includes approximately 21.8 acres of prime farmland soils. The Perulack Compressor Station would be located on Berks series soils, with major limitations being shallow depth to bedrock and slope. No prime farmland soils would be within the Perulack Compressor Station site. The proposed expansion facilities within the existing Leidy M&R Station would be within Dekalb and Ungers series soils, with major limitations of both series being acidity. No prime farmland soils would be within the Leidy M&R Station site.

4.2.2 Environmental Consequences

4.2.2.1 General Construction and Operational Impact

Pipeline construction could adversely affect soils along the pipeline construction rights-of-way in several ways including erosion, compaction, loss of productivity, contamination from leaking equipment, and disturbance to farming activities and schedules. The most serious potential impacts can be considered short-term and limited primarily to the construction phase and could include soil erosion and loss of soil productivity through soil compaction, mixing of soil horizons, and increased soil wetness due to disruption or damage to drain tiles. Any of these effects could impact crop production or impair revegetation within the construction right-of-way.

Several pipeline construction procedures, including vegetation clearing, trenching, grading, and backfilling, require the use of heavy equipment operating on the construction right-of-way and can result in de-stabilization of the soil surface and increased erosion potential. Soil erosion could also result from off-road vehicle traffic on the right-of-way following construction. A soil's susceptibility to erosion varies and is a function of characteristics such as soil texture and structure, topography, surface roughness, amount of vegetative cover, and climate. Erosion may also be influenced by the length of time the soils are left bare and by disruption of drainage and erosion control structures such as terraces. Erosion from water occurs primarily on loose soils on moderate to steep slopes, particularly during high intensity storm events. Wind-induced erosion typically occurs on dry, fine, sandy soils where vegetation cover is sparse and strong winds are prevalent. The potential for soil erosion is greatly reduced once the right-of-way is restored and revegetated. Mitigation includes the use of temporary erosion controls during construction, minimizing the duration of soil disturbance, reestablishing contours and vegetative cover as soon as practicable following construction, and installation of permanent erosion controls, and where appropriate barriers for off-road vehicle control.

Soil compaction can result from the movement of heavy construction vehicles on the right-of-way and on access roads. The degree of compaction would depend on the moisture content and texture of the soil. Compaction damages soil structure and reduces pore space which impedes the movement of air and water to plant roots, resulting in loss of soil productivity and lower growth rates. Soil compaction would be most severe where high ground weight equipment (*e.g.*, rubber-tired pipe stringing trucks) operates on wet soils with high clay content. Measures to avoid or minimize soil compaction include avoiding construction or the use of high ground weight equipment during wet weather, segregating topsoil from the working side of the right-of-way, and subsurface plowing following construction.

The mixing of soil horizons during grading, trenching, and backfilling could also lower soil productivity by diluting the superior physical and chemical properties of the topsoil with the less productive subsoil. Trenching, including trench blasting, could also bring rock from bedrock or rocky subsoils to the surface. The mixing of soil horizons and introduction of rock can be avoided or minimized by maintaining separation between stripped topsoil and excavated trench spoil piles (including blast rock or rocky subsoils), returning subsoil and topsoil to their original horizons during backfilling, and hauling away excess rock.

Construction activities could also disrupt natural drainage or man-made surface and subsurface drainage systems. Underground drainage tiles would be cut during pipeline trenching and

shallow tiles outside of the trench area could be damaged or displaced by heavy equipment, particularly where soil grading or topsoil stripping has reduced the amount of soil between the drainage tiles and construction equipment. Drainage tiles could also be damaged outside of the trench line by ruts resulting from the operation of heavy equipment in wet soils. Disruption of surface and subsurface drainage systems could also result in temporary crop losses off the right-of-way in fields drained by the affected systems. Buried pipelines could also interfere with the placement of future drainage tiles if buried at the same depth as the tiles.

Inadequate compaction of trench backfill could result in subsidence of soil over the pipeline, altering field drainage and causing water to pond over the pipeline, delaying planting or killing crops. Severe subsidence in agriculture fields could also interfere with the operation of agricultural equipment.

Finally, construction equipment traveling from weed-infested fields into previously weed-free areas could also facilitate the spread of weeds. Pipeline construction within prime farmland would have the same impact on soils as described above. However, construction of aboveground facilities on prime farmland soils would result in a permanent loss of the prime soils from within the area permanently maintained for the aboveground facility.

4.2.2.2 Site-Specific Impact and Mitigation

The impact on soils from construction of pipelines and associated aboveground facilities can be reduced effectively through the use of appropriate construction, erosion control, and revegetation plans. We developed our Plan in consultation with other federal and state agencies and the natural gas pipeline industry to provide a set of standard practices for pipeline construction, restoration, and maintenance, that when implemented properly, allows for an acceptable level of impact on soils. Dominion has agreed to implement our Plan during construction, restoration, and post-construction monitoring. Dominion would also consult with the respective county Soil Conservation District Offices and obtain their site-specific recommendations for additional construction and restoration mitigation. Dominion would also prepare an ESC Plan as required for different states, and would submit the state or county specific plans to the respective state NRCS offices for review and comment.

<u>Erosion</u>

The erosion potential of soils that would be affected by the Project varies greatly. A number of soil types that would be affected by both aboveground facilities and pipelines have high or severe erosion potential due to soil structure and/or slope. Dominion would implement temporary measures during construction, including the use of silt fence, hay bales, and soil berms, to minimize erosion during construction. Following construction, Dominion would minimize erosion by re-grading and stabilizing disturbed areas, including reseeding in all areas except cultivated fields.

We received one comment from a landowner along Texas Eastern's existing pipeline in Pennsylvania asking if Dominion would repair erosion control structures (water bars) on the existing right-of-way that Dominion would parallel with its proposed PL-1 EXT2 Pipeline. Dominion proposes to overlap a portion of the Texas Eastern right-of-way during construction, and in general would only be responsible for restoration and installation or repair of erosion

controls on the overlapped portion of the right-of-way. Maintenance or repair of erosion control devices on the remainder of Texas Eastern's right-of-way would be coordinated with Texas Eastern. However, both companies would be responsible for repairing and restoring erosion control devices that become unstable due to erosion.

Soil Compaction

The potential impact of soil compaction would be greatest in cultivated agricultural fields and residential lawns that would be crossed by the proposed pipelines. If the Project causes severe soil compaction in these areas, proper restoration of crops or lawns following construction could be substantially affected. Dominion would minimize the chance for soil compaction in agricultural and residential areas by segregating topsoil prior to trenching, stockpiling topsoil separate from subsoil during construction, and returning topsoil during restoration, in accordance with the measures in our Plan. If topsoil or subsoil were severely compacted, as determined by testing, Dominion would use a paraplow or other deep tillage device to de-compact the soil.

Stony Soils and Shallow-to-Bedrock Soils

Based on NRCS soil series mapping, the proposed pipelines would cross 145 miles of soils with the potential for rock to be encountered within the depth of the trench. Dominion estimates that blasting may be required for trench excavation for about 54.3 miles, all along proposed pipelines in Pennsylvania (specific locations are listed in table E-1 in appendix E). Grading, trenching (including mechanical ripping and/or blasting), and backfilling in these areas may bring stones to the surface and introduce rock into topsoil.

In accordance with our Plan, Dominion would remove excess rock from the upper 12 inches of the soil in all rotated and permanent cropland, hayfields, pastures, residential areas, and other areas at the landowner's request. Rock would be removed until the size, density, and distribution of rock in surface soils are similar on and off the right-of-way. Where blasting would be required in agricultural and residential areas, Dominion would survey areas prior to blasting to estimate the density and size of existing rock fragments, and then re-survey these areas during restoration. If the density and size of rock fragments are found to be in excess of the pre-construction condition, Dominion would remove rock fragments to the extent practical, to restore the areas to pre-construction conditions.

Revegetation Potential

Based on NRCS soil series mapping, the proposed pipelines would cross 56.3 miles of soils with poor or very poor revegetation potential. Our Plan includes the requirement that Dominion is responsible for ensuring successful revegetation of soils disturbed by project-related activities. This includes consultation with local soil conservation authorities or landowners to obtain written recommendations for fertilizer, pH modifiers, seed mixes and application rates, and seeding dates. Dominion would conduct post-construction monitoring of all disturbed areas for at least two years following restoration, and take corrective action as necessary, until revegetation is considered to be successful.

Prime Farmland Soils

Through Dominion's use of the mitigation measures included in our Plan that apply to agricultural areas, there would be minimal adverse impact on prime farmland soils from construction and operation of the proposed pipelines. In addition, property owners can request additional measures through negotiations in easement agreements with Dominion. Construction and operation of the Centre Relay Compressor Station, however, would result in the permanent conversion of prime farmland soils to industrial use. The Centre Relay Compressor Station site includes 21.8 acres of prime farmland soil that would be affected temporarily during construction, of which 3.1 acres would be permanently affected by operation of the station. Because the Centre County officials authorized the zoning of this property to be used as industrial, and the land is available for purchase by Dominion, we believe that conversion of 3.1 acres of prime farmland soil to industrial use would be an acceptable impact.

Conclusions on Soils Impacts

With the implementation of best management practices associated with our Plan, and the preparation of a project-specific ESC and SPCC Plans, in consultation with the respective resource and permitting agencies, we believe that impact to soils from construction and operation of the proposed Project would be minimal.

4.3 WATER RESOURCES

4.3.1 Groundwater

Groundwater use, quality, and availability vary throughout the project area. In most of the project area, natural groundwater is suitable for drinking as well as other purposes, but the quality of the water differs among aquifers as a result of natural occurring conditions and local human activity.

4.3.1.1 Existing Environment

Cove Point LNG Terminal and TL-532 Pipeline

The principal aquifers underlying the Cove Point LNG Terminal and the TL-532 Pipeline include the Castle Hayne-Aquia Aquifer, the Severn-Magothy Aquifer, and the Potomac Aquifer. The reported typical yields of wells completed in 1985 were estimated to be 164 million gallons per day for the Castle Hayne-Aquia Aquifer, 173 million gallons per day for the Severn-Magothy Aquifer, and 251 million gallons per day for the Potomac Aquifer (USGS, 1997).

The aquifer closest to the surface in the project area is the Castle Hayne-Aquia Aquifer, which extends from New Jersey southward to southeast North Carolina. In Maryland, the aquifer consists of glauconite sands in the Piney Point and Nanjemoy Formations. The average aquifer thickness is about 140 feet. The top of the aquifer ranges from 0 feet below sea level in recharge areas in Charles County, to approximately 250 feet below sea level at the Cove Point LNG Terminal. Regional flow moves from recharge areas of higher altitude toward rivers, estuarines, bays and the Atlantic Ocean. Flow in the western shore of Maryland is from the northwest toward the Potomac River and Chesapeake Bay. The Castle Hayne-Aquia Aquifer does not

recharge directly by precipitation, nor does it discharge by evapotranspiration. This aquifer recharges primarily through vertical leakage through confining units (USGS, 1997).

The Severn-Magothy Aquifer underlies most of New Jersey, the Delmarva Peninsula, and the western shore of the Chesapeake Bay. In Maryland, the aquifer consists of sand beds in the Severn, Mount Laurel Sand, the Mattawoman, and the Magothy Formations. Units of clay confine the local aquifers of the region. The average aquifer thickness is about 185 feet. The top of the aquifer is approximately 500 feet below sea level under the Cove Point LNG Terminal. Regional flow is from outcrop recharge areas in southeastern Pennsylvania (via precipitation) toward lowlands, major bays, and the Atlantic Ocean. In the project area, the Severn-Magothy Aquifer recharges directly by vertical leakage through confining units. Like the Castle Hayne-Aquia Aquifer, it does not discharge by evapotranspiration.

The entire Potomac Aquifer underlies the entire Coastal Plain Physiographic Province except for small areas near the Fall Line. This aquifer is the lowermost and most widespread of the Coastal Plain aquifer system. In Maryland, the aquifer consists of sands and gravels with confining clay beds in the Potomac Formation. The average aquifer thickness is about 1,600 feet. The top of the aquifer is approximately 500 to 750 feet below sea level. Regional flow is eastward and southeastward toward major rivers, bays, and the Atlantic Ocean. In the project area, the Potomac Aquifer receives recharge by vertical leakage from adjacent aquifers. A minor portion of the discharge is attributed to evapotranspiration.

There are no sole source aquifers within the region of Maryland where the proposed facilities would be located. Also, there are currently no wellhead protection areas within the project area. However, wellhead protection areas are expected to be delineated in the next year by the Maryland Wellhead Protection Program.

PL-1 EXT2 Pipeline

The principal water-yielding geologic units in the area of the PL-1 EXT2 Pipeline are the carbonates and sandstones of the Silurian-aged Mifflintown Formation, the Devonian-aged Onondaga Formation, the Mississippian-aged Pocono Group, and the Pennsylvania-aged Pottsville Group. The reported typical yields of the wells completed ranged from 20 to 120 gallons per minute for the Mifflintown through the Onondaga Formations; 30 to 300 gallons per minute for the Pocono Group; and 50 to 100 gallons per minute for the Pottsville Group.

All of Section 1 and Section 2, from S1MP0.0 to S2MP25.1, of the pipeline lie within the Ridge and Valley Physiographic Region, while Section 2, from S2MP25.1 to S2MP28.6, and Section 3 lie within the Appalachian Plateau Physiographic Province. Aquifers of the Ridge and Valley Province consist of permeable rocks within folded and faulted sedimentary formations. The principal aquifers are carbonate rocks, such as limestone, that are located in the valleys. The water-yielding characteristic of the carbonate rocks depends on the degree of fracturing and the development of cavities. Sandstone formations also yield large quantities in areas of high fracturing.

Most of the Appalachian Plateau aquifers are Permian-aged and Pennsylvania-aged rocks. Rocks capable of producing usable quantities of water are present along the pipeline route and typically consist of local recharge and discharge systems. The water table in this region

generally follows topography. The depth to groundwater can be as great as several hundred feet along ridge tops and can be very near ground surface along streams and riverbanks. Confining units overlying aquifers can result in artesian wells in low-lying areas.

Aquifer recharge occurs in most areas with the greatest recharge occurring in flat-lying areas where well-developed soils or deposits of sediment are present and water residence time at the surface is great enough to allow percolation. Most precipitation that falls on hill slopes is quickly shed to streams and rivers via runoff. The groundwater flow path is often affected by secondary flow controls such as fracture, joint and bedding planes (USGS, 1997).

There are no EPA designated sole source aquifers in Pennsylvania.

TL-492 EXT3

The TL-492 EXT3 Pipeline would be within the Appalachian Plateau Physiographic Province. Aquifers in consolidated sedimentary rocks in the Appalachian Plateaus Province are divided into Mississippian, Permian, or Pennsylvania aquifers. Most of the water-yielding rocks are sandstones, but carbonate rocks of Mississippian-age locally yield water in parts of Virginia and West Virginia. Coal beds and seams yield water of poor quality (acidic) through fractures along joint systems (cleat) that store and transmit water.

In southwestern Pennsylvania, the consolidated rocks nearest the surface are mostly Pennsylvanian in age. Pennsylvania rocks are the principal coal-bearing formations and consist of cyclic sequences of sandstone, shale, conglomerate, clay, coal, and minor limestone. The principal water yielding geologic units are sandstones of the Permian and Pennsylvanian Dunkard Group through the Mississippian and Devonian Pocono Formation. Reported typical yields of wells completed in all these units range from 30 to 300 gallons per minute, but some wells yield as much as 600 gallons per minute.

Total freshwater withdrawals from consolidated sedimentary rock aquifers in the Appalachian Plateau and Central Lowland Provinces were estimated to be 282 million gallons per day during 1985 (USGS, 1997). Approximately 47 percent of this amount, or about 133 million gallons per day, was withdrawn for domestic and commercial supplies. Approximately 116 million gallons per day, or about 41 percent of the total withdrawals, was pumped for industrial, mining and thermoelectric power purposes. Most of this water was used for coal mining operations.

There are no EPA designated sole source aquifers in the project area.

TL-453 EXT1 and TL-536 Pipelines

The TL-453 EXT1 and TL-536 Pipelines would be located within the Appalachian Plateau Physiographic Province. The principal water yielding geologic units in this area are sandstones of the Devonian Formation. The reported typical yields of the wells completed range from 30 to 300 gallons per minute, but some yield as much as 600 gallons per minute. Most of the productive aquifers consist of sandstone and conglomerate. Devonian siltstone, shale, and thin-bedded sandstone locally yield sufficient water for domestic and commercial supplies but are not considered to be principal aquifers.

Total freshwater withdrawals from consolidated sedimentary-rock aquifers in the Appalachian Plateaus were estimated to be about 282 million gallons per day during 1985 (USGS, 1997). About 47 percent of this amount, or about 133 million gallons per day, was withdrawn for domestic and commercial supplies. About 116 million gallons per day, or about 41 percent of the total withdraws, was pumped for industrial, mining, and thermoelectric power purposes; most of this water was used in coal mining operations.

There are no EPA designated sole source aquifers within the project area.

Perulack and Centre Relay Compressor Stations and Leidy M&R Station Upgrade

The Perulack and Centre Relay Compressor Stations and Leidy M&R Station Upgrade would be located along the PL-1 EXT2 Pipeline. The principal water-yielding geologic units for these aboveground facilities are the same as discussed above for the PL-1 EXT2 Pipeline.

PL-1 Pipeline Pressure Restoration Sites

The principal water-yielding geologic units are limestone and dolomitic limestone of the Waynesboro Formation through the St. Paul Group (Cambrian and Ordivician age), with well yields reported to range from 25 to 210 gallons per minute (USGS, 1997). The Mississippian rocks consist primarily of shale, sandstone, and conglomerates; yields of wells completed in the Mauch Chunk and Pocono Formations range from 20 to 90 gallons per minute (USGS, 1997). Yields from limestones of Silurian and Devonian aged Mifflintown Formation through Onondaga Group range from 20 to 120 gallons per minute (USGS, 1997).

The Ridge and Valley Physiographic Province consist of permeable rocks within folded and faulted sedimentary formations. The principal aquifers are carbonate rocks that are located in the valleys. The water-yielding characteristics of the carbonate rocks depend on the degree of fracturing and the development of cavities. Sandstone formations also yield large quantities in areas of high fracturing.

The chemical quality of water in the Ridge and Valley Province aquifers is somewhat variable but is generally suitable for municipal supplies and other purposes (USGS, 1997). Abandoned or improperly plugged boreholes drilled for oil and gas exploration provide path for upward movement of water.

There are no EPA designated sole source aquifers in the project area.

Wolf Run Compressor Station Expansion

The Wolf Run Compressor Station is located in the same general hydrogeologic setting as described above for the TL-492 EXT3 Pipeline and the principal water-yielding geologic units are the same as discussed above for that pipeline.

Public and Private Water Supply Wells and Springs

Public and private water supply wells located in the vicinity of the proposed facilities are listed in table F-1 in appendix F, and summarized below. Water supply wells were identified from existing databases and records maintained by respective state agencies, and surveys conducted by Dominion.

Cove Point LNG Terminal

As part of the application process, Dominion requested that MDE identify public supply wells and springs in the project area. Three public water supply wells exist within a 150-foot radius of the proposed construction work area for the terminal expansion facilities. These are associated with the Cove Point LNG Terminal public water system and are approximately 600 to 700 feet deep. Water from these wells, which are screened in the Aquia Aquifer, is used for drinking, cooling, fire protection, and testing. Withdraw limits are a daily average of 22,000 gallons on a yearly basis and a daily average of 50,000 gallons for the month of maximum use. This system is classified as a non-transient non-community.

There are four private wells in the vicinity of the Cove Point LNG Terminal expansion facilities. These wells are associated with the residences on SR 497 Cove Point Road, adjacent to the entrance to the Cove Point LNG Terminal.

TL-532 Pipeline

One public water supply well has been identified within a one-mile radius of the construction right-of-way for the TL-532 Pipeline, and 184 private water supply wells have been identified within 150 feet of the construction right-of-way and workspace.

PL-1 EXT2 Pipeline

Sixteen public water supply wells and one private spring have been identified within a one-mile radius of the construction work area for the PL-1 EXT2 Pipeline. Four private water supply wells have been identified within 150 feet of the construction right-of-way and workspace.

TL-492 EXT3 Pipeline

No public water supply wells are known to occur within a one-mile radius of the construction right-of-way and workspace for the TL-492 EXT3 Pipeline. No municipal water authorities are located within a one-mile radius of the pipeline; however, three groundwater facilities are located within three miles downstream. No permitted private water supply wells occur within 150 feet of the construction right-of-way and workspace, however, two water wells were identified during field investigations within the environmental study areas.

TL-453 EXT1 Pipeline

No public water supply wells are known to occur within a one-mile radius of the construction right-of-way and workspace for the TL-453 EXT1 Pipeline, and no private water supply wells or springs are known to occur within 150 feet of the construction right-of-way and workspace.

TL-536 Pipeline

No public water supply wells are known to occur within a one-mile radius of the construction right-of-way and workspace for the TL-536 Pipeline. During its field surveys, Dominion identified two private water supply wells within 150 feet of the construction right-of-way and workspace.

Perulack and Centre Relay Compressor Stations

No public water supply wells are known to occur within a one-mile radius of the construction right-of-way and workspace for the Perulack and Centre Relay Compressor Stations. No private water supply wells were identified within 150 feet of the construction right-of-way and workspace for these stations during Dominion's field surveys.

Leidy M&R Station Upgrade

Two public water supply wells are located within a one-mile radius of the construction right-of-way and workspace for the Leidy M&R Station Upgrade (table F-1 in appendix F). No private water supply wells were identified within 150 feet of the construction right-of-way and workspace for the station during Dominion's field surveys.

PL-1 Pipeline Pressure Restoration Sites

One public water supply well is located within a one-mile radius of the proposed modifications to the PL-1 pipeline (table F-1 in appendix F).

Wolf Run Compressor Station Expansion

No public or private water supply wells were identified within 150 feet of the construction workspace for the Wolf Run Compressor Station Expansion during Dominion's field surveys.

Contaminated Groundwater

Dominion completed a search of the federal Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list database to identify contaminated sites that could potentially be encountered during construction. Results of that search, by proposed facility, are summarized below.

There are no sites on the CERCLIS database located within five miles of the proposed construction areas for the Cove Point LNG Terminal expansion facilities. There are three sites on the CERCLIS database located within five miles of proposed construction right-of-way and workspace for the TL-532 Pipeline:

- In Prince George's County, there is a site called the Eagle Harbor Tire Fire, located on Eagle Harbor Road in Aquasco. This site is approximately 1.5 miles south of the proposed right-of-way between S1MPs 23 and 24. The site is reported to be stabilized and no further remedial action is planned.
- Within the town of Waldorf in Charles County, there are two sites owned by the United States Naval Research Lab. Both are ranked as low priority sites.
  - The United States Naval Research Lab-Control is located about one mile north of the proposed pipeline at approximately S2MP 17.8 at the end of Laurel Branch Drive. A perennial unnamed tributary to Mattawoman Creek lies between the proposed pipeline and this facility. It is likely that this stream acts as a hydrologic divide.
  - The United States Naval Research Lab-Launch is located on Berry Road. This facility is approximately 0.6 mile northwest of the United States Naval Research

Lab-Control facility discussed above. This facility also is likely hydrologically separated from the proposed pipeline.

There are no sites on the CERCLIS database located within five miles of the proposed construction areas for the remaining proposed facilities.

4.3.1.2 Environmental Consequences

General Construction and Operational Impacts

Although construction activities associated with proposed pipeline installation could affect groundwater resources, potential impacts would be avoided or minimized by the use of both standard and specialized construction techniques. In order to minimize impacts to potable water sources, Dominion has stated that it would implement our Plan and Procedures.

Construction, operation, and maintenance of the Cove Point Expansion Project is not expected to have an impact on groundwater resources, due to the nature of the construction activities and the types of aquifers in the project area. Ground disturbance associated with typical pipeline construction is primarily limited to 10 feet below the existing ground surface, which is above most surficial aquifers. Shallow aquifers, however, could experience minor temporary disturbance from changes in overland water flow and recharged caused by clearing and grading of the proposed right-of-way. In vegetated areas, enhanced water filtration provided by a well-vegetated cover would be temporarily lost until vegetation can be successfully re-established. Near-surface soil compaction caused by heavy construction vehicles could also reduce the soils' ability to absorb water. However, the acreage affected is small in comparison to the aquifer's recharge area; impacts from surface soil compaction would be minor and temporary, and would not substantially affect groundwater resources or groundwater quality.

Construction activities such as trenching, blasting, dewatering, and backfilling may encounter shallow surficial aquifers and potentially could cause minor fluctuations in shallow groundwater levels and/or increased turbidity within the aquifer. Shallow surficial aquifers occur in low-lying areas and areas adjacent to wetlands. These areas exhibit relatively rapid recharge and groundwater movement. The effects of construction would be short-term, the aquifer would be expected to quickly re-establish equilibrium, and turbidity levels would not be expected to remain elevated in the long-term. However, alteration of the natural soils strata could result in new migration pathways for groundwater, particularly in wetland areas. By adhering to our Plan and Procedures, Dominion's normal construction procedures would generally return soil materials to their appropriate depth, thus minimizing alteration of groundwater flow regimes.

Dewatering of the pipeline trench and well point dewatering for bore pits would be the only activity requiring pumping of groundwater and could be necessary in areas where there is a high water table. The potential effect of groundwater withdrawal on users of the aquifer would depend on the rate of duration of pumping. Pipeline construction activities within a particular location are typically completed within several days; consequently, potential impacts are temporary.

Dewatering impacts can be minimized by discharging all water into well-vegetated upland areas or properly construction dewatering structures, which would allow the water to return to the

aquifer. In addition, no silt-laden water should be allowed to directly enter any waterbody or wetland.

Blasting would likely be required in several areas in Pennsylvania (see section 4.1 of this EIS). Because no areas of potentially contaminated groundwater have been identified within five miles of the proposed pipeline routes in Pennsylvania, there is no potential for blasting to affect contaminated groundwater migration pathways. Furthermore, because blast charges used would be the minimum required to excavate to a depth no greater than approximately 8 to 10 feet below the ground surface, any impacts to groundwater flow would be minor and localized.

Refueling of vehicles and storage of fuel, oil, and other fluids during the construction phase of the proposed Project could create a potential long-term contamination hazard to aquifers. Spills or leaks of hazardous liquids could contaminate groundwater and affect users of the aquifer. Soil contamination could continue to add pollutants to the groundwater long after the spill has occurred. This type of impact could be avoided or minimized by restricting the location of refueling and storage facilities and by requiring immediate cleanup in the event of a spill or leak. Dominion would prohibit refueling activities and storage of hazardous material within 200 feet of all private wells and within 400 feet of all public water supply wells, and would make an attempt to locate refueling activities downgradient from wells or potential recharge areas. Dominion would not store hazardous materials, fuels, lubricating oils, or perform concrete coating activities within any municipal watershed area unless approved by the appropriate government authority.

Dominion submitted a general SPCC Plan for inland spills detailing measures that would be taken to clean up and dispose of any accidental discharge within a municipal watershed, or within 100 feet of wetlands or waterbodies. We have reviewed this SPCC Plan and believe that it is acceptable.

Site-Specific Impacts

Dominion would interview each affected landowner regarding locations of any water supply wells on their property prior to construction. For wells found to be within 150 feet of the construction right-of-way or other work areas, written permission would be sought to conduct pre- and post-construction well water quality testing and water system yield evaluations. The wells would be sampled for potential contaminants that might be used during construction (fuel, oil, etc.), as well as standard drinking water parameters. In the event that any well is damaged by Dominion's construction activities, Dominion would provide a temporary source of drinking water and would restore the well to its original capacity or provide other remedies as agreed upon in writing with the user of the affected well, such as replacing the well.

The only contaminated sites located within the project area are three sites in the general vicinity of the TL-532 Pipeline in Charles County, Maryland. The federal CERCLIS hazardous waste site database indicates that it is unlikely that contaminated groundwater, if present, would be encountered during pipeline construction (*i.e.*, one site is stabilized and the other two are most likely located in an adjacent groundwater basin). Therefore, no impacts to or from contaminated groundwater would be expected. Because the Project would disturb more than five acres of land, Dominion would prepare a Storm Water Pollution Prevention Plan (SWPPP) prior to construction, which would be maintained onsite during all construction activities. In each

affected state, the SWPPP would be submitted to the department of environmental quality, or equivalent, with a notice of intent for coverage under the General Permit for Storm Water Discharges Associated with Construction Activity.

We have determined that implementation of our Plan and Procedures, Dominion's SPCC Plan, and Dominion's proposed mitigation measures would reduce impact on groundwater resources to less than substantial levels. After completion of the proposed pipeline and aboveground facilities, and after the successful revegetation of the right-of-way, operation of the proposed Project would not substantially affect groundwater resources.

4.3.2 Surface Water

4.3.2.1 Existing Environment

Surface waterbodies that would be affected by the proposed facilities were identified by Dominion using field reconnaissance, aerial photographs, and USGS topographic maps. Table F-2 in appendix F lists the waterbodies that would be affected by the Project, including water quality classification, fishery type, and information on sensitivity. Information on waterbodies by project facility is summarized below.

Cove Point LNG Terminal

The proposed expansion facilities at the Cove Point LNG Terminal are approximately one-half mile west of the Chesapeake Bay, the nation's largest estuary. The Chesapeake Bay watershed is over 64,000 square miles in size and includes parts of New York, Pennsylvania, West Virginia, Delaware, Maryland, Virginia, and the District of Columbia. Water use in the Cove Point area of Chesapeake Bay has been designated by the MDE as Surface Water USE II, which includes basic water use applicable to all surface waters such as swimming, boating, fishing, and all other recreational activities involving water contact; protection of aquatic life and wildlife; and agricultural supply and industrial water supply. Surface Water USE II also includes a designation for shellfish harvesting (propagation, storage, and harvesting of oysters, clams, and mussels), which requires that more stringent bacteriological, fecal, coliform, and toxic standards designed to protect human health be met.

In addition to the Chesapeake Bay, several man-made ponds and an unnamed tributary to Grays Creek are located in the vicinity of the proposed terminal expansion facilities. Two ponds located southeast of the LNG storage tank area were constructed in the 1970's during construction of the original facility. These ponds were used as settling basins during the disposal of dredge material associated with the installation of the underwater tunnel. The remaining ponds on the properly were developed as stormwater retention basins and are associated with permitted stormwater outfalls for the terminal. The unnamed tributary to Grays Creek is an intermittent stream located north of the proposed expansion facilities and outside of the existing fenced area.

Surface water users in the region are private surface water intakes used for livestock, farming, and cooling of industrial equipment. According to the MDE, one surface water user is located within three miles downstream of the proposed construction area. No public surface water intakes are known to occur in the vicinity of the terminal. No impaired waters are present in the project area.

Sensitive surface waters generally include waters that do not meet water quality standards associated with their designated beneficial use, waters that have been designated for intensified water quality management, waterbodies that contain threatened or endangered species or critical habitat, waters less than three miles upstream of potable water intake structures, outstanding quality waterbodies, waters of particular ecological and recreational importance, waterbodies located in sensitive and protected watershed areas, or physically unstable waterbodies. According to Title 26 of the Code of Maryland Regulations (MDE, 2004), the National Rivers Inventory (National Park Service, 2004), FWS, MDE, and Maryland Department of Natural Resources (MDNR), there are no sensitive waterbodies within the project area.

Dominion identified sediment contamination data from the National Sediment Inventory (NSI) data sites closest to the construction area (USEPA, 1998). According to the data, no known sources of sediment contamination occur within 150 feet of the construction work areas for the Cove Point LNG Terminal expansion facilities.

TL-532 Pipeline

The proposed TL-532 Pipeline would cross waterbodies in the West Chesapeake Bay, Patuxent River Lower, Zekiah Swamp, Port Tobacco River, Mattawoman Creek, and Potomac River Middle Tidal watersheds. According to the MDE, eight private surface water users and no public surface water users are within three miles downstream of proposed waterbody crossing locations.

The Lower Patuxent watershed is listed under the MDE Watershed Restoration Action Strategy (WRAS). Watersheds under WRAS are those targeted by the state government as a high priority for restoration. The Lower Patuxent watershed is on the WRAS due to water quality impairments that affect tidal wetlands and the Chesapeake Bay. A comprehensive plan has been developed by state and county agencies to protect the surface water in this watershed. The three subbasins within this watershed that are targeted for restoration are the Hall Creek, Island Creek and Solomons Harbor. These subbasins are all downstream of the proposed pipeline.

Of those waterbodies crossed by the TL-532 Pipeline, seven waterbodies and some of their tributaries are considered sensitive waterbodies for various reasons. Sensitive waterbodies that would be crossed are St. Leonard Creek, Hunting Creek, Patuxent River, Devil's Nest, Zekiah Swamp Run, Jordan Swamp, and Mattawoman Creek. All of these waterbodies are considered sensitive because they do not meet the water quality standards associated with the waters' designated beneficial use. In addition, St. Leonard Creek, Hunting Creek, and the Patuxent River are also shellfish harvesting waters, and Zekiah Swamp Run is classified as a Wild and Scenic River.

MDNR uses the Unified Watershed Assessment to categorize and prioritize watersheds for protection, restoration and preservation. Category 1 watersheds are those not meeting clean water goals and need restoration. Category 2 watersheds are those that meet clean water goals, but need preventative action. Category 3 watersheds are those that are pristine or sensitive and need an extra level of protection. Five of the six watersheds crossed by the TL-532 Pipeline are Category 3 watersheds: Patuxent River Lower, Zekiah Swamp, Port Tobacco River, Mattawoman Creek, and Potomac River Middle Tidal.

Dominion identified known locations of contamination in the project area from the NSI data sites (USEPA, 1998). No known sources of sediment contamination were identified within 150 feet of the proposed construction right-of-way or work areas for the TL-532 Pipeline. The closest NSI site is on the Patuxent River approximately 26 miles upstream of the proposed pipeline.

PL-1 EXT2 Pipeline

The proposed PL-1 EXT2 Pipeline would cross waterbodies in the Kettle Creek, Bald Eagle Creek, Crooked-Standing Stone Creek, Penns-Middle Creek, Kishacoquillas-Jacks Creek, and Tuscarora-Buffalo Creek watersheds. According to the PADEP, five private and one public surface water users are within three miles downstream of proposed waterbody crossing locations.

According to the PADEP WRAS, pesticides in the Bald Eagle Creek watershed have degraded the groundwater and springs that feed Slab Cabin Run, Logan Branch, and Spring Creek. The Bald Eagle Creek watershed is on the WRAS due to water quality impairments that affect, or could affect, the 3 natural/recreation areas, 14 Class A trout waters, 11 high quality streams, and 11 exceptional value streams located within its boundary. Bald Eagle Creek watershed has 141 miles of impaired waters, with the majority of the impairment in Beech Creek and Spring Creek. Extensive studies are underway by state and county agencies to develop a comprehensive plan to protect groundwater in this watershed.

Contaminated waters were also identified using Section 303(d) of the CWA. This list identifies six waterbodies crossed by the PL-1 EXT2 Pipeline as being impaired by acid mine drainage and pesticides. These waterbodies are Bald Eagle Creek, Spring Creek, Beech Creek, Twomile Run, Kettle Creek, and West Branch Susquehanna River.

Twenty-five of the waterbodies crossed by the PL-1 EXT2 Pipeline and some of their tributaries are considered sensitive waterbodies for various reasons. Sensitive waterbodies that would be crossed are Willow Run, Dougherty Run, Blacklog Creek, East Licking Creek, Juniata River, Kishacoquillas Creek, East Branch of Standing Stone Creek, Standing Stone Creek, Detweiler Run, Sinking Creek, Bald Eagle Creek, Little Marsh Creek, Laurel Run, Marsh Creek, Council Run, Beech Creek, Backwater-Beech Creek, West Branch Big Run, West Branch Susquehanna River, Kettle Creek, Twomile Run, Huling Branch, Shintown Run, and Two Rock Run. Most of these waterbodies are considered sensitive because they are of outstanding or exceptional quality. Several do not meet the water quality standards associated with the waters' designated beneficial use; several are located in sensitive and protected watershed areas; West Branch Susquehanna River and Beech Creek are included in the Nationwide Rivers Inventory for scenic beauty; and the Juniata River could contain threatened or endangered species habitat.

No known sources of sediment contamination were identified within 150 feet of the proposed construction right-of-way or work areas for the PL-1 EXT2 Pipeline.

TL-492 EXT3 Pipeline

The proposed TL-492 EXT3 Pipeline would cross waterbodies in 12 watersheds in Pennsylvania: the Pennsylvania Fork of Dunkard Creek, Garrison Fork of Dunkard Creek, Cappo Run, Hamilton Run, Bloody Run, Roberts Run, Blockhouse Run, Taylor Run, Hoover Run, Tustin Run, Toms Run, and the Pennsylvania Fork of Fish Creek; and one watershed in West Virginia, the Upper West Virginia Fork of Fish Creek. According to the PADEP, no private or public

surface water users are within three miles downstream of proposed waterbody crossing locations. The West Virginia Department of Environmental Protection (WVDEP) indicated that there are no known surface water users or public surface water users in the project area.

According to the PADEP WRAS, portions of the Upper Monongahela River watershed, including Dunkard Creek, is degraded by acid mine drainage, and leaking on-lot septic systems contribute to raw sewage to streams and groundwater in the basin. In addition, 10 sewage treatment plant National Pollutant Discharge Elimination System (NPDES) source discharges and erosion and sedimentation are specified as other impairments. The portions of the watershed are designated as a priority watershed under the Unified Watershed Assessment developed by the PADEP in 1998. Contaminated waters were also identified using Section 303(d) of the CWA, which lists Bloody Run as being impaired by urban runoff and storm sewer siltation.

Of those waterbodies crossed by the TL-492 EXT3 Pipeline facilities, one waterbody and several unnamed tributaries are considered sensitive waterbodies for various reasons. Sensitive waterbodies that would be crossed are Bloody Run and several associated tributaries, and several unnamed tributaries to the Pennsylvania and Garrison Forks of Dunkard Creek. The latter are listed because they are included in PADEP's WRAS plan, while Bloody Run and three of its unnamed tributaries are considered sensitive because they do not meet the water quality standards associated with their designated beneficial use.

The NSI database listed no known sources of sediment contamination within 150 feet of any area that would be disturbed by construction of the TL-492 EXT3 Pipeline.

TL-453 EXT1 Pipeline

The proposed TL-453 EXT1 Pipeline would cross waterbodies located in the following watersheds: the West Branch Genesee River, Middle Branch Genesee River, Genesee River, Marsh Creek, Turner Creek, North Branch Cowanesque River, and Ludington Run. According to the PADEP, no private or public surface water users are within three miles downstream of proposed waterbody crossing locations.

None of the watersheds crossed by the TL-453 EXT1 Pipeline are listed under the PADEP WRAS. Section 303(d) of the CWA lists four watersheds crossed by the PL-453 EXT1 Pipeline as being impaired. These watersheds are Marsh Creek, North Branch Cowanesque River, West Branch Genesee River, and the Genesee River.

Of those waterbodies crossed by the TL-453 EXT1 Pipeline, three waterbodies and several unnamed tributaries are considered sensitive. Sensitive waterbodies that would be crossed are Middle Branch Genesee River, Marsh Creek, and the Genesee River. The latter two and all of the unnamed tributaries are considered sensitive because they do not meet the water quality standards associated with the waters' designated beneficial use. The Middle Branch Genesee River is listed as sensitive because it is habitat for a protected fish species and is of outstanding or exceptional quality.

The NSI database listed no known sources of sediment contamination within 150 feet of any area that would be disturbed by construction of the TL-453 EXT1 Pipeline.

TL-536 Pipeline

The proposed TL-536 Pipeline would cross waterbodies located in the Genesee River, Orebed Creek, Redwater Creek, Honeoye Creek, Plank Creek, and Butter Creek watersheds. According to the PADEP, no private or public surface water users are within three miles downstream of proposed waterbody crossing locations.

None of the watersheds crossed by the TL-536 Pipeline are listed under the PADEP WRAS. In addition, no contaminated waters were identified under Section 303(d) of the CWA. The NSI database listed no known sources of sediment contamination within 150 feet of any area that would be disturbed by construction of the TL-536 Pipeline.

Of those waterbodies crossed by the TL-536 Pipeline, only Butter Creek and several of its unnamed tributaries are considered sensitive waterbodies. These waterbodies are considered sensitive because they are of outstanding or exceptional quality.

Perulack and Centre Relay Compressor Station Stations

The proposed Perulack Compressor Station site is within the Lower Juniata watershed. Dominion has identified no surface water users downstream of this compressor station.

PADEP WRAS 8C, as well as Section 303(d) of the CWA, list acid mine drainage and agricultural siltation as impairments of the Lick Run watershed. None of the waterbodies within the Perulack Compressor Station site are considered sensitive waterbodies.

The proposed Centre Relay Compressor Station is within the Bald Eagle Creek watershed; however, no surface waterbodies are within the proposed compressor station site or would be affected by construction and operation of the station.

Leidy M&R Station Upgrade

The Leidy M&R Station Upgrade is within the Middle West Branch Susquehanna Watershed; however, no surface waterbodies are within the proposed station site or would be affected by construction and operation of the station upgrade.

PL-1 Pipeline Pressure Restoration Sites

The proposed pipeline retest crosses unnamed tributaries to Narrows Branch Tuscarora Creek located in the Lower Juniata subbasin. The pipeline replacement section lies within the Conococheague-Opequon watershed and crosses an unnamed tributary to Back Creek. PADEP identified no surface water users within three miles downstream of the project area.

The Back Creek watershed is listed under the PADEP WRAS as part of State Water Plan 13C. The PL-1 replacement section crosses a tributary to Back Creek. The management plan does not have any specific recommendations or requirements for Back Creek and its tributaries.

The unnamed tributaries to Narrows Branch Tuscarora Creek which are crossed by the PL-1 Pipeline Retest segment and the unnamed tributaries to Back Creek which is crossed by the replacement section have been assessed by PADEP, and under PADEP's Section 305B, are classified as attaining aquatic life.

Section 303(d) of the CWA lists Narrows Branch Tuscarora Creek as being impaired by agricultural siltation. The retest area crosses unnamed tributaries to Narrows Branch Tuscarora Creek. The 303d list also includes Back Creek and its tributaries as being impaired by grazing related agricultural siltation, organic enrichment, low dissolved oxygen, and turbidity. The NSI database listed no known sources of sediment contamination within 150 feet of any area that would be disturbed by construction of the PL-1 Pipeline Pressure Restoration Sites.

The only waterbody crossed by the PL-1 Pipeline Replacement, the unnamed tributary to Back Creek, is considered sensitive because it does not meet the water quality standards associated with its designated beneficial use.

Wolf Run Compressor Station Expansion

Thirteen unnamed tributaries to the Right Fork of Freemans Creek would be affected by construction of the Wolf Run Compressor Station Expansion. The Right Fork of Freemans Creek is not listed on West Virginia's CWA Section 303(d) list of impaired waters. The 13 unnamed tributaries to the Right Fork of Freemans Creek are considered sensitive because they are classified as high quality waterbodies.

4.3.2.2 Environmental Consequences

Cove Point LNG Terminal

Construction activities associated with the proposed expansion facilities would not directly affect the Chesapeake Bay or its shoreline. No dredging or other underwater activities are proposed. Land disturbing activities would be confined mostly to previously disturbed upland areas within the existing facility, however site roads and work areas would affect intermittent streams on site. During site preparation for the expansion facilities, disturbed soils would be exposed to erosional forces. Stormwater runoff from this area would be directed to existing retention basins located around the facility. To minimize the impacts of erosion and sedimentation on surface waters, construction activities at the terminal would be conducted in accordance with our Procedures, a Stormwater Management Plan, and the conditions of a Grading Permit that would be issued by Calvert County.

Stormwater leaving the facility would be routed to existing stormwater outfalls and associated retention basins permitted by the MDE under an existing Discharge Permit. Dominion would install sediment and erosion control measures as required by our Procedures and Calvert County to mitigate stormwater runoff impacts. Surface water quality could be adversely affected by a spill, leak, or other release of hazardous materials during construction activities. Transport of these hazardous materials into nearby waterbodies by stormwater runoff would degrade water quality and could potentially impact aquatic organisms. To minimize the potential for a spill or release and to establish procedures for handling a spill or release during construction of the expansion facilities, Dominion would implement an SPCC Plan. Dominion would follow its existing spill prevention and control procedures for avoiding, or containing and disposal of, spills or releases directly into Chesapeake Bay during offloading of LNG tankers.

Operation of the LNG Terminal expansion facilities would include relatively minor volumes of water intakes and discharges. Although the LNG vaporizers would be a closed system, a small amount of water is required to initiate the system and periodically maintain volumes. The water

intakes would be expanded under the existing state permit for this appropriation. During normal plant operations, surface water discharges would consist of stormwater runoff and condensate from the LNG vaporizers. The facility has ten stormwater outfalls and one process water outfall permitted by the MDE. Process water, generated during the vaporization of LNG, would be discharged to an unnamed tributary to Grays Creek at the permitted process water outfall. This water would be adjusted for pH (maintained between pH 6.5 and 85) prior to discharging. Currently, the vaporizers generate approximately 10 gallons per minute (gpm) of water per vaporizer. After addition of the proposed expansion facilities, discharge from the vaporizers would be roughly double that of the existing discharge.

Operation of the proposed LNG Terminal expansion facilities would result in additional LNG tankers docking and unloading LNG cargo at the Cove Point Terminal. The additional LNG tankers would traverse the Chesapeake Bay, dock, and offload LNG cargo in the same manner as existing LNG ship traffic that currently calls on the Cove Point Terminal. Because LNG ships would be fully loaded with LNG when arriving at Cove Point, there would be no ballast water on board, and ships would not discharge ballast water while docked at the terminal. However, the LNG vessels would take on seawater ballast while discharging LNG cargo in order to maintain a constant draft at the berth. LNG ships would require approximately 14 million gallons of seawater ballast. The ballast water would be pumped at a maximum rate of about 16,000 gpm and an average rate of about 12,000 gpm over a 12- to 16-hour period. The intake aperture on the ships would be about 25 to 30 feet below the water surface. LNG ships have multiple ballast water intakes, therefore the rate of intake at each intake location would be some fraction of the total.

Pipeline Construction

The greatest potential impacts on surface waters would result from suspension of sediments caused by in-stream construction for pipeline crossings, and by erosion of cleared stream banks and adjacent pipeline right-of-way. The extent of the impact would depend on sediment loads, stream velocity, turbulence, stream bank composition, and sediment particle size. These factors would determine the density and downstream extent of the turbid plume of sediment. Turbidity resulting from suspension of sediments due to in-stream construction or erosion of cleared right-of-way areas would reduce light penetration and the corresponding photosynthetic oxygen production. Re-suspension of deposited organic material and inorganic sediments would cause an increase in biological and chemical intake of oxygen, also resulting in a decrease of dissolved oxygen.

Grading of stream banks would expose large areas of soil to erosional forces and would reduce riparian vegetation along the cleared section of the stream. The use of heavy equipment for construction could cause compaction of near-surface soils, an effect that could result in increased runoff into waterbodies. The increased runoff could erode stream banks, resulting in increasing turbidity levels and sedimentation rates of the receiving waterbody.

Dominion has stated that it would follow our Procedures for waterbody crossings. We developed our Procedures to provide guidelines for acceptable levels of protection for surface waterbodies affected by pipeline projects. Our Procedures include requirements for pre-construction planning, environmental inspection, construction methods, sediment and erosion control, restoration, and post-construction maintenance. It includes provisions to handle

stormwater and protection of waterbodies and wetlands from accidental spills of fuels or hazardous materials. In general, implementing the measures in our Procedures during pipeline crossings of waterbodies results in acceptable levels of impact.

We received a comment from the Federal Emergency Management Agency (FEMA), Region III, stating that project facilities located within areas designated by FEMA as Special Flood Hazard Areas must comply with local floodplain management ordinances, in particular for Calvert and Prince Georges counties, Maryland. Dominion has initiated consultation with MDE Water Management program and will apply for a non-tidal wetland, waterway, and 100-year floodplain permit. Dominion has also initiated coordination with necessary county agencies and will apply for necessary permits from each county. Several surface water users were identified within 3 miles downstream of waterbody crossings on the TL-532 and PL-1 EXT2 pipelines. Dominion states that consultations, in accordance with the Commission's Plan and Procedures, would take place prior to in-stream work for water supply intake owners.

By implementing the construction and restoration measures specified in our Procedures, Dominion's ESC Plan, and appropriate federal, state, and local permits, we believe that the potential impacts to surface waterbodies discussed above from construction in and around these areas would be minimized to the extent practicable, would be temporary in nature, and would cause no long-term negative impacts to surface water quality.

Compressor station construction could affect surface waters on a temporary basis. Discharges to surface waters would consist primarily of stormwater runoff. Stormwater leaving the compressor stations would be routed to approved stormwater controls. Temporary sediment and erosion control measures would be installed to mitigate construction stormwater runoff impacts. Site-specific Construction Stormwater Management Plans for use during construction would be developed to minimize sedimentation runoff to local waterways. These plans would be reviewed and approved by local authorities.

In West Virginia, there are sections of ephemeral and intermittent streams that would be permanently filled-in as a result of site grading for the proposed Wolf Run Compressor Station. The Corps Huntington District, West Virginia would make a determination as to whether a Nationwide Permit 12 applies. Construction and mitigation would be consistent with both general and specific regional conditions of the Nationwide Permit. The WVDEP has issued a Section 401 water quality certification permit, contingent upon compliance with conditions and limitations of the Nationwide Permit (FERC, 2005b).

Refueling of vehicles and storage of fuel, oil, or other fluids near surface waters may create a potential for contamination due to accidental release. If a spill were to occur, immediate downstream users of the water would experience a degradation in water quality. Acute and chronic toxic effects of aquatic organisms could result from such a spill. Similar adverse effects on water quality could result from the resuspension of pollutants from previously contaminated sediments during in-stream excavation activities, although no areas of known contamination are present at the proposed crossing locations. The amount of contamination released from resuspended sediments would depend on the existing concentration and on the sorptive capacity of the surrounding sediments. The potential for spills would be reduced by implementation of Dominion's SPCC Plan. Within the SPCC Plan, Dominion specifies that fueling of equipment and storage of fuel would occur at least 100 feet away from waterbodies.

We believe that strict implementation of the SPCC Plan would adequately protect surface waters, including water supply areas, in the proposed project area.

Horizontal Directional Drill

Dominion proposes to use HDD for pipeline crossings of the following waterbodies:

- TL-532 Pipeline: St. Leonard Creek, Hunting Creek, Patuxent River, Zekiah Swamp, Jordan Swamp, and Mattawoman Creek.
- PL-1 EXT2 Pipeline: Juniata River and Bald Eagle Creek.

We have received several comments during scoping concerning the impact on St. Leonard Creek from geotechnical studies being conducted by Dominion to determine the feasibility of a HDD crossing of this waterbody. Permits for some of the activities associated with the geotechnical studies have been obtained from the Corps and MDE. We believe that such studies are a necessary component of project planning and design.

Dominion has stated that it would provide site-specific plans for each HDD crossing after discussions with the appropriate federal and state agencies and after completion of geotechnical studies at the proposed crossings. Dominion should prepare and file a site-specific HDD Contingency Plan for each crossing. We believe that such plans are a necessary component for completing a HDD with the least environmental impact. Because a directional drill can fail for various reasons, Dominion should be prepared to complete the crossing if the directional drill is unsuccessful, and its HDD Contingency Plan should include details on how this would be accomplished. **Therefore, we recommend that:**

- **Dominion should provide in its comments on the draft EIS, or in a separate document submitted at the same time, HDD Contingency Plans for each waterbody proposed to be crossed by HDD. Each HDD Contingency Plan should include site-specific construction drawings and should address:**

  a. how Dominion would handle any inadvertent release of drilling mud into the waterbody or areas adjacent to the waterbody, including procedures to contain inadvertent releases;

  b. how Dominion would clean up any inadvertent releases; and

  c. how Dominion would complete the waterbody crossing should the HDD be unsuccessful. This section of the plan should contain site-specific details for each waterbody for which HDD is proposed, including procedures to seal the abandoned drill hole, and scaled drawings identifying all areas that would be disturbed by construction.

  Dominion should file each plan with the Secretary for review and written approval by the Director of OEP. In addition, Dominion should file each plan concurrently with the appropriate office of the Corps for authorization to construct using these plans.

Hydrostatic Test Water

Dominion would hydrostatically test the LNG Terminal expansion facilities and new pipelines prior to placing them in service to verify their integrity. These tests consist of pressurizing the facilities with water and checking for pressure losses due to leakage. Hydrostatic testing would be performed in accordance with the pipeline safety regulations identified in 49 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards."

Dominion has identified individual source and discharge locations for the hydrostatic test water. Table 4.3.2.2-1 lists the proposed test water sources, test sections, and approximate water volumes that would be used in the tests. Some waterbodies identified in table 4.3.2.2-1 are considered sensitive by the state agencies, mainly because these waterbodies do not meet the designated water quality standards. Dominion would need to obtain water withdrawal permits from the state agencies prior to any hydrostatic test water withdrawals, and any special considerations required by the state agencies because of the sensitive classifications would be addressed in the permitting process.

Withdrawal of hydrostatic test water could temporarily affect downstream users and aquatic organisms (primarily fish) if the diversion constitutes a large percentage of the source's total flow or volume. Potential impacts include temporary disruption of surface water supplies, temporary loss of habitat for aquatic species, increased water temperatures, depletion of dissolved oxygen levels, and temporary disruption of spawning, depending on the time of withdrawal and current downstream users. These impacts would be minimized by obtaining hydrostatic test water from bodies of water with sufficient flow or volume to supply required test volumes without significantly affecting downstream flow. In addition, Dominion has stated that it would limit withdrawal volumes to no more than 25 percent of the waterbody's flow rate at the time of withdrawal. Dominion is in consultations with the appropriate state agencies to ensure that the proposed waterbodies have sufficient flow to support hydrostatic test water withdrawals. Impacts to spawning would further be avoided by performing hydrostatic testing during non-spawning periods. However, based on potential concerns identified by NOAA Fisheries, we have included recommendations to further minimize potential impact on fish from hydrostatic testing (see section 4.6.1.2).

Water used for hydrostatic testing would be discharged on land or returned to the waterbody where it was appropriated, depending on the NPDES permit stipulations. Potential impacts resulting from the discharge of hydrostatic test waters into streams and upland vegetation areas would be limited to erosion of soils and some subsequent degradation of water quality from increased turbidity and sedimentation. High-velocity flows could cause erosion of the stream banks and stream bottom, resulting in temporary release of sediment. Erosion caused by the discharge of hydrostatic test water would be minimized by using energy dissipation devices, controlling the discharge rate, and properly selecting discharge locations. Continuing erosion could occur at the discharge area if the area is not properly stabilized with erosion control devices after the discharges have been completed.

No chemical additives would be introduced to the water used to hydrostatically test the new pipeline, and no chemicals would be used to dry the pipeline following the hydrostatic testing. Dominion would consult with the appropriate state agencies concerning specific permit requirements, and would conduct hydrostatic testing in accordance with all applicable permits and our Plan.

TABLE 4.3.2.2-1

Hydrostatic Test Water Sources for Proposed Facilities

Segment	Water Source	Test Site (milepost)	Initial Fill (approx. gallons)
Cove Point LNG Terminal Expansion			
Expansion facilities	Two on-site ponds	Existing terminal property	25,700,000
TL-532 Pipeline			
Section 1	Patuxent River	S1MP 21.95	5,777,000
Section 2	Patuxent River	S1MP 21.95	6,904,000
HDD St. Leonard Creek	St. Leonard Creek	S1MP 4.59	119,000
HDD Hunting Creek	Hunting Creek	S1MP 19.42	119,000
HDD Patuxent River	Patuxent River	S1MP 21.95	227,000
HDD Zekiah Swamp	Zekiah Swamp	S1MP 6.23	119,000
HDD Jordan Swamp	Jordan Swamp	S1MP 7.59	119,000
HDD Mattawoman Creek	Mattawoman Creek	S1MP 19.79	119,000
PL-1 EXT2 Pipeline			
Section 1/Segment 1	Test Segment 2	Fill 5.62 (Section 1) Empty (0.0) (Section 1)	667,960
Section 1/Segment 2	Juniata River	Fill 12.24 (Section 1) Empty 5.62 (Section 1)	789,535
Section 1/Segment 3	Juniata River	Fill 12.24 (Section 1) Empty 15.31 (Section 1)	365,592
Section 1/Segment 4	Test Segment 3	Fill 15.31 (Section 1) Empty 17.44 (Section 1)	253,180
Section 1/Segment 5	Kishacoquillas Creek or Test Segment 4	Fill 17.44 (Section 1) Empty 17.44 (Section 1)	235,636
Section 1/Segment 6	Kishacoquillas Creek or Test Segment 1, 2, 3, and 4 from Section 2	Fill 26.87 (Section 2) Empty 26.87 (Section 2)	1,201,441
Section 2/Segment 1	Bald Eagle Creek and Test Segments 2 and 3	Fill 6.82 (Section 2) Empty 26.87 (Section 2)	495,493
Section 2/Segment 2	Test Segments 3 and 4	Fill 9.77 (Section 2) Empty 6.82 (Section 2)	350,620
Section 2/Segment 3	Test Segment 4	Fill 12.23 (Section 2) Empty 9.77 (Section 2)	293,168
Section 2/Segment 4	Bald Eagle Creek and Test Segments 5 and 6	Fill 15.68 (Section 2) Empty 12.23 (Section 2)	410,840
Section 2/Segment 5	Test Segment 6	Fill 15.82 (Section 2) Empty 16.68 (Section 2)	16,695
Section 2/Segment 6	Bald Eagle Creek	Fill 19.05 (Section 2) Empty 15.82 (Section 2)	384,266
Section 2/Segment 7	Bald Eagle Creek	Fill 19.05 (Section 2) Empty 19.65 (Section 2)	71,550
Section 2/Segment 8	Bald Eagle Creek and Test Segment 7	Fill 19.65 (Section 2) Empty 24.26 (Section 2)	549,202
Section 2/Segment 9	Test Segment 8	Fill 24.26 (Section 2) Empty 27.26	358,218
Section 3/Segment 1	Test Segments 2 and 3	Fill 5.95 (Section 3) Empty 27.26	869,860

TABLE 4.3.2.2-1

Hydrostatic Test Water Sources for Proposed Facilities

Segment	Water Source	Test Site (milepost)	Initial Fill (approx. gallons)
Section 3/Segment 2	West Branch Susquehanna River and Test Segment 3	Fill 12.02 (Section 3) Empty 5.95 (Section 3)	721,608
Section 3/Segment 3	West Branch Susquehanna River	Fill 14.55 (Section 3) Empty 12.02 (Section 3)	287,824
Section 3/Segment 4	West Branch Susquehanna River	Fill 14.55 (Section 3) Empty 20.33 (Section 3)	687,8841
Section 3/Segment 5	Test Segment 4	Fill 20.33 (Section 3) Empty 22.51 (Section 3)	259,285
Section 3/Segment 6	Test Segment 5	Fill 22.51 (Section 3) Empty 25.62 (Section 3)	370,030
TL-492 EXT3 Pipeline			
Segment 1	West Fork of Fish Creek	Fill 0.00 Empty 5.65 (push ahead)	662,186
Segment 2	Test Segment 1 (push ahead)	Fill 5.65 Empty 10.77	595,101
TL-453 EXT1 Pipeline a/			
Segment 1		MP0.0 to MP0.7	8,800
Segment 2		MP6.0 to MP6.1	5,500
Segment 3		MP6.6 to MP6.67	10,600
Segment 4		MP11.5 to MP11.6	3,500
Segment 5		MP0.0 to MP11.5	1,365,000
TL-536 Pipeline			
	Genesee River	Fill 0.0 Empty 9.49	792,000
PL-1 Retest			
	Off-Site	MP 0.0 to MP 0.4	75,000
PL-1 Replacement			
	Off-Site	MP 0.0 to MP 0.6	120,000
Leidy M&R Station			
	Local Municipal Water Supply	NA	30,000
Wolf Run Compressor Station Expansion			
	Right Fork of Freemans Creek, WV	NA	30,000

a/ Water sources would be the Middle Branch Genesee River at MP2.26 and the Genesee River at MP4.29. The water would be withdrawn and trucked to the five test segments listed for TL-453 EXT1.

Cove Point LNG Terminal

A total of 25,700,000 gallons of water would be required for the hydrostatic testing of the new LNG storage tanks. The source of this water would be two on-site ponds which have been used previously for tank hydrotesting. The estimated capacity of the ponds is 50,289,000 gallons. Dominion would follow the same mitigation measures and permit requirements as were required for a hydrotest conducted in 2004. Dominion would implement the following mitigation measures to prevent or minimize impacts associated with the proposed hydrotest:

- place intake pipes/pumps in the deepest water possible and withdraw water from the near-surface;
- fit intake pipes with screens and/or filters;
- use proper number of pumps/intake pipes for water withdrawal;
- install temporary erosion and sedimentation controls, such as silt fences and/or hay bales;
- store gasoline and diesel in appropriate, labeled containers;
- install spill guards around gasoline and diesel containers;
- store appropriate gasoline and diesel spill containment and clean-up materials near gasoline and diesel storage containers;
- revegetated bare soils with native grasses after the Project is complete;
- install sand filters to ensure that sediments and rust particles from the tank are not discharged back into the waterbodies;
- monitor dissolved oxygen levels of the waterbodies during all phases of the hydrotest and aerate the water, if necessary;
- use a spray system to discharge the water back into the ponds; and
- minimize activity in vegetated areas.

Because Dominion would adhere to the permit requirements stipulated in the previous permit using water from the same surface waterbody, we believe that any impacts would be minimal.

TL-532 Pipeline

Dominion proposes to test the TL-532 Pipeline in two sections: from the Cove Point LNG Terminal to the Patuxent River, and from the Patuxent River to the Marshall Hall Gate Site. The Patuxent River is the proposed source for the test water.

Dominion would also individually test each HDD crossing segment with water withdrawn from the waterbody proposed to be crossed. A total of six tests are proposed. Dominion would consult with all appropriate state agencies for withdrawal and discharge of hydrostatic test water from the waterbodies proposed to be crossed. Dominion has stated that it would haul water to the proposed test sites if water levels are deemed low at the proposed test time, pending regulatory approval. We have recommended a timing restriction on the withdrawal of hydrostatic test water from the Patuxent River and Hunting Creek at the request of NOAA Fisheries (see section 4.6.1.2).

PL-1 EXT2 Pipeline

Dominion proposes to test the PL-1 EXT2 Pipeline in three sections consisting of either six or nine segments. The Juniata River, Kishacoquillas Creek, Bald Eagle Creek, and the West Branch Susquehanna River are the proposed sources for the test water, and discharged water from some segments would be used as source water for other segments. Taking into account the potential reuse of some of the water, the approximate maximum estimated volumes that could be withdrawn are: Juniata River 1.6 million gallons; Kishacoquillas Creek 1.4 million gallons; Bald Eagle Creek 1.9 million gallons; and West Branch Susquehanna River 1.7 million gallons.

TL-492 EXT3 Pipeline

Dominion proposes to test the TL-492 EXT3 Pipeline in two segments. The West Fork of Fish Creek is the proposed source for the test water, and discharged water from segment 1 would be used as source water for segment 2. Testing for the TL-492 EXT3 Pipeline would require approximately 662,000 gallons.

TL-453 EXT1 Pipeline

Dominion proposes to test the TL-453 EXT1 Pipeline in five segments. The Middle Branch Genesee River and the Genesee River are the proposed sources for the test water, which would be trucked to the test sites. Testing of the TL-453 EXT1 Pipeline would require approximately 1.4 million gallons.

TL-536 Pipeline

Dominion proposes to test the TL-536 Pipeline in one segment. The Genesee River is the proposed source for the test water. Testing of the TL-536 Pipeline would require approximately 792,000 gallons.

Conclusion on Hydrostatic Testing

Based on our review of Dominion's proposal plans for hydrostatic testing, we believe that implementation of the measures described above, including our recommended mitigation measures, would adequately reduce impacts on water resources.

4.4 VEGETATION

4.4.1 Existing Environment

Vegetation types that would be affected by the Cove Point Expansion Project include forest, agriculture, open land, wetlands, and disturbed/industrial land (see table 4.4.1-1). The Project would be within the eastern transitional and mixed deciduous forests and would cross two forest cover types: oak-hickory and maple-beech-birch (Kingsley, 1985; Sutton, *et al*., 1986). Much of the project area has been or is actively managed for agriculture.

The oak-hickory cover type is composed of tree species that are well adapted to warm, drier, mixed deciduous forests (Spur *et al*., 1973, Sutton *et al*., 1986). White, black, and Northern red oak and hickories including shagbark, mockernut, and bitternut are the dominant canopy species. Yellow poplar and black walnut are also commonly associated with this forest cover type. Tick trefoil, snakeroot, and clovers may form the herbaceous layer.

The maple-beech-birch forest cover type is common in moist, cool, temperate forests. This forest cover type is dominated by sugar maple, American beech, and yellow birch (Spur *et al*., 1973). Other canopy species include red maple, eastern hemlock, and white pine. The understory may include black cherry, white ash, striped maple, hemlock, and pine, and the herbaceous layer may include wild sarsaparilla, starflower, wood lily, and Canada mayflower.

Agricultural land, open fields, and disturbed industrial land occurs within each of the forest cover types described above. Agricultural lands include intensive and rotational crop land, hayfields,

range land, and pastures and are typically vegetated by annually planted and harvested corn, soybean, oats, hay, wheat, and alfalfa. Open fields are typically vegetated with grasses, forbs, and shrub species including goldenrod, bush clover, black locust, and Allegheny blackberry. Disturbed industrial land may be vegetated with maintained grasses or in some cases fallow fields.

TABLE 4.4.1-1

Vegetation Types Affected by the Cove Point Expansion Project a/

Facility	Forest b/ (acres)	Range Land and Scrub Land b/ (acres)	Agricultural and Open Land b/ (acres)	Disturbed/ Industrial Land (acres)
Cove Point LNG Terminal Expansion	18.0	0	0	30.7
TL-532 Pipeline	159.8	0.6	279.2	5.2
PL-1 EXT2 Pipeline	345.9	12.0	464.2	14.7
TL-492 EXT3 Pipeline	46.3	0	49.4	1.2
TL-453 EXT1 Pipeline	65.4	8.5	41.3	1.6
TL-536 Pipeline	25.5	0	59.8	0.3
Perulack Compressor Station	18.7	0	6.8	0
Centre Relay Compressor Station	0	0	55.6	0
Leidy Measuring and Regulating Station Upgrade	0	0	0	10.2
Wolf Run Compressor Station Expansion	0	0	0	20.8
PL-1 Pressure Restoration Sites	1.0	0	7.8	0
Total	**680.6**	**21.1**	**964.1**	**182.9**

a/ Includes area affected during construction. Does not include residential lands and open water.
b/ Values for forest, range/scrub land, and agricultural and open land includes affected wetland acreage.

Wetlands include freshwater palustrine wetlands, including forested wetlands (PFO), scrub-shrub wetlands (PSS), and emergent marshes and wet meadows (PEM). In addition to vegetated wetlands, several palustrine open water (POW) habitats and an intertidal emergent marsh (E2EM) occur in the project area. Palustrine wetland systems include all nontidal wetlands that are dominated by trees, shrubs, emergent herbaceous plants, and emergent mosses or lichens while estuarine systems include deepwater habitats and adjacent tidal wetlands (Cowardin *et al*., 1979). See section 4.5 of this EIS for further discussion on wetlands.

The Cove Point Expansion Project would affect a total of about 680.6 acres of forest (37 percent of the total Project), including palustrine forested wetlands or forested wetlands mixed with other wetland cover types. About 87 percent of the pipeline route for each of the pipeline facilities would be adjacent to existing rights-of-way, and most forested areas would be crossed adjacent to existing rights-of-way. Other vegetative cover types include agricultural land and open land (964.1 acres, 52 percent), range and scrub land (21.1 acres, 1 percent), and disturbed industrial land (182.9 acres, 10 percent).

The TL-532 Pipeline would cross portions of the Chesapeake Bay Critical Area in Calvert County between S1MPs 3.5 and 5.9 (St. Leonard Creek); S1MPs 19.1 and 19.8 (Huntington Creek); and in Calvert and Prince George's Counties between S1MPs 21.7 and 22.9 (Patuxent River). The Chesapeake Bay Critical Area is part of the Chesapeake Bay Critical Area Protection Program which mandates the establishment, preservation, and maintenance of a

100-foot, naturally vegetated, forested buffer landward from the mean high water line of tidal waters or from the edge of tidal wetlands and tributary streams (Critical Area Commission, 2005). The Calvert County Critical Area Program requires the County to maintain 100 percent of existing forest cover within 1,000 feet of tidal waters (Calvert County, 2005). In Prince George's County, the Chesapeake Bay Critical Area includes the Patuxent, Potomac, and Anacostia Rivers, and land and waters within 1,000 feet of the mean high tide line (Prince George's County, 2005).

The PL-1 EXT2 Pipeline would cross four Pennsylvania State Forests: Tuscarora State Forest (S1MPs 5.7 to 10.5), Rothrock State Forest (S1MPs 22.7 to 26.8 and S2MPs 0.0 to 1.5), Bald Eagle State Forest (S2MPs 11.6 to 12.1), and Sproul State Forest (S2MPs 24.7 to 28.6 and S3MPs 2.3 to 24.9).

The Tuscarora State Forest is 91,165 acres in size and located in six counties. The original forest was vegetated with hemlock, American chestnut, and oak and was heavily lumbered during the early 1900s. Four natural and wild areas are within the Tuscarora State Forest; however, none of these natural and wild areas would be crossed by the PL-1 EXT2 Pipeline.

Rothrock State Forest consists of 35,000 acres of land in Huntingdon County. During the early 1900s, much of this forest was nearly stripped bare of trees to provide wood for iron furnaces located in the area. Forest fires further altered this area during the mid-1950s, and in 1955 timber management was practiced as large stands of nearly pure oak and hickory grew large enough to be harvested for lumber (PADCNR, 2005b). The Detweiler Run Natural Area (crossed between S2MPs 0.8 and 1.7) and Thickhead Natural Area (crossed between S2MPs 1.7 and 3.0) occur within the Rothrock State Forest. The PL-1 EXT2 Pipeline would cross these areas adjacent to an existing Texas Eastern pipeline right-of-way.

The Bald Eagle State Forest is a 5,900-acre area that lies in the Bald Eagle Valley of north central Pennsylvania. It is vegetated with forests and old field habitats that are undergoing natural succession where grasses are giving way to goldenrod and asters, and gray dogwood and sumacs are being dominated by pines and maples. A mature oak and hickory forest covers Bald Eagle Mountain. Seven natural and wild areas exist within the Bald Eagle State Forest (PADCNR, 2005c); however, none of these areas would be crossed by the PL-1 EXT2 Pipeline.

The Sproul State Forest is a 280,000-acre tract of state forestland that contains some of the most rugged and remote forestland in Pennsylvania. Two hiking trail systems are located within this forest: the Chuck Keiper Trail, a 50-mile double looped system that crosses the Burns Run Wild Area, Fish Dam Run Wild Area, East Branch Swamp Natural Area, and Cranberry Swamp Natural Area; and the Donut Hole Trail, an approximate 90-mile trail that connects with the Susquehannock Trail System. About 12,000 acres of mature second-growth forest has been proposed for management as old-growth within Sproul State Forest. This area is located along southwest-northeast tract of land perpendicular to the Bucktail State Park Natural Area, centered near the hamlet of Keating (about 2 miles west of the PL-1 EXT2 Pipeline near S3MP13.0). The proposed old growth area includes the Burns Run and Fish Dam Run Wild Areas (PADCNR, 2005d). The PL-1 EXT2 Pipeline would be immediately adjacent to the Fish Dam Run Wild Area for about 1 mile between S3MPs 12.5 and 13.5, where the proposed pipeline would be adjacent to the west side of an existing Texas Eastern pipeline right-of-way that forms the western boundary of the wild area.

4.4.2 Environmental Consequences

The primary impact on vegetation resulting from the construction and operation of the proposed facilities would be the temporary and permanent alteration of vegetative cover at the proposed aboveground facility sites and on the pipeline rights-of-way. Dominion has located its proposed expansion facilities at the LNG terminal, and routed its pipeline facilities where practicable, to avoid forested areas or has followed existing forest edges to minimize the acreage of forestland affected. As proposed, construction at the proposed expansion facilities at the Cove Point LNG Terminal would result in the clearing of about 18 acres of forest, while the remaining facilities would result in clearing of about 663 acres of forest.

The right-of-way revegetation rate would depend on several factors, including local climate, soil type, vegetation maintenance practices, land use, and the existing and seeded vegetation. The amount of time required for complete recovery of vegetation to predisturbance levels would depend on these factors as well as the size and age of pre-existing vegetation when cleared. The relative impact of clearing would be greatest in forested areas because the removal of this vegetation would result in the greatest change in the structure and environment of the plant community. Moreover, the effect of clearing would be of longer duration in forested areas than in other areas (*e.g.*, cropland, pasture, etc.) and, in the case of the maintained (operational) right-of-way, would be permanent. On temporary work areas where forest regeneration would be allowed, the re-establishment of forest to preconstruction conditions would probably take between 25 and 150 years. In contrast, the re-establishment of rotated croplands and pasture following construction would probably take one to five years.

Conversion of woodland to an herbaceous cover would be a long-term effect of construction. Where its proposed pipelines would cross upland woodlands, Dominion would maintain the entire permanent right-of-way in a grassy condition. Of the 680 acres of forest that would be cleared during construction of the pipelines and aboveground facilities, about 460 acres would be maintained in herbaceous cover following construction, and the remaining 220 acres would be allowed to revegetate to forest. Forested wetlands within the maintained permanent right-of-way would be converted to emergent or scrub/shrub wetlands. There would be minimal change in agricultural and open land areas since these areas would be maintained in vegetative cover similar to that found before construction.

Vegetation removal would result in alteration to the vegetation structure, especially in forested habitats. Following installation of the LNG facilities and pipelines and recontouring of the right-of-way, Dominion would reseed all disturbed areas in accordance with our Plan and county specific ESC Plan, except agricultural and residential areas where landowners specify otherwise. Revegetation of the temporary right-of-way and extra work areas would occur at varying rates depending on site-specific conditions such as the amount of disruption of the soil and species composition of adjacent habitats. Wooded habitats would take much longer to regrow to pre-construction conditions than herbaceous habitats. Species composition of the right-of-way after construction and restoration would be different from pre-construction composition, although given sufficient time, species composition likely would resemble pre-construction conditions.

Species composition of adjacent habitats, particularly along the edges of the right-of-way, could be altered by changes in abiotic conditions such as sunlight and wind levels. Increased light would favor growth of shade intolerant species that typically do not inhabit the forest interior.

Higher wind levels could lead to increased windthrow in adjacent forested areas, especially forested wetlands.

We received comments during the scoping process regarding the potential spread of noxious or invasive plants as a result of construction activities. Noxious weeds and other invasive plants are non-native, native, and introduced species that often invade and persist in areas after disturbance and outcompete native species. These weeds can cause a decrease in species diversity and interfere with agricultural production. Non-native species were not identified in the pipeline areas during the field survey effort; however, should such species be identified during construction or operation of the facilities, Dominion would coordinate with the appropriate state agencies to determine appropriate mitigating measures to avoid the spread of noxious weeds.

4.4.3 Site-Specific Impact

We received comments during the scoping process regarding potential impact of the Project on submerged aquatic vegetation within Chesapeake Bay. The proposed Project would include no marine dredging, shoreline construction, or other construction activity that would directly affect the Chesapeake Bay shoreline, open water, or bottom habitats. Therefore, the Project would not directly affect submerged aquatic vegetation. The Project would include an increase in the number of ships calling on the Cove Point Terminal. The additional LNG tankers would traverse the Chesapeake Bay within an established deep water shipping channel, dock, and offload LNG cargo in the same manner as existing LNG ship traffic that currently calls on the Cove Point Terminal. The additional LNG ship traffic would not adversely affect submerged aquatic vegetation.

The TL-532 Pipeline would cross portions of the Chesapeake Bay Critical Area in Calvert County between S1MPs 3.5 and 5.9 (St. Leonard Creek); S1MPs 19.1 and 19.8 (Hunting Creek); and in Calvert and Prince George's Counties between S1MPs 21.7 and 22.9 (Patuxent River). To minimize impacts to vegetation within the 100-foot-wide Critical Area Buffer, Dominion would include these areas in the proposed HDD crossings of the adjacent waterbodies. No construction, clearing, or maintenance activities would occur in the Critical Area Buffer. Dominion would also avoid clearing in the 100-foot-wide buffer afforded to Zekiah Swamp and Jordan Swamp, wetlands of Special State Concern (see section 4.5). Dominion would install the appropriate pipeline markers within the buffers, as required by DOT regulations, but disturbance from this activity would be minimal and insignificant.

While Dominion's HDD construction plans would avoid direct impacts within the 100-foot-wide Critical Area Buffers, Dominion does propose to clear and maintain rights-of-way above HDD paths in areas beyond the buffer and adjacent to nontidal waterbodies (Mattawoman Creek). Dominion's proposed construction right-of-way above HDD paths would vary from 50-feet to 25-feet-wide in uplands and 30-feet to 10-feet-wide in wetlands, depending on whether the pipeline parallels an existing right-of-way. We recognize Dominion's intentions to minimize impacts to vegetation through use of HDDs and reduced right-of-way widths. However, we believe impacts could be further minimized.

In our analysis of Dominion's Northeast Storage Project (Docket No. CP04-364-000), we noted that surface disturbance along HDD paths is typically limited to minor hand clearing required for the temporary deployment of telemetry cables. We recommended that Dominion avoid

vegetation removal above HDD paths to the maximum extent practicable. Our recommendation was based on our experience with HDD pipeline installation, our belief that the depth of the pipeline would limit the utility of corrosion/leak surveys, and that standard industry practices, such as pipeline markers, aerial patrols, and smart pigging operations could effectively identify the location of the pipeline, deter encroachment, and facilitate inspections. In response, Dominion agreed to use hand tools only to clear brush and saplings from above the path of the HDDs during construction. Any other clearing in these areas would require written approval by the Director of the OEP. We recognize that Dominion may make subsequent requests for clearing above HDD paths on a site-specific basis; however, to minimize impacts to vegetation within the Critical Area Boundary, **we recommend that:**

- **Dominion should limit vegetation removal above HDD paths to the maximum extent practicable, except for clearing of brush and saplings using hand tools to facilitate the use of HDD tracking systems and installation of pipeline markers. No vegetation should be removed with power tools or construction equipment without <u>prior written approval</u> by the Director of OEP.**

In addition, **we recommend that**:

- **Dominion should consult with the Chesapeake Bay Critical Area Commission regarding any additional mitigation measures to be implemented during the construction and operation of the TL-532 Pipeline across St. Leonard Creek, Hunting Creek, and the Patuxent River. Dominion should file copies of correspondence and any resulting mitigation plan with the Secretary for review and written approval by the Director of OEP <u>prior to construction</u>.**

Dominion indicated that it would prepare a Forest Conservation Plan for each construction segment (*i.e.*, Cove Point LNG Terminal and TL-532 Pipeline) within this area and that it would submit its plan to the MDNR for review and approval as part of project permitting. The Critical Area Commission for the Chesapeake and Atlantic Coastal Bays (Chesapeake Commission) has developed criteria that are used by local jurisdictions to develop individual critical area programs and amend local comprehensive plans, zoning ordinances, and subdivision regulations. The Chesapeake Commission has also developed guidance for forest mitigation that includes forest clearing criteria within critical areas, replacement ratios, and native species lists.

The PL-1 EXT2 Pipeline would cross four state forests: Tuscarora State Forest (S1MPs 5.7 to 10.5), Rothrock State Forest (S1MPs 22.7 to 26.8 and S2MPs 0.0 to 1.5), Bald Eagle State Forest (S2MPs 11.6 to 12.1), and Sproul State Forest (S3MPs 2.3 to 24.9). No known sensitive areas within these state forests would be affected. Dominion indicated that it would continue its consultation with the PADCNR with regard to potential impacts on these state forests. **We recommend that:**

- **Before construction, Dominion should complete consultations with the PADCNR to determine if any unique natural communities or other sensitive areas would be crossed by its pipeline facilities. Dominion should file with the Secretary, <u>before construction</u>, mitigation plans developed through these consultations. The mitigation plans should include all correspondence, telephone logs, and locations of each area by milepost, crossing length, acreage of vegetative community affected, and any proposed mitigation.**

4.5 WETLANDS

4.5.1 Existing Environment

The proposed Cove Point Expansion Project would affect both freshwater and coastal wetlands. The Corps defines wetlands as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Dominion identified wetlands within the project area by field delineations conducted in 2004 and 2005. Additional delineations and report amendments would be completed as necessary to address areas where survey access has not been obtained prior to the initiation of construction. Delineations followed the 1987 Corps Wetland Delineation Manual (Corps, 1987). Wetland types were classified using the FWS classification system (Cowardin *et al*., 1979), and associated National Wetland Inventory (NWI) maps. The wetland delineation reports are accessible as part of the Cove Point Expansion Project public files in Docket No. CP05-130-000, using the e-library link on the FERC's Internet website.

Table G-1 in appendix G lists each wetland that would be crossed by the Project, as identified during field delineations, along with facility location, milepost, FWS classification, length of crossing, and approximate area affected by construction. The wetland types present in the project area include palustrine (freshwater) and estuarine (coastal) wetlands described below.

Maryland

No wetlands would be affected by the proposed expansion facilities at the Cove Point LNG Terminal. Wetlands that would be crossed by the TL-532 Pipeline in Maryland include palustrine emergent, scrub-shrub and forested wetlands, and estuarine emergent marsh and unconsolidated bottom.

Representative vegetative communities identified within palustrine emergent wetlands that would be crossed by the TL-532 Pipeline include broad-leaved cattail (*Typha latifolia*), deer-tongue (*Dichanthelium clandestinum*), spotted Joe pye-weed (*Eupatoiadelphus maculates*), spotted jewelweed (*Impatiens capensis*), green bulrush (*Scirpus atrovirens*), sedges (*Carex* spp.), soft rush (*Juncus effusus*), and smartweed (*Polygonum* spp.). Typical shrub-shrub wetlands crossed by the pipeline consist of willow oak (*Quercus phellos*), Hercules club (*Arailia spinosa*) black willow (*Salix nigra*), sweetgum (*Liquidambar styraciflua*) and blueberry (*Vaccinium* sp.).

Forested wetlands crossed by the Project are typically dominated by red maple (*Acer rubrum*), sweetgum, and sycamore (*Plantanus occidentalis*). Musclewood (*Carpinus caroliniana*), spicebush (*Lindera benzoin*), pepperbush (*Clethra alnifolia*), common greenbrier (*Smilax rotundifolia*), poison ivy (*Toxicondendron radicans*), sensitive fern (*Onoclea sensibilis*), and Jack-in-the-Pulpit (*Arisaema triphyllum*) characterize the typical understory species within the forested wetlands.

Plant species composition within estuarine emergent wetlands crossed by the TL-532 Pipeline consist of common reed (*Phragmites communis*), broadleaf arrowhead (*Sagittaria latifolia*), and common marshmallow (*Althata officinalis*), as well as other species typically found in palustrine emergent wetlands. Areas classified as unconsolidated bottom support similar species as those

identified in estuarine emergent wetlands, however in lesser amounts and are primarily characterized by an unvegetated substrate continuously inundated by the tidal fluctuations.

Numerous commenters expressed concern about the proposed crossings of several unique or sensitive wetland communities that would be crossed along the proposed TL-532 Pipeline in Maryland, primarily associated with tidal creeks. The TL-532 Pipeline would cross approximately 0.02 mile of a tidal estuarine wetland between S1MP5.51 and S1MP6.45. The wetland is associated with an unnamed tributary of St. Leonard Creek and is composed of palustrine forested and estuarine intertidal emergent wetlands. The TL-532 Pipeline would also cross approximately 0.1 mile of estuarine intertidal emergent wetlands associated with Hunting Creek between S1MP19.02 and S1MP19.76. Wetlands associated with the Patuxent River include palustrine open water, palustrine emergent, and estuarine subtidal unconsolidated bottom. Approximately 0.01 mile of these wetlands would be crossed by the TL-532 Pipeline between S1MP21.85 and S1MP22.97. The crossings discussed above are proposed to be completed using HDD.

The TL-532 Pipeline would cross about 0.3 mile of wetlands associated with Zekiah Swamp between S2MP6.0 and S2MP6.3 and 0.03 mile of wetlands associated with Jordan Swamp at S2MP7.5. Zekiah Swamp and Jordan Swamp are designated Wetlands of Special State Concern and each is afforded a 100-foot-wide protective buffer by Maryland State regulation.

Pennsylvania and West Virginia

Wetlands in the project areas in Pennsylvania and West Virginia have similar characteristics. Wetlands that would be crossed by the pipeline facilities in Pennsylvania include palustrine emergent, scrub-shrub and forested wetlands. Wetlands that would be affected by construction and operation of the Perulack Compressor Station in Pennsylvania include palustrine emergent and forested wetlands. No wetlands would be affected by the construction of the Centre Relay Compressor Station and Wolf Run Compressor Station Expansion or the Leidy M&R Station Upgrade in Pennsylvania. Wetlands that would be crossed by the TL-492 EXT3 Pipeline in West Virginia include palustrine emergent wetlands.

Representative vegetative communities identified within emergent wetlands that would be crossed by the Project in Pennsylvania and West Virginia include broad-leaved cattail, deer-tongue, spotted Joe pye-weed, spotted jewelweed, New York aster (*Aster novi-belgii*), wool grass (*Scirpus cyperinus*), sedges, soft rush, and smartweed. Typical shrub-shrub wetlands consist of black willow (*Salix nigra*) with an associated herbaceous layer of wool grass, reed canary grass (*Phalaris arundinacea*), broad-leaved cattail, soft rush, slender rush (*Juncus tenuis*), sedges and spotted Joe pye-weed.

Forested wetlands crossed by the Project in Pennsylvania are typically dominated by sycamore, green ash (*Fraxinus pennsylvanica*) and red maple. New York aster, soft rush, sedges and Pennsylvania smartweed (*Polygonum pennsylvanicum*) characterize the typical understory species within the forested wetlands.

4.5.2 Environmental Consequences

4.5.2.1 General Construction and Operational Impact

The primary impact of pipeline construction and right-of-way maintenance activities on wetlands would be the temporary and permanent conversion of wetland vegetation. Construction would also temporarily diminish the recreational and aesthetic value of the wetlands crossed. These effects would be greatest during and immediately following construction. In emergent wetlands, the impact of construction would be relatively brief, since the herbaceous vegetation would regenerate quickly. In forested and scrub-shrub wetlands, the impact would be of longer duration due to the longer regeneration period of these vegetative types. Clearing of wetland vegetation would result in temporary alteration of wetland wildlife habitat.

Other impacts associated with construction of the pipelines could include temporary changes to wetland hydrology and water quality. Compaction and rutting of wetland soils could result from the temporary stockpiling of wetland soils and the movement of heavy machinery. Surface drainage patterns and hydrology could be temporarily altered during construction and the pipeline trench could act as a drainage channel. Increased siltation and turbidity could result from trenching activities. In addition, trenching could penetrate or remove impervious soil layers under the wetland and, consequently, drain perched water tables. This in turn, could result in drier soil conditions that could inhibit the reestablishment of wetland vegetation. Disturbance of wetlands also could affect the wetland's capacity to control erosion and floods.

Construction through wetlands would comply, at a minimum, with nationwide and/or individual Section 404 permit conditions. The Section 404 permitting process is administered by the Corps for all discharges of dredged or fill material or mechanical land clearing and excavation in waters of the U.S., including wetlands, streams, and navigable waters. The Corps has responsibility for determining compliance with all regulatory requirements associated with Section 404 of the CWA. The 404(b)(1) guidelines restrict discharges of dredged or fill material where a less environmentally damaging, practicable alternative exists. When unavoidable wetland impacts are proposed, the Corps will require that all appropriate and practicable actions be taken to avoid or mitigate those impacts. In order for the Corps to determine if appropriate and practicable measures have been taken, Dominion must demonstrate to the Corps that it has avoided wetland impacts through the selection of the least environmentally damaging practicable alternative and has taken appropriate and practicable steps to minimize wetland impacts, including compensatory mitigation for unavoidable impacts (Corps, 1990). As part of the Corps review and permitting process, Dominion may be required to develop a compensatory mitigation plan for this Project. **We recommend that:**

- **Dominion should file with the Secretary any wetland compensatory mitigation plan(s) it may develop in response to the Corps or other agency recommendations, <u>before implementation</u>.**

In addition to the Corps permitting requirements, Dominion would apply for any appropriate state-issued wetland-crossing permits and obtain Section 401 water quality certificates or waivers.

4.5.2.2 Wetland Construction and Mitigation Procedures

To minimize the potential environmental impact of construction on wetlands, the FERC developed our Procedures in cooperation with state and other federal agencies. Dominion has agreed to implement the Procedures during construction and restoration of all of its proposed facilities. The Procedures would include the following measures, among others, to minimize impact on wetlands.

- Hazardous materials, chemicals, fuels, and lubricating oils would not be stored within a wetland or within 100 feet of a wetland boundary.
- Construction equipment operating within the wetland would be limited to that equipment necessary for clearing, excavation, pipe installation, backfilling, and restoration activities.
- Temporary erosion controls would be installed immediately after the initial disturbance of soil and would be inspected and maintained regularly until final stabilization. Erosion controls would be installed across the construction right-of-way on any slopes leading into wetlands and along the edge of the construction right-of-way within wetland boundaries.
- Vegetation would be cut at ground level, leaving existing root systems in place to promote regrowth. Stumps would be removed from the trenchline; stumps may be removed from the working side of the right-of-way if removal is required for safety concerns.
- The uppermost 1 foot of wetland topsoil would be segregated from the underlying subsoil in areas disturbed by trenching, except in areas with standing water or saturated soils, or where no topsoil is evident.
- Disturbed wetlands would be restored according to a project-specific restoration plan developed in consultation with the appropriate land management or state resource agencies. The restoration plan would include measures for re-establishing herbaceous and/or woody species, and controlling the invasive spread of exotic plant species.
- Monitoring the success of wetland revegetation would be conducted annually for the first three years after construction, or until wetland vegetation is considered successful.
- Vegetation maintenance would not be conducted over the full width of the permanent right-of-way in wetlands. Shrubs and trees may be selectively removed within 15 feet of the pipeline that are greater than 15 feet in height.

In addition to the measures from our Procedures, permits issued by other federal or state agencies may include additional or more stringent measures. For example, the Corps may restrict temporary stockpiling of trench spoil within wetlands, specify construction seasons or windows during which work must be completed, and/or require five years of post-construction monitoring.

4.5.2.3 Site Specific Impact

Construction of the Project would affect 81.2 acres of wetlands. Approximately 38.7 acres (48 percent) of the wetlands that would be affected during construction are classified as non-forested wetlands, and approximately 42.5 acres (52 percent) are classified as forested wetland or a mixed wetland type with a forested component. Table 4.5.2.3-1 identifies the general wetland

types and acreage that would be temporarily and permanently affected by construction and operation of the Project.

TABLE 4.5.2.3-1

Wetlands Affected by the Cove Point Expansion Project

Facility	NWI Classification a/	Length of Crossing (feet)	Temporary Construction Impact (ac) b/	Long-term Operational Impact (ac) c/
TL-532 Pipeline	PFO/PEM	9,806	17.21	2.32
	POW/PEM	0	0.02	0.02
	PEM	2,917	3.53	0.79
	PFO/PSS/PEM	42	0.05	0.01
	PFO/E2EM	127	0.22	0.03
	PFO	1,015	1.46	0.21
	PEM/PSS	766	1.12	0.17
	PEM/PFO	4,033	6.32	0.93
	E2EM	0	0.00	0.00
	PFO/PSS	152	0.24	0.03
	POW/PEM/E1UB	110	0.02	0.02
	PEM/PSS/PFO	128	0.26	0.03
	PFO/PSS/POW	53	0.31	0.02
	PFO/PEM/POW	3,036	4.30	0.53
	POW/PFO/PEM	17	0.04	0.01
	PEM/PSS/POW	19	0.03	0.01
	PFO/POW/PSS	142	0.33	0.05
	POW	0	0.01	0.00
	POW/PFO/PSS/PEM	15	0.03	0.01
	PEM/PFO/PSS	787	1.01	0.18
	PSS	38	0.05	0.01
	PFO/PEM/PSS	4,998	2.41	1.11
	PEM/POW	183	0.34	0.04
	Subtotal	**28,384**	**39.31**	**6.53**
PL-1 EXT2 Pipeline	PEM	12,104	16.09	5.15
	PEM/PFO	2,650	3.97	0.55
	PEM/POW/PFO	243	0.06	0.06
	PEM/PSS	0	0.02	0.00
	PSS/PEM	12	0.11	0.01
	PSS	0	0.01	0.00
	PFO	44	0.06	0.04
	PFO/PEM	36	0.06	0.03
	PEM/POW	71	0.10	0.10
	Subtotal	**15,160**	**20.48**	**5.94**
TL-492 EXT3 Pipeline	PEM	1,520	2.41	1.00
	PEM/PFO	37	0.08	0.01
	Subtotal	**1,557**	**2.49**	**1.01**
TL-536 Pipeline	PEM	4,975	6.59	1.29
	PEM/PFO	230	0.47	0.05
	PEM/PFO/POW	1,030	1.67	0.24
	PEM/POW	1,180	2.37	0.30
	Subtotal	**7,415**	**11.10**	**1.88**
TL-453 EXT1 Pipeline	PEM	1,412	2.6	0.90
	PEM/PFO	354	0.46	0.16
	PEM/PFO/POW	270	0.47	0.12
	PEM/PSS	155	0.54	0.32
	PSS/PEM	301	0.50	0.14
	PSS	53	0.12	0.03
	PFO/PEM	19	0.08	0.01
	Subtotal	**2,564**	**4.77**	**1.68**
Perulack Compressor Station	PEM	Not Applicable	1.95	0.25
	PFO	Not Applicable	0.94	0.03
	Subtotal		**2.89**	**0.28**

TABLE 4.5.2.3-1

Wetlands Affected by the Cove Point Expansion Project

Facility	NWI Classification a/	Length of Crossing (feet)	Temporary Construction Impact (ac) b/	Long-term Operational Impact (ac) c/
PL-1 Pressure Restoration Sites	PEM	20	0.03	<0.01
	PEM/PSS	119	0.15	0.03
	Subtotal	**139**	**0.18**	**0.04**
	Project Total	**55,219**	**81.22**	**17.36**

a/ NWI Classification:
PEM = Palustrine Emergent
PSS = Palustrine Scrub-shrub
POF = Palustrine Forested
POW = Open Water
EEM = Estuarine Emergent

b/ Temporary construction impact is based on a 75-foot-wide construction right-of-way. Assumes HDD of those areas listed in table 2.3.2.2-1.

c/ A permanent impact due to pipeline operation would include 30 feet of forested wetland that would be permanently converted either to scrub-shrub or emergent cover types, or 10 feet of scrub-shrub wetland that would be permanently converted to emergent cover type. A permanent impact indicates the amount of forest that would be within new permanent right-of-way and permanently converted to scrub-shrub or emergent cover types. Scrub-shrub and emergent cover types would be allowed to revert to their original conditions. A permanent impact due to other above ground facilities is based on station layouts.

Dominion proposes to use HDD construction techniques to cross some larger waterbodies and sensitive wetlands (St. Leonard Creek, Hunting Creek, Patuxent River, Jordan Swamp, Zekiah Swamp and Mattawoman Creek on the TL-532 Pipeline, and Juniata River and Bald Eagle Creek on the PL-1 EXT2 Pipeline). In total, the proposed HDDs would reduce the length of wetlands crossed by approximately 2,240 feet, and reduce the temporary construction impact and long-term operational impact by 7.6 and 0.8 acres, respectively. In comparison to the 75-foot-wide construction right-of-way that would be cleared through wetlands for conventional construction, Dominion has proposed to clear an area 10-feet-wide where the pipeline would parallel an existing pipeline right-of-way, and an area up to 30-feet-wide where the pipeline would not parallel an existing pipeline right-of-way. We agree that a limited amount of vegetation clearing may be necessary in certain areas to facilitate a successful HDD installation. However, to further minimize impacts to wetlands, we have recommended that Dominion limit right-of-way clearing along HDD paths to the maximum extent practicable, except for clearing of brush and saplings using hand tools (see section 4.4.3).

In addition, wetlands crossed by the TL-532 Pipeline in Maryland that are within the Critical Area Buffer would be protected by locating the start and end points of HDD crossings outside of the buffer area. Critical Area Buffers have been established to protect and improve the quality of the Chesapeake Bay by the MDNR. This area is a 100-foot buffer surrounding the bay and tidal sections of its tributaries. Wetland clearing, construction, or maintenance would not occur in wetlands located within the Critical Area Buffer. All wetland crossings, either HDD or conventional lay, would be completed in compliance with our Procedures and appropriate state and federal wetland and waterbody permits. If possible, wetlands crossing work would take place during the dry period of summer and early fall, avoiding construction in the wetter spring months. At crossings that require blasting, blast rock would be removed and discarded at an approved disposal location. Dominion would use blasting as a last resort for breaking through rocks at wetland crossings as the potential exists for alterations to occur to perched groundwater wetlands.

4.6 FISH AND WILDLIFE

4.6.1 Fisheries Resources

4.6.1.1 Existing Environment

Waterbodies that would be affected by the proposed Cove Point Expansion Project support estuarine saltwater, warmwater, coldwater, and coolwater fisheries. The fishery type of each affected waterbody is listed in table F-2 of appendix F. Representative important fish species known to occur within the proposed project area are listed in table 4.6.1.1-1.

TABLE 4.6.1.1-1

Recreational and Commercially Important Fish Species Known to Occur in the Project Area

State	Fishery Type			
	Coldwater	Warmwater	Estuarine	Anadromous
Maryland	NA	Bluegill	Black Drum	Alewife
		Black Crappie	Blue Crab	American Eel
		Largemouth Bass	Eastern Oyster	American Shad
		Smallmouth Bass	Summer Flounder	Blueback Herring
		Yellow Perch		Channel Catfish
		White Crappie		Atlantic Croaker
				Gizzard Shad
				Hickory Shad
				Atlantic Menhaden
				Striped Bass
				Atlantic Sturgeon
				Weakfish
				White Catfish
				White Perch
Pennsylvania, West Virginia	Brook Trout	Bluegill	NA	American Shad
	Brown Trout	Brown Bullhead		
	Rainbow Trout	Carp		
		Channel Catfish		
		Crappies		
		Largemouth Bass		
		Muskellunge		
		Pumpkin Seed		
		Rock Bass		
		Smallmouth Bass		
		Spotted Bass		
		Striped Bass		
		Striped Bass Hybrid		
		Walleye		
		White Bass		
		Yellow Perch		

Coldwater streams are typically fast moving well-oxygenated, low temperature waterbodies with hard substrates of gravel, cobble, or rock. Streams and rivers that support wild coldwater fish populations year-round are found within the project area in Pennsylvania. Several of the

warmwater streams crossed by the pipelines are stocked with coldwater species (rainbow trout, brown trout, and brook trout) in the spring when water temperatures allow for their survival for put-and-take recreational fisheries. Trout not caught by late spring or early summer when water temperatures rise and dissolved oxygen levels decrease generally do not survive. Streams and rivers located within the project area in Maryland support both wild warmwater and estuarine saltwater fish species. Commercial fisheries targeting striped bass, blue crabs, and oysters occur in the estuarine waters that would be crossed by the TL-532 Pipeline. In addition, various anadromous fish species utilize the rivers and streams within the project area for spawning activities.

Fisheries may be considered significant for a variety of reasons including particular state management practices, heavy recreational use, commercial fishing, or protected habitat. Significant fisheries as determined by the states crossed by the projects are presented in table F-2 of appendix F.

Maryland

Approximately 350 species of fish, including resident and migratory species, are known to occur in the Chesapeake Bay (EPA, 2000). Seventy of these species of fish are known to inhabit the waters near the Cove Point Terminal. Four shellfish with commercial importance also occur in the mid-Chesapeake region: razor clams, soft shell clams, oysters, and blue crabs. Razor clams arc harvested from very shallow areas of coarse sand and are generally used only for bait. Soft clams are a significant fishery in the Chesapeake Bay, with the clam beds being most common on the eastern shore in the extensive sand flats near shore, however some suitable soft clam areas are present along the western shore as well. Oysters were among the most abundant bivalves and the most commercially important fisheries resource in the bay (Richkus *et al*., 1992). However, harvests throughout the bay have been declining for decades for a variety, of reasons leading to a near collapse of the industry in recent years (EPA, 1995). Since the decline of oyster abundance in the bay, blue crab harvests have become the most valuable fishery in the region (Richkus *et al*., 1992). Blue crabs utilize nearly every habitat type in the bay during some stage of their lifecycles. Blue crabs have also been in decline and additional restrictions have been placed on recreational crabbing and may be placed commercial crabbing.

Waterbodies within the existing Cove Point LNG Terminal are part of the West Chesapeake Bay watershed. No marine or estuarine waterbodies are within the project area for the terminal expansion facilities. Waterbodies that would be affected by the expansion facilities include eight small unnamed tributaries. None of these tributaries have been classified as trout stocking streams and they do not support any commercial fisheries.

The TL-532 Pipeline would require 100 crossings of perennial waterbodies. None of the streams support trout reproduction; however, six streams including St. Leonard Creek, Parker Creek, Swanson Creek, the Patuxent River, Mattawoman Creek, and Mill Swamp have been designated by MDNR as Fisheries Resources of Special Concern. In each of these streams, the MDNR has documented spawning activities by anadromous fish species. Waterbodies that would be crossed by the TL-532 Pipeline include both recreational and commercial fresh warmwater and estuarine saltwater fisheries. Commercial fishing along the proposed pipeline route is limited to the estuarine portions of St. Leonard Creek, the Patuxent River, and Hunting Creek. The primary

target species in these areas are striped bass, blue crab, and oysters. Other game fish species known to occur in the proposed project area waterbodies are listed in table 4.6.1.1-1.

Pennsylvania and West Virginia

The proposed pipelines and aboveground facilities in Pennsylvania and West Virginia would involve a total of 182 perennial waterbody crossings. The waterbodies include those crossed by the PL-1 EXT2 Pipeline, TL-492 EXT3 Pipeline, TL-453 EXT1 Pipeline, TL-536 Pipeline, the PL-1 Pressure Restoration Sites, and the Perulack Compressor Station.

PL-1 EXT2 Pipeline

Construction of the PL-1 EXT2 Pipeline would involve 173 perennial waterbody crossings in Pennsylvania. Fisheries in the project area, as designated by the PADEP, include recreational warmwater, coldwater, high-quality coldwater, trout stocked, exceptional value, and wild trout fisheries. The significant species associated with these fisheries are listed in table 4.6.1.1-1.

One hundred and thirteen of the waterbodies that would be crossed by the proposed PL-1 EXT2 Pipeline (including 24 in Juniata County; 19 in Mifflin County; 12 in Huntington County; 29 in Centre County, and 29 in Clinton County) are designated as Fisheries Resources of Special Concern. Each of these waterbodies provide potential habitat for, or are known to support, important recreational warmwater and coldwater species. In addition, six of these streams are listed as having verified trout reproduction by the Pennsylvania Fish and Boat Commission (PFBC). The Juniata River, located near Longfellow, Pennsylvania, is of specific concern because it is both a spawning ground and migratory corridor for the American shad (*Alosa sapidissima)*. As part of the Susquehanna River Anadromous Fish Restoration Program, the PFBC has been releasing larval American shad into the Juniata River. Juvenile shad that have imprinted on the river return as adults to spawn during the species annual spring migration. Dominion proposes to cross the Juniata River by HDD during the months of April, May, and June. American shad could be present in the river at the time of the proposed crossing. NOAA Fisheries has indicated that a pipeline crossing by HDD would not impact American shad, but that hydrostatic test water withdrawal from the Juniata River could potentially affect this species depending on the season.

TL-492 EXT 3 Pipeline

The proposed TL-492 EXT3 Pipeline would cross 23 perennial waterbodies. Fisheries within the proposed project area are limited to recreational warmwater species. Table 4.6.1.1-1 lists the important warmwater species in the project area. None of the waterbodies are stocked by the PFBC with trout or have been listed by the PFBC as trout reproduction streams.

TL-536 Pipeline

The proposed TL-536 Pipeline would involve 6 perennial waterbody crossings. Fisheries in the area include both coldwater and high-quality coldwater species. Table 4.6.1.1-1 lists the important coldwater species in the project area.

TL-453 EXT1 Pipeline

TL-453 EXT1 Pipeline would involve 10 perennial waterbody crossings, four of which have been designated as Fisheries Resources of Special Concern. Recreational fisheries include warm water, coldwater, and high-quality coldwater species (see table 4.6.1.1-1). These waterbodies include the Middle Branch Genesee River which provides habitat for the American brook lamprey (*Lempira appendix)*, as well as stocked trout; an unnamed tributary to the West Branch Genesee River that supports trout; the Genesee River and an unnamed tributary to the River that supports stocked trout; and an unnamed tributary to the West Branch Genesee River that supports stocked trout. The West Branch Genesee River is also known to support natural reproduction of trout.

Due to the presence of the American brook lamprey in the Middle Branch Genesee River, the PFBC has expressed concern over the proposed TL-453 EXT1 crossing. The American brook lamprey relies upon rivers and creeks to provide habitat for spawning and to support their long metamorphic lifecycle. While adults are very mobile, their eggs, fry, and immature juveniles are vulnerable to burial, crushing, and siltation from in-stream construction projects. It has been determined by the PFBC that the Middle Branch Genesee River has the habitat characteristics required to support the spawning activities of the American brook lamprey. As a result, the PFBC has requested that construction be avoided in the river from April 1 to May 31 to avoid any adverse impacts to the species during spawning. Dominion has stated that it will continue to consult with all appropriate state agencies to determine the most appropriate river crossing and mitigation methods necessary to minimize impacts to the American brook lamprey.

PL-1 Pressure Restoration Sites

The PL-1 Pressure Restoration Sites would involve the crossing of 3 perennial waterbodies, none of which are designated as a Fisheries Resource of Special Concern. The waterbodies do support recreational coldwater fisheries.

Perulack and Wolf Run Compressor Stations

The site of the proposed Perulack Compressor Station contains 3 perennial waterbodies, all of which are classified as coldwater fisheries. All of the waterbodies are very small in size and it is unlikely that they would be used for recreational fishing. The site of the Wolf Run Compressor Station Expansion contains 13 intermittent or ephemeral waterbodies, all of which are in a watershed classified as high quality. Most are also classified as coldwater fisheries. No perennial waterbodies would be crossed within the Wolf Run Compressor Station Site.

4.6.1.2 Environmental Consequences

Cove Point LNG Terminal

Construction of the Cove Point Terminal expansion facilities would not directly or indirectly affect the fisheries in Chesapeake Bay. No underwater activities, including dredging, are proposed as part of this Project. Consequently, construction of the expansion facilities would not result in any direct impacts to fisheries or fishery habitat in the bay. Construction activities would impact small unnamed tributaries within the terminal site, but these tributaries include no designated fisheries. Operation of the proposed LNG Terminal expansion facilities would result

in additional LNG tankers docking and unloading LNG cargo at the Cove Point Terminal. The additional LNG tankers would traverse the Chesapeake Bay, dock, and offload LNG cargo in the same manner as existing LNG ship traffic that currently calls on the Cove Point Terminal. Because LNG ships would be fully loaded with LNG when arriving at Cove Point, there would be no ballast water on board, and ships would not discharge ballast water while docked at the terminal. However, the LNG vessels would take on seawater ballast while discharging LNG cargo in order to maintain a constant draft at the berth (see section 4.3.2.2). Aquatic species in the immediate vicinity of the ship berth could be impacted by entrainment during ballast water intake. Ballast water intakes on LNG ships are near the bottom of the ships, therefore entrainment would be limited to organisms in the deeper water column (25-30 feet below the surface) near the bottom of the basin. Ballast water intake by additional ships at the Cove Point LNG Terminal would be similar to ballast water intake by ships that currently call on the terminal, as well as others that unload cargo at other points of call within the Chesapeake Bay, and this impact would not add appreciably to current impacts.

During the review process for the reactivation of the Cove Point LNG Terminal in 2001, Dominion and FERC consulted with NOAA Fisheries regarding EFH, as required by the MSA (see discussion of MSA in section 1.3 of this EIS). NOAA Fisheries identified EFH for multiple species of commercial finfish in the vicinity of terminal. These species include summer flounder, windowpane flounder, bluefish, red drum, black sea bass, Spanish mackerel, and sandbar shark. Additionally, NOAA Fisheries noted that the endangered shortnose sturgeon has been taken by commercial fishing activities in the Chesapeake Bay watershed. The Commission prepared and submitted to NOAA Fisheries an EFH Assessment as part of the EA prepared for the reactivation project (FERC, 2001).

For this expansion proposal, we have reinitiated consultation with NOAA Fisheries for the currently proposed Cove Point Terminal Expansion facilities. NOAA Fisheries indicated that the EFH Assessment prepared for the reactivation project would be adequate for the current expansion Project, but suggested minor revisions. Revisions include the addition of cobia and king mackerel to the list of potential species with EFH in the project area, the deletion of potential occurrence of larval and egg life stages for the listed EFH species, the deletion of black sea bass and sandbar shark from the list of species with EFH in the project area, and the addition of Murdy *et al.* (1997) to the list of references (Nichols, 2005). We incorporate the 2001 EFH assessment into this EIS by reference, with the above revisions as suggested by NOAA Fisheries. Based on our previous analysis, along with our analysis of the additional species identified by NOAA Fisheries, we concur with NOAA Fisheries and find that construction and operation of the proposed Project, with proposed measures and practices described in sections 4.3 and 4.7, would comply with the intent and degree of protection afforded to the species listed above, and their designated EFH under the MSA.

Since the existing facility's original commissioning in 1978, a Regulated Navigation Area (RNA) has been posted in 33 CFR Section 165.502. As a result of the reactivation of the terminal in 2001, the RNA was altered to its current configuration of 500 yards in all directions from the Cove Point LNG terminal structure. Entry into or movement within this safety and security zone is prohibited unless authorized by the Coast Guard.

Pipelines

Impact on fishery resources as a result of construction across or adjacent to waterbodies could include sedimentation and turbidity, acoustic shock, removal of stream cover, introduction of water pollutants, or entrainment of fish. To minimize these potential impacts, Dominion would adhere to the protective measures outlined in our Procedures. In addition to these protective measures, other federal, state, or local agencies through their respective permitting processes, may require Dominion to follow more stringent measures.

Sedimentation and Turbidity

Increased sedimentation and turbidity from construction have the greatest potential to adversely affect fisheries resources. However, impact on fisheries from construction-induced sedimentation and turbidity would be reduced to short-term, temporary disturbances by use of the Procedures. Construction of waterbody crossings would be limited to the low-flow period of June 1 through September 30 for coldwater fisheries and June 1 through November 30 for coolwater and warmwater fisheries, unless otherwise permitted or further restricted by state agencies. Restricting construction to low-flow periods would minimize sedimentation and turbidity induced by high flow. Additionally, in stocked trout streams no construction would take place between March 1 and June 15, and in streams that support wild trout no construction would take place between October 1 and December 31, unless extended by agreement with responsible agencies.

Trench spoil would be stored above the stream banks and would be protected with silt fence, hay bales, or other erosion control devices that would prevent or significantly reduce sediment runoff into a stream. Additionally, all extra work areas would be at least 50 feet from the water's edge, where topographic conditions permit, to reduce loss of riparian vegetation and limit the probability that these additional cleared areas would contribute to sedimentation.

Construction equipment would cross minor (≤ 10 feet wide) and intermediate (10–100 feet wide) waterbodies on equipment bridges to minimize stream disturbance. Most in-stream work would be completed in less than 48 hours at each individual waterbody, where practical. After construction, all waterbody banks would be stabilized with erosion control fabric and seeded with appropriate seed mixes. A riparian strip extending at least 25 feet back from the waterbody's edge would be allowed to permanently revegetate with native woody plant species across all of the right-of-way, except for a narrow strip up to 10 feet wide centered over the pipeline.

During construction of stream crossings, the concentration of suspended solids would be relatively high for short periods and short distances downstream of the crossing. Overall, impact of construction on benthic macro invertebrates and fish would be minimal and short-term. Increased suspended sediment concentration levels during construction could increase invertebrate drift and reduce fish feeding for brief periods. However, impact would be temporary, and suspended sediment concentrations would return to background levels soon after construction in the waterbody is completed.

Turbidity resulting from suspension of sediments during in-stream construction or erosion of cleared right-of-way areas could reduce light penetration, possibly reducing photosynthetic

oxygen production. Additionally, resuspension of organic and inorganic materials can cause an increase in biological and chemical uptake of oxygen, resulting in a decrease in dissolved oxygen. Ponds, lakes, reservoirs, and slow-moving streams that have thick organic sediment deposits often experience a decrease in oxygen at the sediment-water interface, particularly during the summer months when bacterial respiration is high and chemical oxidation is greatest (Wetzel, 1983). Resuspension of this type of sediment could result in localized depletion of oxygen throughout the water column, which could temporarily displace fish from the affected area.

The PL-1 EXT2 Pipeline would cross the Juniata River which contains habitat for the American shad, a species with designated EFH under the MSA. Dominion proposes to cross the Juniata River by HDD. NOAA Fisheries has indicated that a pipeline crossing of the Juniata River by HDD would not affect American shad, therefore, the Juniata River crossing as proposed would not affect this species. However, because there is a chance that an HDD attempt would not be successful, **we recommend that**:

- **In the event that Dominion cannot complete an HDD crossing of the Juniata River, Dominion should file a site-specific alternative crossing plan. This plan should be developed in coordination with the NOAA Fisheries, Corps, PADCNR, and PFBC as applicable. The plan should include a description of the mitigation measures Dominion would implement to minimize the extent and duration of construction activity that could affect the American shad and any essential fish habitat. In addition, Dominion should not begin a crossing of the Juniata River <u>until</u>:**

  a. the FERC evaluates the potential impact of a non-HDD crossing of the Juniata River on the American shad;

  b. the FERC, Corps, and NOAA Fisheries determine that the alternate crossing and mitigation plan are acceptable; and

  c. the Director of OEP notifies Dominion in writing that it may proceed with an alternative river crossing.

<u>Cover Loss</u>

Streambank vegetation, in-stream logs, rocks, and undercut banks provide important cover for fish. Some in-stream and stream bank cover would be altered or lost at the stream crossings and fish that normally reside in these areas would be displaced. However, these effects would be relatively minor because of the small area affected at each stream. In addition, our Procedures limit vegetation maintenance on stream banks and allow for long-term revegetation of all shoreline areas with native herbaceous and woody plant species, except for a 10-foot-wide corridor directly over the pipeline.

<u>Other Impacts</u>

Other potential effects of construction include interruption of fish spawning migration, entrainment of fish, and fish mortality from toxic substance (fuel) spills. Entrainment of fish during withdrawal of water for hydrostatic testing would generally be minimal because intakes would be screened. Our Procedures specify that during withdrawal for hydrostatic testing,

adequate flow rates be maintained to protect aquatic life. However, NOAA Fisheries has indicated that hydrostatic test water withdrawal from the Patuxent River and Hunting Creek could impact fish spawning, and requested that withdrawal be prohibited between February 15 and June 15. We concur with NOAA Fisheries, we believe that adherence to this time window would minimize impacts on aquatic species. Therefore, **we recommend that:**

- **Dominion should not withdraw water for hydrostatic testing from the Patuxent River or Hunting Creek between February 15 and June 15 of any year.**

Dominion proposes to use the Juniata River for a hydrostatic test water source for the PL-1 EXT2 Pipeline. As discussed above, the Juniata River is known habitat for American shad, with various life stages potentially occurring in the river during the migratory/spawning season from April through June. In its comments on the Project, NOAA Fisheries noted the potential concern of entrainment of shad eggs and larvae during hydrostatic test water withdrawal from the Juniata River, but stated that adverse impacts to shad could be avoided if water withdrawal were restricted to late summer through winter (NOAA Fisheries, 2005). Therefore, **we recommend that:**

- **Dominion should not withdraw water for hydrostatic testing from the Juniata River between March 15 and July 15 of any year.**

Direct spills into streams could be toxic to fish, depending on the type, quantity, and concentration of the spill. Our Procedures includes measures to reduce the potential of direct surface water contamination, including the requirement to store fuel and other potentially toxic materials at least 100 feet from waterbodies and to attempt to refuel equipment at least 100 feet from waterbodies. If refueling within 100 feet of a waterbody is unavoidable, Dominion would implement precautions outlined in their SPCC Plans.

We believe that with use of Dominion's proposed mitigation, including construction and restoration measures contained in our Procedures, and the use of the additional mitigation recommended in this EIS, impacts to fisheries as a result of construction and operation of the Cove Point Expansion Project would not be substantial.

4.6.2 WILDLIFE RESOURCES

4.6.2.1 Existing Environment

Wildlife species inhabiting the Cove Point Expansion Project area are those characteristic of deciduous and coniferous forests, early successional, wetland, and riparian habitats of the Northeastern U.S.

The LNG terminal site and pipeline facilities would be within two major upland forest habitat types: the oak-hickory and maple-beech-birch (see section 4.4, Vegetation, and section 4.5, Wetlands, for additional description of the vegetative cover types). Forests provide a valuable source of food, cover, and denning and nesting habitat, which are used by a variety of wildlife species that include reptiles such as the garter snake, black rat snake, and the eastern box and wood turtles. Representative mammal species found in forest habitats include the gray squirrel, eastern chipmunk, grey fox, raccoon, and white-tailed deer, and a variety of birds such as the

wood thrush, dark-eyed junco, red-eyed vireo, yellow-rumped warbler, rose-breasted grosbeak, and raptors including the red-shouldered hawk.

Early successional habitat is found at the LNG terminal site and many locations along the proposed pipeline routes and consists of fallow fields, agricultural land, hayfields, and existing utility rights-of-way. These areas are frequently disturbed by tilling, harvesting, and/or mowing practices, and vegetation is kept at an early successional stage (grasses and low growing shrubs). Successional habitats typically provide a source of food and nesting habitat for a variety of smaller wildlife species. Ground nesting birds, such as the eastern meadowlark, and burrowing mammals, such as the meadow vole, white-footed mouse, and short-tailed shrew, also benefit from the cover and food provided in these habitats. Larger wildlife species which prey on these smaller species are also attracted to these areas and include raptors such as the red-tailed hawk, and larger mammals such as the red fox. Other representative large mammal species associated with these habitats include the white-tailed deer and groundhog.

Wetland habitats along the pipeline route include palustrine open water and forested, scrub-shrub, and emergent vegetation communities and intertidal emergent marsh. The increased availability of water in these areas provides a more abundant and diverse habitat for a variety of resident and migratory wildlife species. Many wildlife species from other habitats use wetlands as a water resource; others use wetland habitats exclusively, and many fish, amphibians, aquatic reptiles, and some bird species are dependent on the water resource. Representative wildlife species that are highly dependent on wetlands for water or nesting include the red-spotted newt, bullfrog, box turtle, wood duck, green heron, beaver, and muskrat.

Many of the wildlife species associated with wetlands use riparian corridors for foraging, nesting and breeding, and cover. Numerous wildlife species also use the vegetation and cover provided by riparian corridors for dispersal and migration. The pipelines would cross many riparian systems, from small drainages (5 to 10 feet wide) to major waterbody crossings such as the Patuxent River (TL-532 Pipeline), Juniata River (PL-1-EXT2 Pipeline), Roberts Run (TL-492 Pipeline), Genesee River (TL-453 Pipeline), and Butter Creek (TL-536 Pipeline). Often these riparian systems are associated with wetlands and are an integral, hydrologic component of the wetland system. Representative wildlife species that can be found in these riparian systems include the river otter, various waterfowl, northern water snake, northern leopard frog, and eastern painted turtle.

Portions of the Chesapeake Bay Critical Area would be crossed by the TL-532 Pipeline in Calvert County along St. Leonard Creek (S1MPs 3.5 to 5.9) and Hunting Creek (S1MPs 19.1 to 19.8), and in Calvert and Prince George's Counties along the Patuxent River (S1MPs 21.7 to 22.9). These areas would be crossed by the HDD method. The Chesapeake Bay, and its surrounding watershed, provide ideal habitat for animal species including fish, shellfish, birds, mammals, reptiles, and amphibians (see section 4.6.1 Fishery Resources for a description of fish and shellfish).

The Chesapeake Bay is located along the Atlantic flyway and is used annually by millions of migratory birds (Chesapeake Bay Program, 2005). The shallow waters and wetlands associated with the Bay provide a fertile and diverse environment and is used as a winter residence or stopover area for waterfowl, including dabbling ducks (mallards and black ducks), diving ducks (canvasback, redhead, bufflehead, ruddy duck, and hooded merganser), geese (Canada geese),

and swans (tundra and mute swan). Dominion indicates that along the TL-532 Pipeline, waterfowl concentration and staging areas occur along the St. Leonard Creek and Patuxent River. The woodlands and shorelines of the Bay provide habitat for many other species including ospreys, bald eagles, great blue herons, wood ducks, belted kingfisher, and American oystercatchers. Other bird species that may inhabit the Bay region include aerial gleaners such as gulls, terns, barn swallows, brown pelicans, and cormorants and wading birds such as sandpiper, sanderling, willet, black-bellied plover, ruddy turnstone, dowitcher and glossy ibis (Chesapeake Bay Program, 2005).

The Chesapeake Bay also provides habitat for mammals including white-tailed deer, raccoon, beaver, opossum, skunk, red fox, gray squirrel, muskrat and Eastern cottontail rabbit; reptiles such as snapping turtle, eastern box turtle, eastern painted turtle, northern water snake, copperhead, timber and canebrake rattlesnakes, and cottonmouth; and amphibians including frogs, toads, salamanders, and newts (Chesapeake Bay Program, 2005).

Four State Game Lands would be crossed in Pennsylvania. The PL-1 EXT Pipeline would cross State Game Lands 215 in Juniata County (S1MPs 1.9 to 4.0), State Game Lands 113 in Mifflin County (S1MPs 15.3 to 15.7), and State Game Lands 92 in Centre County (S2MPs 20.6 to 21.3). The TL-492 EXT Pipeline would cross State Game Lands 179 in Greene County between MPs 5.0 and 6.3. State Game Lands are managed by the Pennsylvania Game Commission and include about 300 separate tracts that total about 1.4 million acres. Each State Game Lands has an individual management plan designed to improve wildlife habitat and provide recreational opportunities. State Game Lands 92 is 5,279 acres in size and State Game Lands 113 and 215 are 534 and 1,263 acres, respectively. State Game Lands 179 is 5,325 acres (Pennsylvania Game Commission, 2005).

4.6.2.2 Environmental Consequences

General Construction and Operational Impact

Construction and operation of the Cove Point Expansion Project would result in temporary and permanent alteration of wildlife habitat, as well as direct impact on wildlife such as disturbance, displacement, and mortality. The clearing of the LNG terminal site and right-of-way vegetation would reduce cover, nesting, and foraging habitat for some wildlife. During construction of the proposed facilities, the more mobile species would be temporarily displaced from the construction right-of-way and surrounding areas to similar habitats nearby. Some wildlife displaced by construction would return to the newly disturbed area and adjacent, undisturbed habitats soon after completion of construction. Less mobile species, such as small mammals, reptiles, and amphibians, as well as bird nests located in the proposed right-of-way, could be destroyed by construction activities. Routine maintenance activities at the LNG terminal site and on the permanent right-of-ways would have similar but less extensive effects on wildlife species in the area, depending on the time of year. However, the overall impact on general wildlife would not be substantial because of the short duration of the activities and availability of undisturbed similar habitats adjacent to the LNG terminal site and right-of-ways from which the affected species could return and recolonize the nearby areas.

In forested areas, the principal impact on wildlife of the increased or new right-of-way clearing would be a change in species using the right-of-way from those favoring forest habitats (*e.g.*,

northern flying squirrel, barred owl, downy woodpecker) to those using edge habitats and more open areas (*e.g*., white-tailed deer, American kestrel, white-footed mouse). Many species adapt well to this habitat reversal and take advantage of the increased populations of small mammals that prefer open areas. Predatory species such as the red-tailed hawk, coyote, and gray fox commonly use utility rights-of-way for hunting.

Although the Project may be advantageous for some species, it would create new cleared right-of-ways or widen existing cleared rights-of-way, which may affect some forest interior species, or species that prefer large tracts of unbroken forest. The breeding success of some forest interior bird species (*e.g*., warblers and thrushes) has been shown to be limited by the size of available unbroken forest tracts (Robbins, 1979; Robbins *et al*., 1989). For these species, additional loss of forest habitat in tracts of already marginal size could further reduce breeding success. The cleared rights-of-way may also encourage population expansion of parasitic species, such as the brown-headed cowbird which parasitize songbird species. The potential for this type of impact would be greatest where the pipelines would traverse smaller, isolated woodlots (Galli *et al*., 1976). It may also encourage population expansion of exotic species, such as the English sparrow and European starling, which compete with many native species.

The loss of forest habitat and the creation of open early successional and induced edge habitats in these woodlots could decrease the quality of habitat for forest interior species for distances up to 300 feet from the right-of-way (Anderson *et al*., 1977; Temple, 1986). This may reduce the density and diversity of forest interior species in a corridor much wider than the actual cleared right-of-ways. It is not likely that permanently cleared 50 foot right-of-ways would impede the movement of most forest interior species, although it could reduce the breeding habitat of these species. In addition, the proposed pipeline routes would be within or adjacent to existing cleared rights-of-way for about 87 percent of its total length on land, resulting in minimal impact related to forest fragmentation.

Non-forested habitats that would be affected by construction and operation of the proposed facilities include agricultural areas, non-forested wetlands, open land, and open water. The impact of the proposed Project on these habitats and associated wildlife species would be relatively minor and short-term. The temporary alteration of these areas would not have a substantial or permanent impact on their wildlife habitat values.

Numerous wetlands and riparian systems would be crossed by the pipeline facilities. These areas are important as year long habitats for numerous resident wildlife species and are used seasonally as stopovers for migrating waterfowl along migratory flyway routes. Disturbance to these habitats would be minimized through implementation of our Procedures, and except for the conversion of forested riparian and wetland vegetation to herbaceous vegetation within the right-of-way, there would not be a permanent impact on these habitats.

To minimize the potential impact on migratory bird species that may use the permanent right-of-ways for nesting, Dominion would limit routine vegetation maintenance of the right-of-way to once every three years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in an herbaceous state. In no case would routine vegetation maintenance clearing occur between April 15 and August 1 of any year.

Site-Specific Impact

The clearing of forest for construction and operation of the Cove Point LNG Terminal expansion facilities would impact a total of 18 acres of forest. In addition, the clearing of forest for construction and operation of the various pipelines would result in a change of forested wildlife habitats to herbaceous and shrub cover habitat types. Based on calculations and estimates provided by Dominion, a total of 694 acres of forested habitats would be cleared for the Cove Point Expansion Project (see table 4.8.1.1-1). After construction, the temporary construction right-of-way and extra work areas in previously forested areas (about 271 acres) would be allowed to revegetate naturally and would eventually return to preconstruction conditions. The Project would permanently affect a total of about 423 acres of upland forest, which would be converted from forest habitat and maintained as herbaceous and shrub cover for operation of the LNG terminal and pipelines.

Along the TL-532 Pipeline, Dominion would use a 75-foot-wide construction right-of-way and extra work areas. The TL-532 Pipeline would cross portions of the Chesapeake Bay Critical Area along St. Leonard Creek (S1MPs 3.5 to 5.9), Hunting Creek (S1MPs 19.1 to 19.8), and Patuxent River (S1MPs 21.7 to 22.9). Construction through this area would involve the use of a HDD to install the pipeline. In section 4.4.3 of this EIS, we recommend that Dominion consult with the Chesapeake Bay Critical Area Commission regarding any additional mitigation measures to be implemented during construction and operation of the TL-532 Pipeline across these waterbodies.

Four State Game Lands would be crossed in Pennsylvania. The PL-1 EXT Pipeline would cross State Game Lands 92, 113, and 215 and the TL-492 EXT Pipeline would cross State Game Lands 179. Construction would affect a total of about 40.8 acres of State Game Lands (6.4 acres in State Game Lands 92, 3.6 acres in State Game Lands 113, 19.0 acres in State Game Lands 215, and 11.8 acres in State Game Lands 179). Although extra work areas are often necessary for safe construction on slopes, work areas can often be minimized. To ensure that construction and operation impacts along the PL-1 EXT2 and TL-492 Pipelines are minimized within Pennsylvania State Game Lands with emphasis on restoring revegetation in the areas along the right-of-way, **we recommend that:**

- **Dominion should consult with the Pennsylvania Game Commission to develop construction and restoration plans for those portions of state lands crossed by the PL-1 EXT2 Pipeline and TL-492 Pipeline (State Game Lands 92, 113, 215, and 179). The final plans should be filed with the Secretary <u>before construction</u>.**

4.7 THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

Section 7 of the ESA requires a federal agency to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of a federally listed endangered or threatened species or result in destruction or adverse modification of the designated critical habitat of a federally listed species. The agency is required to consult with the FWS and NOAA Fisheries to determine whether any federally listed or proposed species or any critical or proposed critical habitat may occur in the project area, and to determine the proposed action's potential effects on these species or critical habitats. If the Project would affect a listed species, the agency must report its findings to the FWS and NOAA Fisheries in a BA.

To assist FERC in complying with Section 7 of the ESA, Dominion consulted with the FWS and the NOAA Fisheries regarding the presence of federally listed threatened or endangered species and their critical habitats in the project area. In addition, Dominion consulted with the MDNR, West Virginia DNR, PADCNR, PGC, and PFBC, regarding the presence of state listed threatened or endangered species in the project area. The FERC staff also contacted FWS and NOAA Fisheries for assistance in determining which species under their jurisdiction would have the potential to be affected by the proposed Project.

We have requested that the FWS and NOAA Fisheries consider this draft EIS as our BA for the Project. The draft EIS has been provided to the appropriate FWS and NOAA Fisheries field offices for their review. An assessment of potential effects of the Cove Point Expansion Project on federally listed endangered or threatened species is included below.

4.7.1 Federally Listed or Proposed Threatened and Endangered Species

Based on the consultations described above, four federally listed endangered or threatened species potentially occur within the project area. These include one mammal (Indiana bat), one bird (bald eagle), one reptile (bog turtle), and one plant (northeastern bulrush). Three of these species potentially occur within the vicinity of the PL-1 EXT2 Pipeline (FWS, 2004a) and one (bog turtle) potentially occur within the vicinity of the PL-1 Pressure Restoration Sites (FWS, 2005a).

No federally proposed or listed endangered or threatened species are known to exist in the vicinity of the LNG terminal site (FWS, 2004b), TL-532 Pipeline (FWS, 2004c), TL-492 EXT3 Pipeline (FWS, 2004d), TL-453 EXT1 Pipeline (FWS, 2004e), TL-536 Pipeline (FWS, 2004f) or the Perulack and Centre Relay Compressor Station sites (FWS, 2005b). Although not indicated in FWS correspondence, Dominion indicated that a bald eagle nest site is located along the west side of the Patuxent River which would be crossed by the TL-532 pipeline between S1MPs 21.7 and 22.9. Dominion has consulted with the FWS and is awaiting a response regarding federally listed endangered or threatened species at the Mockingbird, Leesburg, and Chambersburg Compressor Stations and the Leidy M&R Station and PL-1 Pressure Restoration sites.

Indiana Bat (*Myotis Sodalis*)

The major reasons for the decline of the endangered Indiana bat are related to land clearing and associated impacts on its winter hibernacula, roosting, and foraging habitats. The loss of riparian summer habitat due to stream channelization, creation of man-made lakes, and clearing for agriculture and housing development have also brought about its endangered status. The Indiana bat could possibly occur as a resident along the PL-1 EXT2 Pipeline. Indiana bat hibernate in caves and mines during the winter months (November through March) and use upland, wetland, and riparian habitats during the spring, summer, and fall. In the summer, the Indiana bat inhabits small stream corridors with well developed riparian woods, as well as mature upland woods. Female Indiana bat form nursery colonies under exfoliating bark of trees such as shagbark hickory, black birch, red and white oaks, and sugar maples. The loose bark of dead and dying trees is used for roosting and rearing young. Indiana bat forages for insects beneath the tree canopy.

The FWS suggested that Dominion determine the extent of forest habitat removal so it can determine if Indiana bat surveys are necessary (FWS, 2004a). In a subsequent correspondence, the FWS stated that the PL1-EXT2 Pipeline would affect about 345 acres of forest habitat that may result in impacts on the Indiana bat if tree cutting is conducted during April 1 to September 30 when bats may be present (FWS, 2005c). If tree cutting should occur during this period, the FWS suggested that Dominion conduct an Indiana bat survey in accordance with the FWS *Mist Netting Guidelines*.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was federally listed as endangered within most of the U.S. on March 11, 1967. On July 12, 1995, the status of the bald eagle was changed to threatened within the lower 48 states. On July 6, 1999, a proposal to delist the bald eagle was announced, but it has not been delisted yet. The reasons for the decline of the bald eagle population are varied and include effects of organochlorine compounds on reproduction, effects of heavy metals and other toxicants, killing by humans, and general loss of habitat. Most of these threats continue to adversely affect bald eagle populations today, although organochlorine pesticides have been banned for use within the U.S., and indiscriminate killing of bald eagles is a federal crime.

The life history of the bald eagle is well documented. Bald eagles nest in mature trees along oceans, lakes, rivers, and swamps. They generally prefer to nest in white pine, sycamore, red oak, or red maple trees. Bald eagle pairs exhibit a high degree of fidelity to nesting sites, often returning to the same nest year after year. Nesting generally occurs in April, and fledging of the young generally follows in mid-to-late summer. Bald eagles feed primarily on fish. However, bald eagles will also take small mammals and birds, and feed opportunistically on carrion. Perching locations are generally located along the waterbodies where feeding activity takes place. Roosting locations are often found in the general vicinity of nesting locations. Bald eagles follow typical north-south seasonal migration patterns and winter in suitable habitats, mainly along wide rivers, from southern Canada southward.

In Maryland, Dominion indicates that a bald eagle nest is located along the west side of the Patuxent River, in close proximity to the TL-532 Pipeline. Dominion has consulted with MDNR and stated that it would conduct an aerial survey during spring 2005 to determine if other nest sites occur in the project vicinity.

In Pennsylvania, the bald eagle population has increased from three nest sites (found in 1963) to 67 nests sites (found in 2002). Since bald eagles continue to recover and expand their breeding range in Pennsylvania, new nest sites could be found in previously undocumented locations. As a result, the FWS suggested that Dominion conduct a mid-winter, aerial survey and that this survey should be conducted by a qualified biologist to determine whether or not any bald eagles occur within 1,320 feet of the proposed pipeline. The FWS also indicated that the search should also focus on forested areas located within two miles of lakes, reservoirs, rivers, and large wetland areas.

Bog Turtle (*Clemmys muhlenbergii*)

The bog turtle was listed as a federally threatened species on November 4, 1997. The primary reason for the listing of this species is its limited distribution due to its restrictive habitat

requirements and destruction of suitable habitat. The main threats to the species are habitat modification and destruction, and over-collecting for the pet trade. The bog turtle is also listed as a state-endangered species in Pennsylvania.

The bog turtle is a small, secretive turtle that spends much of its life in hibernation, hidden in cool, soft muck that provides cover and aids in thermoregulation during hot summer days. They emerge from subterranean hibernacula in the spring and spend much of spring and early summer basking on hummocks, matted vegetation, or in open mucky pools and rivulets.

Bog turtles are rarely found far from wetlands and appear to require fairly specific habitat characteristics. They inhabit fens, bogs, and wet meadows that are characterized by substrates of mucky, organic soil that is kept saturated by groundwater discharge. Plant communities associated with bog turtle habitats vary in species composition but are almost always dominated by low-growing grasses, sedges, rushes, mosses, ferns, scattered cattails, and ephemeral and perennial forbs. Shrub and tree cover in bog turtle habitats is very low, and physical features of habitats include spring-derived rivulets, shallow, mucky pools, and abundant hummocks in the form of tussock-forming sedges or raised mounds of moss.

Bog turtles generally feed upon insects, larvae of aquatic insects, snails, nematodes, millipedes, seeds, and carrion. Mating takes place during the spring, either within the hibernaculum or shortly after turtles emerge from hibernation. Eggs are laid within the wetland, but out of the water, and the young may overwinter near the nest. Adults return to the hibernaculum during autumn.

The FWS suggested that Dominion conduct surveys for the bog turtle in all suitable wetlands within 300 feet of the PL-1 Pressure Restoration Sites in Pennsylvania. On April 26, 2005, Dominion conducted a bog turtle survey and determined that no suitable bog turtle habitat occurs along the PL-1 Pressure Restoration Sites and that bog turtles are not expected to occur within the project area. Since the survey results indicate that suitable bog turtle habitat does <u>not</u> occur along the PL-1 Pressure Restoration Sites in Pennsylvania, we believe that construction and operation of this facility is not likely to adversely affect the bog turtle.

Northeastern Bulrush (*Scirpus ancistrochaetus*)

The endangered northeastern bulrush could occur in the vicinity of the PL-1 EXT2 Pipeline (FWS, 2004a). This plant species is found in ponds, wet depressions, shallow sinkholes, vernal pools, and small or beaver-influenced wetlands, usually one acre or less, where the water level is high in the spring and drops through the summer. Its endangered status is due to the loss of this habitat by impoundments and draining for development. The FWS suggested that Dominion conduct surveys for the northeastern bulrush in all suitable wetlands along the PL-1 EXT2 Pipeline, and that this survey should be conducted by a qualified botanist with field experience in the identification of northeastern bulrush and between June 1 and September 30.

4.7.2 Conclusions and Recommendations, Federally Listed Species

Dominion completed habitat surveys for the bog turtle in wetlands within 300 feet of the proposed PL-1 Pressure Restoration sites in Pennsylvania. No suitable habitat was identified, therefore we believe the construction and operation of this facility is not likely to adversely affect the bog turtle.

The FWS identified three other species (Indiana bat, bald eagle and the northeastern bulrush) which may occur in the project area. We are aware that Dominion has conducted habitat surveys for these species, but has not yet provided us with the results. However, in this draft EIS and BA, we can recommend that Dominion not construct the project components (PL-1 EXT2 and the TL-532 Pipelines) until the information is assessed by the FERC staff and the appropriate FWS offices. If the results indicate the federally listed species may occur along these two project components, formal consultation may be required. Therefore, to ensure that these species are not adversely affected by construction and operation of the Project, **we recommend that**:

- **Dominion should file the results of its Indiana bat surveys along the PL-1 EXT2 Pipeline with the Secretary. Dominion should also indicate whether or not it plans to follow the April 1 to September 30 seasonal restriction for cutting of timber if Indiana bats are present in the project area.**
- **Dominion should file the results of its mid-winter aerial survey for the bald eagle along the TL-532 and PL-1 EXT2 Pipelines. Dominion should provide any additional recommendations from the FWS including whether or not additional surveys would be required, or if Dominion proposes to adhere to time window restrictions for construction of the pipelines.**
- **Dominion should file the results of its survey for the northeastern bulrush along the PL-1 EXT2 Pipeline. Dominion should provide any additional recommendations from the FWS including whether or not additional northeastern bulrush surveys would be required.**
- **Dominion should <u>not</u> begin construction activities until:**
    a. **the staff receives a Biological Opinion from the FWS regarding the proposed action (if required);**
    b. **the staff completes formal consultation with the FWS (if required); and**
    c. **Dominion has received written notification from the Director of OEP that construction may begin.**

With adherence to our recommendations, we believe that the Project is not likely to adversely affect the Indiana bat, bald eagle, and northeastern bulrush.

In addition to the consultation described above, Dominion and FERC consulted with the FWS and NOAA Fisheries during review of the reactivation of the Cove Point LNG Terminal in 2001. As part of the reactivation project, the FWS identified two federally listed threatened species potentially occurring in the vicinity of the Cove Point Terminal, the Northeastern beech tiger beetle (*Cicindelo dorsalis*) and puritan tiger beetle (*Cicindelo puritina*). Both of these species are known to occur in the Cove Point Marsh, which would not be affected by the proposed expansion Project. The FWS concurred that the reactivation project would not affect these species. NOAA Fisheries identified four federally listed endangered species (shortnose sturgeon (*Acipenser brevirosrrum*), Kemp's ridley sea turtle (*Lepidochelys kempi*), green sea turtle

(*Chelona mydas*), and leatherback sea turtle (*Dermochelys coriacea*)); and one federally listed threatened species (loggerhead sea turtle (*Caretta caretta*)) that could potentially occur in the vicinity of the reactivation project. NOAA Fisheries concurred that the reactivation project would not adversely affect these species. Consultation for the reactivation project is described in the EA for the project (FERC, 2001). The currently proposed expansion Project would include additional LNG ships calling on the Cove Point Terminal. We believe that additional LNG ships calling on the Cove Point Terminal would be consistent with project activities reviewed under the reactivation project.

4.7.3 Other Special Status Species

A total of 35 state-listed rare, endangered, threatened, and candidate species, and species in need of conservation, could potentially occur within the project area. Table 4.7.3-1 lists the state listed special status species potentially occurring within the project area. Dominion has coordinated with the qualified individuals to conduct the required field surveys for these species.

Field surveys began in the spring of 2005. Dominion will provide to the Commission the results of the field surveys, which will include life history descriptions and an assessment of the potential for the species to occur within the project area as they are completed. For those species potentially affected, mitigation measures to avoid or minimize impacts will also be identified, if appropriate.

In addition to those state listed species described above, during review of the previous Cove Point reactivation project the MDNR identified one rare species, the Atlantic sturgeon (*Acipenser oxyrinchus*), that could potentially occur in the Chesapeake Bay in the vicinity of the Cove Point Terminal. The MDNR concluded that activities included in the reactivation project were not anticipated to adversely affect the Atlantic sturgeon. Consultation for the reactivation project is described in the EA for the project (FERC, 2001). The currently proposed expansion Project would include additional LNG ships calling on the Cove Point Terminal. We believe that additional LNG ships calling on the Cove Point Terminal would be consistent with project activities reviewed under the reactivation project.

TABLE 4.7.3-1

State Listed Endangered and Threatened Species that Potentially Occur in the Vicinity of the Cove Point Expansion Project

Species	Status a/	Facility Where Species May Occur	Determination
Reptiles			
Timber Rattlesnake (*Crotalus horridus)*	PA-C	PL-1 EXT2 Pipeline	c/
Fish			
American Shad (*Alosa sapidissima)*	PA-SC	PL-1 EXT2 Pipeline	c/
American Brook Lamprey (*Lampetra appendix)*	PA-C	TL-453 Pipeline	c/
Invertebrates			
Gray Petaltail (*Tachopteryx thorey)*	MD-R	LNG Terminal, TL-532 Pipeline	c/
Sable Clubtail (*Gomphrus rogersii)*	MD-E	LNG Terminal, TL-532 Pipeline	c/

TABLE 4.7.3-1

State Listed Endangered and Threatened Species that Potentially Occur in the Vicinity of the Cove Point Expansion Project

Species	Status a/	Facility Where Species May Occur	Determination
Brown Spiketail (*Cordulegaster bilineata)*	MD-R	LNG Terminal, TL-532 Pipeline	c/
Fine-lined Emerald (*Somatochlora filosa)*	MD-R	TL-532 Pipeline	c/
Michigan bog skimmer (*Somatochlora incurvata*)	PA-SC	Leidy M&R Station	c/
Plants			
Hairy Snoutbean (*Rhynchosia tomentosa)*	MD-T	TL-532 Pipeline	c/
Wooley Three-awn (*Aristida lanos)*	MD-U	TL-532 Pipeline	c/
Rough Rushgrass (*Sporobolus clandestinus)*	MD-T	TL-532 Pipeline	c/
New Jersey Rush *(Juncus caesariensis)*	MD-E	TL-532 Pipeline	c/
Swollen Bladderwort (*Utricularia inflate)*	MD-E	TL-532 Pipeline	c/
Racemed milkwort (*Polygala polygama)*	MD-T	TL-532 Pipeline	c/
Sandplain Flax (*Linum intercursum)*	MD-T	TL-532 Pipeline	c/
Primrose Willow (*Ludwiga decurrens)*	MD-R	TL-532 Pipeline	c/
Long-beaked Arrowhead (*Sagittaria longirostra)*	MD-U	TL-532 Pipeline	c/
Evergreen Bayberry (*Myrica hetrophylla)*	MD-E	TL-532 Pipeline	c/
Kidneyleaf Grass-of-Pamassus (*Parnassia asarfolia)*	MD-E	TL-532 Pipeline	c/
Engleman's Arrowhead (*Sagittaria engelmanniana)*	MD-T	TL-532 Pipeline	c/
Blunt-leaved Gerardia (*Agalinis obtusifolia)*	MD-E	TL-532 Pipeline	c/
Spurred Butterfly-pea (*Centrosema virginianum)*	MD-R	TL-532 Pipeline	c/
Silvery Aster (*Aster concolor)*	MD-E	TL-532 Pipeline	c/
Curtiss' Three-awn (*Aristida curtissi)*	MD-U	TL-532 Pipeline	c/
Broad-leaved Beardgrass (*Gymnopogon brevifolius)*	MD-E	TL-532 Pipeline	c/
Few-flowered Tick-trefoil (*Desmodium pauciflorum)*	MD-T	TL-532 Pipeline	c/
Dwarf Iris (*Iris verna)*	MD-E	TL-532 Pipeline	c/
Thin-leaved Flatsedge (*Kyllinga pumila)*	MD-E	TL-532 Pipeline	c/
Common Skullcap (*Scutellaria galericulata)*	MD-R	LNG Terminal	c/
Dense-flowered Knotweed (*Polygonum densiflorium)*	MD-E	LNG Terminal	c/
Large-seeded Forget-me-not (*Myosotis macrosperma)*	MD-R	LNG Terminal	c/
Thread-leaved Gerardia (*Agalinis setacea)*	MD-E	LNG Terminal	c/
Hooker's Orchid (*Platanthera hookeri*)	PA-SC	Leidy M&R Station	c/
Soft-leaved sedge (*Carex disperma*)	PA-SC	Leidy M&R Station	c/
Showy Mountain Ash (*Sorbus decora*)	PA-SC	Leidy M&R Station	c/

a/ Status: MD = Maryland, PA = Pennsylvania, E = Endangered, T = Threatened; R = Rare; C = Candidate Species; SC = Special Concern; U = Uncertain.
b/ Dominion conducted habitat surveys during 2005.
c/ Determination pending results of field surveys and consultations.

4.8 LAND USE, RECREATION, AND VISUAL RESOURCES

4.8.1 Land Use

4.8.1.1 Existing Environment

Table 4.8.1.1-1 contains a summary of land use types that would be affected by the proposed facilities and pipeline routes, by County and land use type. Land uses crossed or affected by the proposed facilities are summarized below.

Cove Point LNG Terminal Expansion

The existing Cove Point LNG Terminal is located on 1,017 acres on the western shore of Chesapeake Bay in Calvert County, Maryland. There are four primary land uses within the 1,017-acre tract:

- 108 acres of developed land with industrial facilities. Development occurs in an area zoned for “light industrial" use.
- 215 acres of undeveloped open space and wooded land zoned for "light industrial" use. During construction of the existing Cove Point LNG Terminal, several extra workspaces were used in this area.
- 614 acres of natural and mostly wooded lands set aside as conservation easement protected from future development. Included in this area is a 190-acre fresh water marsh (Cove Point Marsh) and a 25-acre easement for a recreation area (along Chesapeake Bay in southeastern corner of the property) granted to the Cover Point Association. The recreation area serves as a buffer between the facility and the neighboring community. No part of this 614-acre conservation easement was used during initial construction of the existing facility and no activities are proposed in this area for the currently proposed Project.
- 80 acres of County Park along Route 497. This area, known as Cove Point Park, was granted in easement to Calvert County. The Cove Point Park serves as the major outdoor recreation facility in southern Calvert County and contains four tennis courts, two ball fields, a playground, two basketball courts, and a refreshment stand.

The area proposed for the expansion facilities is south of the existing Cove Point LNG Terminal, much of which is currently being used by Dominion for LNG storage and LNG processing facilities.

TL-532 Pipeline

The proposed TL-532 Pipeline would consist of approximately 47.8 miles of 36-inch pipe, starting at the existing Cove Point LNG Terminal, and running through Calvert, Charles, and Prince Georges County, Maryland. The TL-532 Pipeline would parallel Dominion’s existing TL-522 Pipeline for approximately 35 miles, or 73 percent of the new pipeline’s length. In these areas, the TL-532 Pipeline would be installed 15 to 25 feet from the TL-522 Pipeline.

TABLE 4.8.1.1-1

Land Use Types Crossed (by County) by Cove Point Expansion Project Pipelines a/

Facility/ County, State	Agriculture		Industrial/ Commercial		Residential		Open Land		Forest/ Woodland		Rangeland		Open Water		Total	
	mi	%	mi	%	mi	%	mi	%	mi	%	mi	%	mi	%	mi	%
TL-532 Pipeline																
Calvert MD	4.28	19.72	0.23	1.07	2.65	12.2	10.4	47.89	3.46	15.92	0	0	0.7	3.2	21.71	46.03
Prince George's, MD	1.39	20.72	0.08	1.2	0.19	6.17	3.66	54.5	0.95	14.11	0.06	0.9	0.38	5.71	6.71	14.22
Charles, MD	1.47	7.52	0.45	2.42	1.54	8.22	8.77	46.75	6.52	34.77	0	0	0.06	0.32	18.81	39.86
Total	**7.14**	**47.96**	**0.76**	**4.69**	**4.38**	**26.59**	**22.83**	**149.14**	**10.93**	**64.8**	**0.06**	**0.9**	**1.14**	**9.32**	**47.18**	**100**
PL-1 EXT2 Pipeline b/																
Juniata, PA	0.87	11	0.06	0.74	0	0	1.67	21	5.44	67	0	0	0.03	0.37	8.07	10
Mifflin, PA	5.23	34	0.07	0.45	0.27	2	1.67	11	7.4	48	0.67	4	0.1	0.65	15.41	19.1
Huntingdon, PA	0	0	0	0	0	0	1.45	32	3.05	67	0	0	0.01	0.22	4.51	5.59
Centre, PA	8.16	24	1.11	3	0.38	1	10.04	30	13.76	40	0.42	1	0.09	0.29	33.96	42.09
Clinton, PA	0.08	0.43	0.34	2	0	0	11.24	60	6.95	37	0	0	0.13	0.69	18.74	23.22
Total	**14.34**	**69.43**	**1.58**	**6.19**	**0.65**	**3**	**26.07**	**154**	**36.6**	**259**	**1.09**	**5**	**0.36**	**2.22**	**80.69**	**100**
TL-492 EXT3																
Wetzel, PA	0	0	0.04	11.47	0	0	0.19	50	0.14	38.07	0	0	<0.01	0.46	0.38	3.54
Greene, PA	0.14	1.35	0.11	1.09	0	0	6.53	63.14	3.52	33.98	0	0	0.05	0.44	10.35	96.46
Total	**0.14**	**1.35**	**0.15**	**12.56**	**0**	**0**	**6.72**	**113.14**	**3.66**	**72.05**	**0**	**0**	**0.06**	**0.9**	**10.73**	**100**
TL-453 Pipeline	2.34	20.28	0.17	1.43	0	0	1.3	11.23	6.95	60.17	0.78	6.78	0.01	0.1	11.55	100
TL-536 Pipeline	1.33	14	0.03	0.33	0.05	0.32	7.15	75.31	0.91	9.62	0	0	0.02	0.21	9.49	100
PL-1 Replacement	0.64	100	0	0	0	0	0	0	0	0	0	0	0	0	0.64	100
PL-1 Retest	0.3	79	0	0	0	0	0	0	0.08	21	0	0	0	0	0.38	100
Project Total	**26.23**		**2.69**		**5.08**		**64.07**		**59.13**		**1.93**		**1.59**		**160.66**	

a/ Land use percentage is based on length of pipeline per county; total percentage is based on the entire length of the pipeline. Wetlands are included within the listed land use types.
b/ Along the PL-1 EXT2 Pipeline, the two-directional pipeline measurement totaled 79.77 miles. The surveyed pipeline measurement totaled 80.66 miles. Due to differences between the pipeline lengths, an 80.66/79.77 factor was used to calculate land use areas.

Dominion would use a standard construction right-of-way of 75 feet for installation of the TL-532 Pipeline. Where adjacent to the existing TL-522 Pipeline, 25 to 35 feet of the construction right-of-way would overlap the existing pipeline easement. In areas where the TL-532 Pipeline would not parallel the TL-522 Pipeline, the entire 75 feet would be new right-of-way. Following construction, Dominion would maintain a permanent 50-foot-wide right-of-way for the TL-532 Pipeline. Where the existing pipeline is paralleled, 25 to 35 feet of the permanent right-of-way would overlap with the existing permanent right-of-way, and 15 to 25 feet would be new permanent right-of-way adjacent to the existing 50-foot-wide right-of-way. In areas where the TL-532 Pipeline would not parallel the TL-522 Pipeline, the entire 50 feet would be new permanent right-of-way.

Dominion was granted initial pipeline survey permission by 99 percent of the property owners located along a preliminary study corridor for the TL-532 Pipeline. The predominant land use crossed by the proposed pipeline is forest/woodland, which accounts for 19.55 miles (40.9 percent) of the total land crossed. Other land uses include 16.75 miles of open land (35.1 percent), 6.3 miles of agricultural land (13.2 percent), 3.61 miles of residential land (7.6 percent), 0.89 mile of open water (1.9 percent), 0.6 mile of industrial/commercial land (1.3 percent), and 0.06 mile of rangeland (0.1 percent).

PL-1 EXT2 Pipeline

The proposed PL-1 EXT2 Pipeline would consist of approximately 81 miles of pipeline through Juniata, Huntingdon, Centre, Mifflin, and Clinton Counties, Pennsylvania, starting at the existing PL-1 Pipeline near the Texas Eastern Perulack Facility and terminating with a tie in to the existing piping at Leidy Station. Approximately 75.4 miles (93 percent) of the route would parallel an existing Texas Eastern Pipeline. The proposed PL-1 EXT2 Pipeline would be installed approximately 30 feet from the Texas Eastern Pipeline and would share 20 feet of the existing pipeline right-of-way. Total right-of-way width during construction, including the 20-foot overlap, would be 75 feet. Following construction, Dominion would maintain a 50-foot-wide permanent right-of-way that would include 20 feet of the existing Texas Eastern Pipeline right-of-way.

The predominant land use crossed by the proposed PL-1 EXT2 Pipeline is forest/woodland, which accounts for 36.6 miles (45.4 percent) of the total land crossed. Other land uses include 26.1 miles of open land (32.3 percent), 14.34 miles of agricultural land (17.8 percent), 15.58 miles of industrial/commercial land (2.0 percent), 1.09 miles of rangeland (1.4 percent), 0.65 mile of residential land (0.8 percent), and 0.36 mile of open water (0.4 percent).

There are some lands along the pipeline route with special agricultural designations. In Clinton, Juniata, Mifflin, and Huntingdon Counties there are 13, 10, 10, and 45 properties, respectively, enrolled in Agricultural Security Areas within the vicinity of the proposed pipeline. There is also one property designated as an Agriculture Preservation Farm in Juniata County; however, underground utilities are permitted and deemed consistent under these designations.

TL-492 EXT3 Pipeline

The proposed TL-492 EXT3 Pipeline would consist of approximately 11 miles of pipeline starting at the existing pipeline at Lambert Junction in Wetzel County, West Virginia, and

terminating at a tie-in to an existing pipeline at Bluff Gate in Greene County, Pennsylvania. The entire route would parallel the existing TL-324 Pipeline and would be installed approximately 25 feet from that pipeline. During construction Dominion would increase this existing permanent right-of-way by 50 feet to create a total construction right-of-way of 75 feet. Following construction, Dominion would maintain a 50-foot-wide permanent right-of-way, of which 25 feet would overlap the existing TL-324 Pipeline right-of-way.

The predominant land use crossed by the proposed TL-492 EXT3 Pipeline is open land, which accounts for 6.72 miles (62.6 percent) of the total land crossed. Other land uses include 3.66 miles of forest / woodland (34.1 percent), 0.15 mile of industrial/commercial land (1.4 percent), 0.14 mile of agricultural land (1.3 percent), and 0.05 mile of open water (0.6 percent).

TL-453 Pipeline

The proposed TL-453 Pipeline would consist of approximately 11.5 miles of pipeline between Dominion's existing Ellisburg and Harrison Compressor Stations in Potter County, Pennsylvania. The proposed pipeline would parallel an existing pipeline for approximately 74 percent of its length (8.5 miles). Dominion would install the TL-453 Pipeline 25 feet from the existing pipeline.

The predominant land use crossed by the proposed TL-453 Pipeline is forest/woodland which accounts for 6.95 miles (60.2 percent) of the total land crossed. Other land uses include 2.34 miles of agricultural land (20.2 percent), 1.3 miles of open land (11.2 percent), 0.78 acre of rangeland (6.8 percent), 0.17 acre of industrial/commercial land (1.4 percent), and 0.01 acre of open water (0.1 percent).

TL-536 Pipeline

The proposed TL-536 Pipeline would consist of approximately 9.5 miles of pipeline, starting at Dominion's existing State Line Compressor Station in Potter County, Pennsylvania, and terminating at a gate lot in Sharon Township, also in Potter County. The TL-536 Pipeline would parallel Dominion's existing L-257-S Pipeline for its entire length, and would be installed approximately 25 feet from the existing pipeline.

The predominant land use crossed by the proposed TL-536 Pipeline is open land, which accounts for 7.15 miles (75.3 percent) of the total land crossed. Other land uses include 1.33 miles of agricultural land (14.0 percent), 0.91 mile of forest / woodland (9.6 percent), 0.03 mile of industrial/commercial land (0.33 percent), 0.05 acre of residential land (0.32 percent), and 0.02 acre of open water (0.21 percent).

Perulack Compressor Station

The Perulack Compressor Station would be constructed on approximately 25.4 acres of land in Juniata County, Pennsylvania, at the southern end of the proposed PL-1 EXT2 Pipeline. According to Dominion, it currently has the option to purchase the property for the proposed compressor station site, and property acquisition is underway. Existing land use at the proposed Perulack Compressor Station site is a mix of forest (18.65 acres / 73.4 percent) and open land (6.76 acres / 26.6 percent).

Centre Relay Compressor Station

The Centre Relay Compressor Station would be constructed on approximately 55.6 acres of land just north of S2MP 13.2 on the proposed PL-1 EXT2 Pipeline in Centre County, Pennsylvania. The land on which the Centre Relay Compressor Station is proposed is currently used for agriculture (55.6 acres in total).

Leidy M&R Station Upgrade

At the existing Leidy M&R Station in Clinton County, Pennsylvania, Dominion proposes to abandon approximately 0.14 mile of existing 16-inch-diameter pipeline and replace it with 0.14 mile of 24-inch-diameter pipeline, and install a launcher/receiver at the end of the proposed PL-1 EXT2 Pipeline. All modifications would take place on approximately 10.22 acres of land currently owned by Dominion inside the existing Station's property boundaries.

Wolf Run Compressor Station Expansion

In May 2004 Dominion proposed the construction of the new Wolf Run Compressor Station in Lewis County, West Virginia as part of the Northeast Storage Project. As part of the Cove Point Expansion Project, Dominion proposes to add an additional 3,550 hp of compression to the planned Wolf Run Compressor Station. The compression modifications would take place within the 20.8-acre site currently proposed for the Wolf Run Compressor Station in the Northeast Storage Project.

PL-1 Pressure Restoration Sites

Dominion proposes the following modifications to the existing PL-1 Pipeline in Franklin County, Pennsylvania:

- PL-1 Replacement - replacement of 0.64-mile of 30-inch diameter pipe
- PL-1 Retest – retest of a 0.38-mile segment of 30-inch pipe, if the test is unsuccessful, the pipe section would be replaced.

These modifications, collectively known as the PL-1 Pressure Restoration Sites, would be conducted entirely within the existing PL-1 Pipeline right-of-way. The Pl-1 Replacement would require 7.80 acres of agricultural land for construction and 3.90 acres for operation. During construction, the PL-1 Retest would require 3.69 acres of agricultural land and 0.96 acres of forest/woodland. During operation, the PL-1 Retest Pipeline would require 1.84 acres of agricultural land and 0.48 acres of forest/woodland.

4.8.1.2 Environmental Consequences

General Construction and Operational Impact

Impacts on land would result from the clearing of the construction right-of-way for the installation of the new pipelines and from the maintenance of the new permanent pipeline rights-of-way. In addition to the construction right-of-way, temporary extra work areas would be required in areas of steep side slopes; for crossings of major rivers, streams, wetlands, roadways, and railroads; and for topsoil storage in agricultural areas. Pipe storage and contractor yards for the concentrated storage of equipment and materials would be required in nearby areas

convenient to the pipelines and existing rail and highway transportation routes. Access to the pipelines during construction would be along existing state and local roadways, federal and state forest roads, logging roads, rights-of-way, and new, upgraded, or extended temporary access roads.

Following construction, the temporary construction right-of-way, extra work areas, access roads, and pipe storage and contractor yards would revert entirely to prior use. The new permanent pipeline rights-of-way would be maintained in a grassy state and land use restrictions would be imposed to prohibit the construction of aboveground structures that may cause damage to the pipeline such as buildings, house additions, garages, patios, pools, or the cultivation of trees or orchards. Acceptable uses of the permanent right-of-way would include general traffic over paved roads and driveways; plowing, harvesting, and general use of farm equipment in agricultural lands; and all types of recreation including off-road vehicle use where allowed in upland areas. Some landowners may consider these restrictions a long-term impact, especially if future plans for development were intended along the permanent right-of-way.

Agricultural land, including cultivated cropland, pasture, and orchards, would be temporarily affected by construction. Short-term impact on these areas would include the loss of standing crops and orchard trees within the construction right-of-way and the potential loss of future crop productivity resulting from the mixing of topsoil with subsoil or soil compaction (see section 4.2 for further discussion of impact on and mitigation for agricultural land). Drain tiles would be cut for installation of the pipeline, and tiles within the construction right-of-way could be damaged or broken as a result of the passage of heavy equipment. The noise and activity of construction may disturb livestock, and segments of permanent fencing would be replaced with temporary fencing to allow equipment movement on the right-of-way. However, livestock access across the right-of-way would be maintained in coordination with affected landowners.

Landowners would be compensated for damages incurred during construction on agricultural land, including the loss of standing crops and loss of crop productivity generally for the next one or two growing seasons. Drain tiles and fences would be repaired or replaced to their original or better condition. Following construction, agricultural land would be returned entirely to preconstruction use, except for orchards and where new aboveground facilities (*i.e.,* compression stations) would be located. In orchards, trees would be allowed to be replanted within the temporary construction right-of-way, but are typically prohibited within the permanent right-of-way. Construction of the proposed aboveground facilities on agricultural land would permanently remove the sites from agricultural use.

During the scoping process several commenters were concerned about the stress generated by the Project, specifically easement negotiations with Dominion and safety concerns, and the affect this may have on their health and quality of life. Commentors also expressed concern about potential health effects of living near a pipeline. While we acknowledge these concerns, it is not possible to route major pipeline facilities to avoid affecting private landowners. While construction would be disruptive, it would be short-term and confined to a 6- to 7-month period for most locations along a pipeline, although the entire construction sequence can pass through a localized area in as little as 3 months. Locations adjacent to proposed HDD operations may experience construction related impacts for a longer period, depending on the length and difficulty of the HDD crossing. During the construction period, Dominion would be required to

follow the mitigation outlined in this EIS to minimize impact on farms and properties. We are not aware of human health effects from living near a buried natural gas pipeline.

Forest clearing during pipeline construction would represent a long-term impact since these areas would be permanently converted to cleared, open land. Forest cleared within the temporary construction right-of-way would be allowed to revegetate entirely to preconstruction conditions; however, revegetation could take more than 20 years depending on the forest type. Compensation for timber would be determined through consultation with the local and state experts.

An easement would be used to convey right-of-way to Dominion. The easement gives the pipeline company the right to operate and maintain the pipeline and the permanent pipeline right-of-way, and in return compensates the landowner for the use of the land. The easement negotiations between Dominion and the landowner would also include compensation for loss of use during construction, loss of nonrenewable or other resources, and damage done to property during construction. Typical easement agreements include monetary compensation for loss of timber in woodlots or other forested areas; loss of fruit producing trees; and damage to or removal of fencing or other specialized landscaping, driveways, drain tiles, or water wells or septic systems. Monetary compensation for areas where improvements have been made by the landowner may be negotiated in the easement agreement. Easement agreements also typically specify activities or uses of the right-of-way that are not allowed following construction. In areas where use by off road vehicles is a concern, landowners could also negotiate for Dominion to install and maintain barriers across the right-of-way.

Site-Specific Impact and Mitigation

The pipelines would be constructed following typical construction and permanent right-of-way cross sections as shown in figures 2.2-1 through 2.2-3. As described in section 2.0, Dominion would use a nominal 75-foot-wide right-of-way during construction with a 50-foot-wide permanent right-of-way to remain after construction. The additional 25 feet on the "working side" of the pipeline would be used for temporary construction purposes. However, the right-of-way width would vary depending on whether the pipeline would be constructed adjacent to existing rights-of-way or on new right-of-way. Once construction is complete, these areas would be restored to the previous land use in compliance with the FERC Plan and Procedures.

In addition to the typical construction right-of-way, extra temporary work areas would be required for the crossing of roads, railroads, and waterbodies. During construction of the proposed Cove Point Terminal expansion facilities and associated pipelines these extra work areas would range in size from 25 feet wide by 200 feet long to 25 feet wide by 450 feet long for roads, and 25 feet wide by 200 feet long for railroads.

Construction of the proposed Project would affect about 1,660 acres of land including land disturbed for the LNG terminal expansion, pipeline construction right-of-way and extra work areas, aboveground facilities, access roads, and pipeyards.

New and existing roads would be required to provide access to pipelines and other facilities. Roads would be widened to a maximum of 50 feet, as necessary, and after construction would be maintained at a width of 20 feet to provide access for maintenance activities.

Table 4.8.1.2-1 summarizes the acreage affected by construction and operation of the proposed above ground facilities and pipelines.

Cove Point Terminal Expansion

The expansion of the Cove Point Terminal would be completed entirely on land owned by Dominion. No additional leased or purchased land would be required. Land use impacts associated with the expansion and operation of the Cove Point LNG Terminal expansion include disturbance of existing land use and conversion of some land to another use. The acreage required during construction and operation of the facilities is listed in table 4.8.1.2-1.

Construction of the facility would require disturbance of approximately 48.7 acres of land, of which 30.7 acres would be industrial/commercial lands that were previously disturbed and are currently being used by Dominion for LNG storage and processing facilities (*e.g.*, offices and utility buildings). The remaining 18.0 acres would be forest/woodland most of which is within a temporary construction area that was cleared for initial construction of the terminal and has since grown back. During construction, Dominion would temporarily utilize 6.4 acres of forest/woodland for construction parking facilities. After construction these acres would be restored to their previous condition and use.

Following construction, about 30.6 acres would be required for operation of the expansion facilities. Construction and operation of the LNG would have minor impacts on land use. For the more than half of the disturbed land, existing industrial land would be used for another industrial purpose.

TL-532 Pipeline

Dominion has been granted permission to survey 99 percent of the properties along the TL-532 Pipeline route. Consequently acreage and percent values presented here apply to 99 percent of the pipeline route. A total of about 487.7 acres would be required for the construction right-of-way, extra temporary work areas, access roads, and a temporary pipeyard. The majority of the area required for construction consists of open land (33 percent) and forests (33 percent), followed by agriculture (24 percent), residential (7 percent), water (2 percent), industrial/ commercial (1 percent), and rangeland (<1 percent).

One pipe/contract yard is also proposed for this pipeline comprising approximately 27.0 acres of agriculture/open land in Charles County. Approximately 6.51 miles of access roads would be used during the construction and operation of the pipeline. All access roads are existing with the exception of 0.03 mile of new construction in Calvert County; portions of two roads in Calvert and Charles Counties would require some restoration. The new access road would be constructed in open land, whereas existing access roads traverse agriculture/fields (2.80 miles), followed by forest (1.77 miles), open land/agriculture (1.14 miles), forest/residential (0.23 mile), agriculture/forest (0.22 mile), residential (0.13 mile), open land (0.05 mile), and forest/open land (0.04 mile).

For pipeline operations, the permanent right-of-way would affect approximately 414 acres. The predominant land use of these acres consists of open lands (37 percent), followed by forest (35 percent), agriculture (16 percent), residential (7 percent), open water (2 percent), industrial/ commercial (1 percent), and rangeland (<1 percent).

TABLE 4.8.1.2-1

Acreage Affected by Construction and Operation of Proposed Cove Point Expansion Project

Facility/ County, State	Agriculture (acres)		Industrial/ Commercial (acres)		Residential (acres)		Open Land (acres)		Forest/ Woodland (acres)		Rangeland (acres)		Open Water (acres)		Total (acres)	
	Const.	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**	**Const.**	**Oper.**
Cove Point Terminal Expansion	0	0	30.71	16.4	0	0	0	0	17.96	14.21	0	0	0	0	48.67	30.61
TL-532 Pipeline																
Calvert	54.53	41.55	1.31	2.10	21.07	20.00	63.83	61.58	65.22	68.68	0	0	5.91	4.59	211.90	198.50
Prince George's	18.04	13.2	0.76	0.54	2.17	1.75	24.42	24.38	18.38	15.48	0.58	0.58	3.45	3.43	67.8	59.36
Charles	46.71	12.95	3.08	3.47	9.66	7.65	71.62	69.15	76.21	62.50	0	0	0.74	0.67	208.02	156.39
Total	**119.28**	**67.70**	**5.15**	**6.11**	**32.90**	**29.40**	**159.87**	**155.11**	**159.81**	**146.66**	**0.58**	**0.58**	**10.10**	**8.69**	**487.72**	**414.25**
PL-1 EXT2																
Juniata	10.79	5.26	0.53	0.35	0	0	15.18	10.12	51.25	32.94	0	0	0.24	0.16	78.00	48.84
Mifflin	82.78	31.68	0.59	0.39	2.53	1.62	17.98	10.12	67.75	44.83	8.17	4.05	0.93	0.62	180.73	93.31
Huntingdon	0	0	0	0	0	0	13.21	8.8	27.82	18.48	0	0	0.09	0.06	41.12	27.34
Centre	127.70	51.02	10.47	4.94	3.58	2.32	93.64	61.83	126.28	83.39	3.86	2.57	0.83	0.56	366.36	206.63
Clinton	0.73	0.5	3.11	2.07	0	0	102.16	68.11	72.75	42.1	0	0	1.14	0.76	212.19	113.54
Total	**222.00**	**88.46**	**14.70**	**7.75**	**6.11**	**3.94**	**242.17**	**158.98**	**345.85**	**221.74**	**12.03**	**6.62**	**3.23**	**2.16**	**878.40**	**489.66**
TL-492 EXT 3																
Wetzel, WV	0	0	0.26	0.26	0	0	1.26	1.13	1.73	0.86	0	0	0.03	0.01	3.28	2.26
Greene., PA	1.26	0.85	0.98	0.69	0	0	46.86	39.58	44.6	21.3	0	0	0.44	0.27	94.14	62.69
Total	**1.26**	**0.85**	**1.24**	**0.95**	**0**	**0**	**48.12**	**40.71**	**46.33**	**22.16**	**0**	**0**	**0.47**	**0.28**	**97.42**	**64.95**
TL-453	27.71	14.2	1.64	1	0	0	13.56	7.86	65.4	42.13	8.53	4.75	0.2	0.07	117.04	70.01
TL-536 Pipeline	11.98	8.05	0.3	0.19	0.55	0.3	47.8	43.31	25.51	5.54	0	0	0.19	0.12	86.32	57.52
Perulack Compressor Station	0	0	0	0	0	0	6.76	4.69	18.65	6.86	0	0	0	0	25.41	11.55
Centre Compressor Station	55.6	15.85	0	0	0	0	0	0	0	0	0	0	0	0	55.6	15.85
Leidy M&R, Clinton, PA	0	0	10.22	10.22	0	0	0	0	0	0	0	0	0	0	10.22	10.22
Wolf Run Compressor Station Expansion, Lewis, WV	0	0	20.8	20.8	0	0	0	0	0	0	0	0	0	0	20.8	20.8
PL-1 Replacement	7.81	3.9	0	0	0	0	0	0	0	0	0	0	0	0	7.81	3.9
PL-1 Retest	3.66	1.86	0	0	0	0	0	0	0.96	0.46	0	0	0	0	4.62	2.32
Project Total	**449.30**	**200.87**	**84.76**	**63.42**	**39.56**	**33.64**	**518.28**	**410.66**	**680.47**	**459.76**	**21.14**	**11.95**	**14.19**	**11.32**	**1840.03**	**1191.64**

We received a number of comments during the scoping process concerned about the impact of the proposed pipeline on properties in Calvert County that are registered in agricultural preservation agreements. Commenters questioned how a new natural gas pipeline could be consistent with the intent of preservation agreements, and felt that participation in agricultural preservation agreements made their properties a target for the pipeline route since the value of an easement across these lands is presumably less than full market value. We acknowledge these concerns, and understand landowners' frustration with the proposal to cross farmland in agricultural preservation agreements.

The primary potential impact on lands preserved in agricultural agreements resulting from construction of a project is that the land may be taken out of its existing use and used in a manner inconsistent with the preservation agreement. In that case, the land could potentially be disqualified from the local program.

Dominion would compensate landowners for crop loss and other associated damages. Short-term impacts include loss of standing crops within the construction work area and disruption of farming operations in the vicinity of construction for the growing season during the year of construction. During construction, Dominion would implement our Plan, which includes mitigation measures that employ best management practices to preserve valuable topsoil, as well as other protective measures. After construction, Dominion would restore lands in agricultural preservation (as well as in all agricultural lands) that is consistent with the existing use of the land. Farmers would still be able to farm the land, and mitigation would be site-specific and based on easement agreements made between Dominion and affected landowners or tenants. Therefore, we believe impacts on these lands would be short-term and temporary.

We also received a number of comments concerned about the impact of the proposed TL-532 Pipeline on the rural character of Calvert County. We believe any impact on the rural character of the county would be limited to the period of active construction, which would be short-term. During construction, there would be an increase in vehicles and activity along the pipeline route, and equipment and materials (*e.g.*, pipe) would be visible within the construction right-of-way. However, following construction, the right-of-way would be restored, and land use and visual impact would not result in a substantial impact on the general rural character of the county.

We received a number of comments suggesting that the EIS review include an evaluation of the Project's consistency with the Calvert County Comprehensive Plan (Comprehensive Plan). The Comprehensive Plan is the official policy document for Calvert County. The goal of the Comprehensive Plan is to maintain and/or improve the overall quality of life for all citizens of Calvert County by: (a) promoting sustainable development; (b) encouraging a stable and enduring economic base; (c) providing for safety, health, and education; and (d) preserving the natural, cultural, and historic assets of Calvert County.

We reviewed the Comprehensive Plan and believe that this plan is meant to be used by the state and county officials as a guide when (1) making a decision regarding local zoning ordinances; and (2) determining whether or not to provide state funding for a local project. We note that this Project will not be funded at the state or local level, but by Dominion. We also note that a goal of the Comprehensive Plan is to keep citizens informed and have citizens engage as active participants, which the FERC has maintained throughout this public proceeding. Finally, public safety (item (c) above) is addressed in section 4.12 (Reliability and Safety), and item (d) above is

addressed in section 4.10 (Cultural Resources). We believe many elements of the Comprehensive Plan have been considered for this proposal and are addressed in this EIS.

PL-1 EXT2 Pipeline

Approximately 878 acres would be required for construction of the PL-1 EXT1 Pipeline, which are predominantly forest (39 percent), open land (28 percent), and agriculture (25 percent) with the rest consisting of industrial/commercial (2 percent), rangeland (1 percent), residential (1 percent), and open water (<1 percent). There are four proposed pipe/contractor yards associated with the PL-1 EXT Pipeline including two in Mifflin County, one in Clinton County, and one in Centre County, requiring a total of 57.6 acres. Approximately 57.4 percent of the area that would be used for pipe/contractor yards is agriculture, with the remainder being industrial/commercial.

Approximately 116 miles of access roads would be required during the construction of the PL-1 EXT2 Pipeline, of which only 0.14 mile would be new construction through land currently used for agriculture and fields.

We received on comment from a landowner along the existing Texas Eastern Pipeline that the PL-1 EXT2 Pipeline would parallel, questioning if easements exist for the Texas Eastern Pipeline. We have not attempted to verify the presence of easements along the existing pipeline. Texas Eastern is required to operate and maintain its pipeline in compliance with DOT safety standards, which require a certain amount of access to its pipeline. This access is normally maintained by fee ownership outright, or easement agreements with affected landowners.

Following construction, approximately 489 acres would be retained for permanent pipeline right-of-way, predominantly consisting of forest (45 percent) and open land (32 percent), followed by agriculture (18 percent), industrial/commercial (2 percent), rangeland (1 percent), residential (1 percent), and water (<1 percent).

TL-492 EXT3 Pipeline

A total of 97.4 acres would be required for the TL-492 EXT3 Pipeline construction right-of-way. The predominant land use that would be affected during construction consists of open land (49.4 percent) and forest (47.6 percent); other land use that would be affected includes agriculture, industrial/commercial, and water. During construction, 12.08 acres would be required for extra workspace, a majority of which is forest (7.08 acres); the rest is agricultural land (2.71 acres) and open lands (2.29 acres). Two pipe/contractor yards are also proposed to be used during construction, requiring 3.14 and 3.05 acres, in Greene County, Pennsylvania. The existing land use for both of these sites is open field.

The TL-492 EXT3 Pipeline would require approximately 6.9 miles of access roads, all of which are existing roads, with the exception of 0.7 mile of new construction. Access roads primarily cross forestland (4.8 miles), followed by open land (1.47 miles), agriculture (0.43 miles), and residential areas (0.21).

Following construction, the permanent right-of-way would affect 65 acres of land. A majority of this acreage is open land (62.7 percent), followed by forest (34.1 percent); agriculture, industrial/commercial, and water comprise the remaining 3.2 percent.

TL-453 Pipeline

Approximately 117 acres would be affected by the TL-453 Pipeline construction right-of-way, a majority of which are forested (55.9 percent), followed by agriculture (23.7 percent), open space (11.6 percent), range (7.3 percent), industrial/commercial (1.4 percent), and water (0.2 percent). Approximately 14.6 acres would be required for extra workspace, 73.9 percent of which consist of industrial/commercial land use; the remaining acres consist of agriculture (23.8 percent) and water (2.3 percent). Another 3.1 acres would be required for pipe/contractor yards, all of which would occur on agricultural land.

Approximately 1.8 miles of access roads would be required during construction of the TL-453 Pipeline. Primarily, existing access roads would be used, with the exception of 0.35 miles of new construction. This access road is an abandoned railroad bed where the existing land use is forest. The land uses crossed by the existing access roads consists of forest/open land (0.37 miles), forest/agriculture (0.23 miles), forest (0.18 miles), and agriculture (0.71 miles).

Following construction, approximately 70 acres would be retained as permanent pipeline right-of-way, of which approximately 60.2 percent would be forested and 20.3 percent would be agriculture, with the remaining consisting of open land (11.2 percent), rangeland (6.8 percent), industrial commercial (1.4 percent), and open water (0.1 percent).

TL-536 Pipeline

The TL-536 Pipeline construction right-of-way would affect a total of 86.32 acres, primarily consisting of open land (55.4 percent) and forest (29.6 percent). An additional 3.31 acres would be required during construction for extra work or staging areas. With the exception of 0.06 acre of forestland, extra workspace would be located in agricultural areas. Dominion proposes to use one 5.81-acre pipe/contractor yard, located in an agricultural area.

Construction of the TL-536 Pipeline would require approximately 2.15 miles of access roads, all of which are existing roads within forestland. No new access roads are proposed.

Following construction, Dominion would retain 57.52 acres of permanent operational right-of-way, which would be predominantly open land (75.0 percent). The remainder of the permanent operational right-of-way consists of agriculture (14.0 percent), forest (9.6 percent), and residential, water, and industrial/commercial (collectively comprising 1.03 percent).

Perulack Compressor Station

The Perulack Compressor Station site would require approximately 25 acres during construction, of which 18.6 acres is currently forested and 6.8 acres is open land. Approximately 11.5 acres would be required for operation and maintenance of the new station. No additional workspaces, access roads, or other facilities would be required for this facility.

Centre Relay Compressor Station

The proposed Centre Relay Compressor Station would affect 55.6 acres of agricultural land during construction. Following construction, 15.8 acres would be maintained for operation and

maintenance of the station. No additional workspaces, access roads, or other facilities would be required for this site.

Leidy M&R Station Upgrade

All proposed pipeline replacements and upgrades at the Leidy M&R Station would take place within existing facility boundaries. Upgrades would impact approximately 10.22 acres of land within Leidy Station. No upgrade construction or operation activities would require additional access roads or the use of additional land outside of the existing facility's property boundaries.

Wolf Run Compressor Station Expansion

All proposed expansion activities at the Wolf Run Compressor Station would occur within the site boundaries proposed under Dominion's Northeast Storage Project (Docket No. CP04-365-000). None of the construction or operation activities would require additional access roads or the use of additional land outside of the originally proposed 20.8-acre Wolf Run Compressor Station workspace.

PL-1 Pressure Restoration Sites

The construction right-of-way for PL-1 Pressure Restoration Sites would affect approximately 7.8 and 4.65 acres for the replacement and retest pipeline segments, respectively. This acreage is predominantly agriculture and entirely within the existing pipeline right-of-way. A total of 3.1 acres of extra workspace are required for this Project, which would also be located on agricultural land. No pipe/contractor yards are proposed. One existing access road would be required during construction. Operation and maintenance of the PL-1 Restoration Project sites would impact a total of 6.22 acres. Of these acres, 92.3 percent consist of agriculture with the rest being forest.

4.8.2 Existing Residences and Planned Future Developments

4.8.2.1 Existing Environment

A total of 58 residences, one camp, and one local shop would be within 50 feet of the proposed construction rights-of-way and work areas, all of which would be along the TL-532 and PL-1 EXT2 Pipelines. Table 4.8.2.1-1 summarizes residences, by facility, and approximate distance from proposed work areas. No churches or schools would be within 50 feet of the proposed construction work areas. Based on open houses, field reconnaissance, and various meetings conducted by Dominion, Dominion has identified two residential areas that are currently under construction and six residential areas planned for future development that would be within 50 feet of the TL-532 Pipeline.

Cove Point LNG Terminal Expansion

The area of expansion is part of the existing Cove Point LNG terminal and is zoned as 'light industrial' use. The expansion of the LNG terminal would occur on property owned by Dominion. The nearest residence to the proposed expansion facilities is 0.4 mile southwest.

TABLE 4.8.2.1-1

Residences Within or Within 50 Feet of the Proposed Construction Work Areas for the Cove Point Expansion Project

Facility/State	County	Within Construction Work Areas	Within 50 feet of Construction Work Areas		Total
			0 to 25 feet	26 to 50 feet	
Cove Point Terminal Expansion					
Maryland	Calvert	0	0	0	0
TL-532 Pipeline					
Maryland	Calvert	1	5	12	18
	Prince George's	0	1	4	5
	Charles	4	11	9	24
PL-EXT2 Pipeline					
Pennsylvania	Juniata	0	0	0	0
	Mifflin	3	4	3	10
	Huntington	0	0	0	0
	Centre	1	1	1	3
	Clinton	0	0	0	0
TL-492 EXT3 Pipeline					
Pennsylvania	Wetzel	0	0	0	0
	Greene	0	0	0	0
TL-453 EXT1 Pipeline					
Pennsylvania	Potter	0	0	0	0
TL-536 Pipeline					
Pennsylvania	Potter	0	0	0	0
Perulack Compressor Station					
Pennsylvania	Juniata	0	0	0	0
Centre Relay Compressor Station					
Pennsylvania	Centre	0	0	0	0
Liedy M&R Station					
Pennsylvania	Clinton	0	0	0	0
Wolf Run Compressor Station Expansion					
West Virginia	Lewis	0	0	0	0
Total		**8**	**22**	**29**	**58**

TL-532 Pipeline

Dominion has received permission to conduct surveys along 99 percent of the proposed TL-532 Pipeline route. Approximately 4.38 miles of the surveyed pipeline route would cross residential land use, and within this area 82 structures (of which 46 are residences) would be within 50 feet of the construction work area. Twenty-four of these structures (of which five are residences) would be within the construction right-of-way. Fourteen of these structures (three of which are residences) would be within the permanent right-of-way. Dominion has identified two currently planned and six future planned residential developments that would be crossed by the TL-532 Pipeline.

PL-1 EXT2 Pipeline

The proposed PL-1 EXT2 Pipeline would cross 0.65 mile of residential land use. There are 12 structures including 9 residences within 50 feet of the construction work area and another

9 structures (of which 4 are residences) within the construction right-of-way. Four of these structures, none of which are residences, would be within the permanent right-of-way.

TL-492 EXT3 Pipeline

The proposed TL-492 EXT3 Pipeline would not cross any residential land use, and no residences would be within 50 feet of the construction work area. There are two sheds that would be within the construction right-of-way, one of which would also be within the permanent right-of-way.

TL-453 EXT1 Pipeline

The proposed TL-453 EXT1 Pipeline would not cross any residential land use, and no residences or structures would be within 50 feet of the construction work area. There is one residence (trailer) that would be within a proposed access road, and the owner has given Dominion permission to relocate the residence. An Amish school is located within 300 feet of the construction right-of-way.

TL-536 Pipeline

The proposed TL-536 Pipeline would cross approximately 0.05 mile of residential land use. Two structures, including an abandoned house, would be within 50 feet of the construction work area.

Perulack and Centre Relay Compressor Stations

The nearest residence to the proposed Perulack Compressor Station is 1,300 feet northeast of the site, and the nearest residence to the proposed Centre Relay Compressor Station is 1,050 feet north of the site.

Environmental Consequences

In residential areas, the two most substantial impacts associated with construction and operation of the pipelines are disturbance during construction and restriction on future residential or other development within the permanent right-of-way. Because these impacts are localized, we have identified residences within 50 feet of the construction work area (construction right-of-way and extra temporary work space, if required) to determine the degree of impact and the appropriate mitigation.

Temporary construction impacts in residential areas can include: inconvenience caused by noise and dust generated by construction equipment and personnel; disruption of access from trenching of roads or driveways; ground disturbance; removal of trees, landscaped shrubs, or other plantings; damage to existing septic systems or wells; and removal of aboveground structures, such as sheds or trailers, from within the right-of-way. With typical overland pipeline construction, the trench is normally excavated before pipe stringing, welding, and installation. Trenches that remain open for extended periods of time can pose a safety hazard to nearby residents. Impact can be reduced by locating the pipeline at a greater distance from the residence, by using specialized construction practices and safety fencing, and by reducing the amount of time the trench remains open in the vicinity of residences.

Construction practices to minimize disruption in residential areas include reducing work area requirements, reducing the size of work crews and equipment, increasing the use of temporary safety fencing, avoiding the removal of trees, and minimizing the length of time that the trench is left open. Specialized residential construction techniques include stove-pipe construction and drag-section construction. For stove-pipe construction, the trench is dug, a section of pipe is laid and welded into place, and that section of the trench is backfilled immediately. For drag-section construction, a separate work space is required for prefabrication of long pipeline segments comprising several sections of pipe. Once the trench has been dug, the prefabricated pipeline segments are laid in the trench, welded into place, and the trench is backfilled. Both techniques would minimize the amount of land required for construction and the time the trench is left open in the immediate vicinity of the affected residences.

The facilities that have the potential to impact residential areas include the TL-532 Pipeline and the PL-1 EXT2 Pipeline, both of which would cross residential areas and have some residences located within 50 feet of construction areas. Along the proposed TL-532 Pipeline there are also some residences that would be located within the construction and permanent right-of-ways. Dominion has attempted to minimize impact on residential areas by deviating away from the existing pipelines at several locations where there is dense residential development along the existing rights-of-way. One such area is the White Sands development that is crossed by the existing TL-522 Pipeline in Calvert County. We have also evaluated an alternative route that would continue along the TL-522 Pipeline in this area (see section 3 of this EIS).

Residences near construction work areas may experience increased noise and dust, as well as increased traffic, during project construction. However, because the location of construction would be continuously changing as work crews move along the pipelines, construction impacts to residences in the vicinity of the pipelines would be short-term and localized. For specific mitigation measures related to air quality and noise see section 4.11 of this EIS.

To minimize construction impact on residences located within 50 feet of the construction work areas, Dominion would implement the following general mitigation:

- felling trees parallel to or within the right-of-way to minimize alterations to the properties adjacent to the right-of-way;
- retaining mature trees and landscaping from the edge of the construction workspace unless necessary for the safe operation of construction equipment;
- installing temporary gates, when necessary, to contain livestock, to prohibit or control public access across the right-of-way, and to minimize the hazard of open ditches when construction activities are not in progress. These temporary fences and gates would remain closed at all times except for construction purposes;
- removing all debris and equipment after construction activities from the right-of-way and adjacent area. After construction is complete the right-of-way would be allowed to return to the original pre-construction conditions;
- maintaining access and traffic flow to the extent possible during construction activities; and

- maintaining a minimum of 25 feet between residences and the construction work area for a distance of 100 feet on either side of the residence. This would result in the construction work area being reduced as necessary to maintain the minimum distance.

In addition, Dominion would prepare site-specific mitigation plans for all residential areas within 25 feet of the construction right-of-way. Dominion has not yet filed these plans with the Commission. In addition, because construction of the pipelines is scheduled for 2007 and 2008, new residences or businesses may be constructed adjacent to the proposed construction work areas before construction begins. Therefore, **we recommend that:**

- **In the event that new residences are built prior to Project construction, Dominion should update table 4.8.2.1-1 of this EIS for the residences located within 50 feet of the construction work areas (*i.e.*, construction right-of-way and extra temporary work space) and file this information in its initial Implementation Plan with the Secretary <u>before construction</u>. For all residences that would be 25 feet or closer to the construction work area, Dominion should file a site-specific plan with the Secretary for review and written approval of the Director of OEP <u>before construction</u>.**

4.8.3 Recreation and Special Interest Areas

4.8.3.1 Existing Environment

Cove Point LNG Terminal Expansion

No identified public recreation or other designated special land use would be directly affected by the proposed LNG terminal expansion facilities. However, land surrounding the Cove Point Terminal has special status. The Maryland Conservation Council (MCC) and the original owners of the Cove Point LNG Terminal, Columbia Gas Transmission Corporation, entered into an agreement that governs the treatment and use of the land and water within the "Cove Point natural area." This area includes all of the natural environments located outside of the fenced LNG tanks and the operational equipment sites. The agreement with MCC has provided a cooperative arrangement between this natural environment and the Cove Point Facilities for over 20 years. Dominion is now the successor to this land agreement.

Calvert Cliffs State Park is located north of the Cove Point LNG Terminal. This park encompasses approximately 1,079 acres owned and operated by the Friends of Calvert Cliffs State Park and the Maryland State Forest Service and Park Service. The park contains nature trails, picnic areas, fishing, as well as fossil hunting along 30 miles of cliffs. The Maryland General Assembly has placed the park in "Wildland" status, which is a "unit of importance for all the natural sciences, especially ecology, and with outstanding value for education, research, and appreciation of the natural processes."

The nearest recreation area is located directly southwest of the LNG terminal facilities. Cove Point granted an easement to Calvert County for the construction of these park facilities. There are no areas within the proposed project area that are included in or are designated for study for inclusion in the National Wild and Scenic River System (16 U.S.C. 1271) or National Trail System (16 U.S.C. 1241). There are also no designated or proposed designated wilderness areas under the Wilderness Act (16 U.S.C. 1132) in or adjacent to the LNG terminal.

The Cove Point LNG Terminal is within the Maryland Coastal Zone, and therefore requires a determination of consistency with the state Coastal Zone Management Program. A request is currently pending with the MDE Wetlands and Waterways program for this determination. See section 4.8.6 for further discussion.

TL-532 Pipeline

Special land uses crossed by the proposed TL-532 Pipeline route include the Calvert Cliffs State Park, the Zekiah Swamp Run Rural Legacy Area, and land owned by the Maryland-National Capital Park and Planning Commission.

The proposed pipeline route would cross Calvert Cliffs State Park (described above) for approximately 0.59 mile. The pipeline would be adjacent to Dominion's existing TL-522 Pipeline at this location.

The Zekiah Swamp Run Rural Legacy Area consists of 31,000 acres and follows the watershed boundaries of the Zekiah Swamp Run. Sponsored by Charles County, the area is abundant with farms, forests, and wetlands of Special State Concern, historic and archaeological sites, and mineral rich deposits. The pipeline would cross approximately 0.54 mile of this site.

The Maryland-National Capital Park and Planning Commission was established to provide long-range planning and park acquisition and development for Maryland counties bordering the District of Columbia. Land owned by the Maryland-National Capital Park and Planning Commission is located in the vicinity of Mattawoman Swamp. The proposed pipeline would cross approximately 0.03 mile of this land.

The TL-532 Pipeline would cross the Patuxent River by HDD method for 0.73 mile, which is listed as a State Scenic River.

We received several comments concerned about the potential impact on Piscataway National Park, which is located on the Potomac River near the north end of the TL-532 Pipeline. The TL-532 Pipeline would not affect this park. At its closest point (the north end of the pipeline at the Marshall Hall Gate), the pipeline would be approximately 0.9 mile south of the boundary of the Piscataway National Park, however the Project would be located in closer proximity to landowners who have a conservation easement agreement with the National Park Service.

PL-1 EXT2 Pipeline

A number of special land uses would be crossed by the PL-1 EXT2 Pipeline. These include Sproul State Forest (22.88 miles), Rothrock State Forest (8.47 miles), Bald Eagle State Forest (0.46 miles), Thickhead Wild Area (mileage crossed to be determined), State Game Lands 92 (0.71 mile), 113 (0.4 miles), and 215 (2.09 miles), Detweiler Run Natural Area (0.88 mile), the West Branch Susquehanna River Water Trail (mileage to be determined), and Tuscarora State Forest (4.25 miles).

The PADCNR manages all State Forests, with uses dedicated to recreation, for the benefit and enjoyment of people, and conservation of natural lands. The Thickhead Wild Area, located in Rothrock State Forest is also managed by the PADCNR with usage classified as conservation, as is the Detwieler Run Natural Area, which comprises 463 acres in Detweiler Hollow that supports

old-growth white pine and hemlock. The West Branch Susquehanna River Trail is sponsored by the Pennsylvania Lumber Heritage Region and is currently under development. Finally, state game lands are under the jurisdiction of the PGC and management is directed towards wildlife resources.

TL-492 EXT3 Pipeline

The TL-492 EXT3 Pipeline would cross about 1.3 miles of State Game Lands #179.

No federal or state owned lands, or other public recreation or other designated special land use areas would be crossed or affected by any of the remaining proposed facilities.

4.8.3.2 Environmental Consequences

Table 4.8.3.2-1 summarizes acreage of recreation areas and special land uses affected by the proposed TL-532, PL-1 EXT2, and TL-492 EXT3 Pipelines.

TABLE 4.8.3.2-1

Public Land and Other Designated Recreation, Scenic, or Special Use Areas Affected by Proposed Facilities

Facility	Special Land Use	Acres Affected
TL-532 Pipeline	Calvert Cliffs State Park	5.39
	Zekiah Swamp Rural Legacy Area	9.88
	Patuxent River	6.64
	Maryland-National Capitol Park and Planning Commission Land a/	0.29
PL-1 EXT2 Pipeline	State Game Lands 215	18.99
	Tuscarora State Forest	39.09
	State Game Lands 113	3.64
	Rothrock State Forest	77.01
	Detweiler Run Natural Area	8.00
	Bald Eagle State Forest	4.18
	State Game Lands 92	6.45
	Sproul State Forest	208.13
	Thickhead Wild Area	Not available
TL-492 EXT3 Pipeline	State Game Lands 179	11.82

a/ Route not surveyed yet in Charles County.

The primary concern associated with construction and operation of the pipelines on lands used for recreation is that it may preclude normal recreational activities from occurring. Impacts including increased noise and disruption due to construction activities could be a nuisance to hikers, bikers, picnickers, hunters, anglers, sightseers, and campers. On state lands, fall hunting is an important recreational use and these impacts could also disturb and temporarily displace wildlife from construction areas. Impacts to wildlife resources and associated mitigation measures are discussed in section 4.6.2.

Construction of both the TL-532 Pipeline and PL-1 EXT2 Pipeline would last approximately 6 to 7 months, beginning in May of 2007 and 2008, respectively. Construction of the TL-492 EXT3 Pipeline would last approximately 10 weeks, beginning in May of 2008. It is anticipated that some impacts to summer and fall recreation may be unavoidable but they would be temporary

due to the length of the construction period and because construction activities would not remain in one place along a given pipeline route for more than several weeks. Recreation activities in all areas would be unaffected post construction, as right-of-ways would be restored to their pre-existing condition and use. Additionally, no aboveground facilities are proposed in any recreation areas.

To ensure that impacts to recreational and other special use areas are avoided and/or minimized throughout the construction and operation of the TL-532, PL-1 EXT, and TL-492 EXT3 Pipelines, Dominion has indicated that it would continue to conduct consultations with each of the respective landowner or management agencies to discuss construction timing and other mitigation measures to reduce or minimize impacts. To ensure that impact on these areas is minimized, **we recommend that:**

- **Dominion should develop, in consultation with the affected landowners or land managing agencies, site-specific construction and restoration plans, as necessary, for those areas listed in table 4.8.3.1-1 of this EIS. Consultations should include discussion of the need for construction timing restrictions and/or special construction techniques and restoration measures. Dominion should file documentation of consultation, and any resulting site-specific plans, with the Secretary <u>before construction</u>.**

4.8.4 Visual Resources

4.8.4.1 Existing Environment

Cove Point LNG Terminal Expansion

The proposed Cove Point LNG Terminal expansion facilities would be constructed within the existing terminal property. The property is located in southern Calvert County, Maryland along the western shore of the Chesapeake Bay. This region is a relatively low-lying area reaching elevations of only a few hundred feet. Much of this flat terrain is bisected by numerous stream channels. The landscape surrounding the site consists of mixed forests and farms, with interspersed residential and commercial development. The Calvert Cliffs are a prominent feature located along the western shore of the Chesapeake Bay just north of the existing terminal. These wave-cut cliffs extend 30 miles between Chesapeake Beach and Drum Point, MD and reach a height of 100 feet.

TL-532 Pipeline

The proposed TL-532 Pipeline route crosses generally flat, low-lying terrain bisected by numerous stream channels. Short segments of steep terrain occur along some stream channels. The pipeline route would cross a number of land types including a mixture of forest and agricultural lands, open non-forested lands, rangelands, open water, and disturbed industrial and residential lands. The TL-532 Pipeline would be adjacent to an existing pipeline right-of-way for approximately 75 percent of its length.

PL-1 EXT2 Pipeline

The proposed PL-1 EXT2 Pipeline would be within a portion of the Appalachian Mountains. This section of mountains consists of moderate to high elevations, and is characterized by long narrow mountain ridges separated by broad to narrow valleys. The landscape along the proposed pipeline route consists of mixed agriculture and forest, interspersed with residential and commercial/industrial developments. The PL-1 EXT2 Pipeline would be adjacent to an existing pipeline right-of-way for approximately 93 percent of its length.

TL-492 EXT3 Pipeline

The TL-492 EXT3 Pipeline would be within the Appalachian Plateau, which is characterized by very hilly, narrow hill tops and steep-sloped narrow valleys. The landscape along the proposed pipeline is dominated by forests and mixed woodlands and farmlands. The TL-492 EXT3 Pipeline would be adjacent to an existing pipeline right-of-way for its entire length.

TL-453 Pipeline

The TL-453 Pipeline would be within a region of high plateaus bisected by steep to shallow valleys. The landscape along the proposed route is characterized by mixed forests and farmland, with interspersed residential areas and numerous streams and rivers. The TL-453 Pipeline would be adjacent to an existing pipeline right-of-way for approximately 74 percent of its length.

TL-536 Pipeline

The TL-453 Pipeline would be within a region of high plateaus bisected by steep to shallow valleys. The landscape along the proposed route is characterized by mixed forests and farmland, with interspersed residential and commercial developments. The TL-536 Pipeline would be adjacent to an existing pipeline right-of-way for its entire length.

Perulack Compressor Station

The Perulack Compressor Station site is crossed by several streams and is currently a mix of forest and farmlands. The landscape surrounding the proposed compressor station consists of long and narrow mountain ridges separated by long narrow valleys.

Centre Relay Compressor Station

The proposed Centre Relay Compressor station site is currently agricultural land. The landscape surrounding the proposed station consists of mixed farmland, woodlots, and commercial and residential development.

Leidy M&R Station Upgrade

The Leidy M&R Station Upgrade would take place entirely within Dominion's existing facility site. The surrounding area is characterized by very hilly, narrow hill tops and steep-sloped narrow valleys, with a landscape of mixed forest, farmlands, and open lands, with interspersed streams and residential and commercial areas.

PL-1 Pressure Restoration Sites

The proposed pressure restorations sites would be within an area characterized by parallel valleys separated by steep ridges. The landscape surrounding the sites is made up of mixed farmlands, forest, and open lands, with interspersed residential and commercial areas. The restoration sites would be entirely within existing pipeline rights-of-way.

4.8.4.2 Environment Consequences

The primary visual impacts that would result from the Cove Point Expansion Project would be due to vegetation removal for the construction and operation of proposed facilities and associated access roads, and the installation of new above ground facilities.

Visual impacts associated with the removal of vegetation would be temporary and generally confined to the construction period in agricultural and other non-forested land uses. After construction, cleared vegetation in these areas would return to pre-construction conditions, with minimal visual impacts. Visual impacts due to vegetation removal would be most noticeable in areas where a pipeline does not parallel an existing right-of-way and a new corridor must be cleared. These impacts would be greatest where a right-of-way would introduce a newly cleared corridor through forestland and the right-of-way would be visible from public access points such as road crossings. Visual impacts associated with vegetation removal for the Project would be greatest along the proposed TL-532 and PL-1 EXT2 Pipelines, as these pipelines would cross the greatest amount of forestland (41 percent and 45 percent their respective routes). However, both of these pipelines would parallel existing right-of-ways for a majority of their length (73 percent and 93 percent, respectively), which would minimize the visual impact of a new cleared corridor.

The Cove Point LNG Terminal expansion facilities would include the addition of two new storage tanks within the existing terminal. Each tank would be 161 feet high, and therefore potentially visible from areas surrounding the terminal. The Cove Point Terminal has a 614-acre natural wooded buffer surrounding the site, which eliminates a view of the facility from most of the surrounding land areas. The facility is further obscured from public view near its entrance by a large stand of pine trees, which were specifically planted to screen the view from Cove Point Road to the south. We asked Dominion in a data request to provide lines of site profiles or visual simulations for the proposed tanks to assist in evaluating potential visual impacts of the proposed tanks. Dominion prepared visual simulations from five reference observation points:

1. The clubhouse of the Chesapeake Bay Country Club.
2. State Route 497, approximately 1,200 feet west of the plant entrance road.
3. State Route 497, approximately 3,000 feet west of the plant entrance road.
4. A residential development along Cove Point Road, approximately 1,600 south of the State Route 497 intersection.
5. A point approximately 2 miles off-shore, east of the proposed facility's easternmost project boundary.

Based on these simulations, we believe the view of the new proposed LNG storage tanks from areas surrounding the existing terminal would be very minimal, and limited to just the tops of the tanks, although they will be located closer to Cove Point Road. The views would be consistent

with the existing terminal facilities, would not be a substantial change from the current view of the terminal, and therefore visual impact would not be substantial.

The Perulack Compressor Station would be constructed at a location where some natural vegetation would provide visual screening between the station and the nearest residences and public road. The new station would also be adjacent to an existing Texas Eastern compressor station, so addition of the station would not represent an entirely new feature to the landscape. We believe the visual impact of the Perulack Compressor Station would not be substantial.

The Centre Relay Compressor Station would be constructed in an open agricultural area, and would be visible from surrounding public roads, farms, businesses, and residences. A compressor station at this site would generally be viewed as a new industrial feature on the landscape. However, there are several commercial buildings along Route 64 along the south side of the site, and there is an extensive commercial quarry operation approximately 0.5 mile south and visible from the area surrounding the site. Dominion has indicated it is evaluating the need for visual screening for the Centre Relay Compressor Station, and that if it determined that screening is required, a screening plan would be submitted to the Commission for our review and approval prior to construction.

We received comments from the owner of a restaurant located along State Route 26 near the southwest corner of the proposed site of the Centre Relay Compressor Station, expressing concern about the potential affect of the new station on his business. The proposed site is currently being farmed but is zoned for light industrial use, and Dominion has stated that selection of this site was made in consultation with representatives of Centre County and the current landowner. While the consistency of the proposed station with local zoning ordinances is pending review by county authorities, we have reviewed the site for general consistency with the surrounding land use. We believe that construction of the compressor station at the proposed site would be consistent with existing land use along Route 26.

4.8.5 Hazardous Waste Sites

To determine if there any known hazardous waste sites within the vicinity of the proposed facilities, Dominion searched the EPA Maps on Demand database (Resource Conservation and Recovery Information System [RCRIS] Master Facility List and Comprehensive Environmental Response Compensation and Liability Information System [CERCLIS] Superfund Program sites) (USEPA Enviromapper: http://maps.epa.gov/enviromapper/). No waste sites were identified that would be crossed by the proposed pipeline rights-of-way or above ground facilities, and none were located within 0.25 mile of a proposed site.

4.8.6 Coastal Zone Management

In 1972, Congress passed the CZMA to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone for this and succeeding generations" and to "encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone (16USC 1452, section 303 (1) and (2)).

Section 307 (c)(3)(A) of the CZMA states that "any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program." In order to participate in the coastal zone management program, a state is required to prepare a program management plan for approval by the NOAA, Office of Coast and Ocean Resource Management (OCRM). Once the OCRM has approved a plan and its enforceable program policies, a state program gains "federal consistency" jurisdiction. This means that any federal action that takes place within a state's coastal zone must be found to be consistent with state coastal policies before federal action can take place.

The Cove Point Expansion Project is subject to a federal Coastal Zone Consistency review because it would: (1) involve activities within the coastal zone of Maryland as described in sections 1 and 2 of this EIS; and (2) require several federal permits or authorizations (see table 1.3.5-1). Maryland has an approved coastal zone management program administered by the MDE Coastal Zone Consistency Division. To ensure consistency with the State's Coastal Zone Management Program, the Coastal Zone Consistency Division evaluates proposed federal acts that affect Maryland's coastal zone. Acts reviewed include direct federal actions, federal licenses and permits, and financial assistance to State and local governments.

It is noteworthy that in the FERC proceedings for the reactivation of the Cove Point facility in Docket No. CP01-76-000, on August 2, 2002, Williams Cove Point (who previously owned and operated the terminal facilities) received a letter from the Coastal Zone Consistency Division. The letter concluded that the proposed reactivation of the Cove Point facility *is consistent* with the Maryland Coastal Zone Management Plan as required by Section 307 of the Coastal Zone Management Act. The consistency determination was attached to Williams Cove Point's Permit to Construct and Prevention of Significant Deterioration New Source Review approval from the MDE Air and Radiation Management Administration, issued on August 6, 2002.

Dominion indicates that it has consulted with the MDE regarding its Project and the consistency review for the Coastal Zone Management Plan (CZMP). During the FERC Pre-filing Process, on behalf of the MDE, we asked Dominion to review its proposal and make a consistency determination to present to the MDE for their review.

If the Cove Point Expansion Project is approved by the Commission, concurrence from the MDE that the Project is consistent with the CZMP must be received prior to any issuance of a Notice to Proceed with construction from the Secretary of the FERC. Therefore, **we recommend that**:

- **Dominion should not begin construction of the Project <u>until</u> it files with the Secretary a copy of the determination of consistency with the Coastal Zone Management Program issued by the MDE.**

4.9 SOCIOECONOMICS

The potential socioeconomic effects from construction, operation, and maintenance of the Cove Point Expansion Project are related to the number of construction workers that would work on the Project and their impact on population, public services, nearby homes and businesses, local traffic, and temporary housing during construction. Other potential impacts are related to property values and tax revenues during project operation, and environmental justice.

This section focuses on the major new or expanded facilities, including the Cove Point Terminal expansion facilities, the Perulack and Centre Relay Compressor Stations, and TL-532 and PL-1 EXT2 Pipelines. The remaining facilities would have little or no socioeconomic impact because they would occur within existing Dominion facilities or adjacent to existing rights-of-way, and would generally be consistent with ongoing facility operations.

The socioeconomic impact area considered for this analysis includes Calvert, Prince George's, and Charles Counties Maryland, and Juniata, Mifflin, Huntingdon, Centre, and Clinton Counties, Pennsylvania.

4.9.1 Population

The 2000 total population for the affected counties was 1,285,280 individuals, ranging from 22,821 individuals in Juniata County, Pennsylvania, to 801,515 individuals in Prince George's County, Maryland. Population density, which is indicative of the extent of development, ranged from 42.6 individuals per square mile in Huntingdon County, Pennsylvania, to 1,651.1 individuals per square mile in Prince George's County, Maryland. Population density in all 5 Pennsylvania counties was lower than the state density of 274.0 individuals per square mile, and in Maryland two counties had lower population densities than the state (541.9 individuals per square mile). Table 4.9.1-1 provides population statistics by county and state.

During construction and operation of the Cove Point Terminal expansion facilities, a minor increase in the local population is expected. During the construction and operation phases of the proposed terminal expansion, a total of 392 jobs would be generated annually. Of these jobs, 62 percent (244 jobs) are expected to be generated by the construction phase of the Project and would be required temporarily during the four year construction period. The remaining 38 percent (148 jobs) would be permanent jobs generated during the operations phase of the Project and are expected to be supported over the lifetime of facility operations (which for this analysis is assumed to extend 20 years). A majority of the temporary and permanent workers would reside within or near the project area. During summer construction months, temporary workers are likely to bring their families to the area. No long-term impacts to the local population are anticipated because following construction, temporary work crews would disperse from the project area. Additionally, all existing housing, schools, roads, and emergency services are adequate to support the influx of permanent workers.

TABLE 4.9.1-1

Existing Socioeconomic Conditions in the Project Area

State/County	2000 Population	2000 Population Density (per square mile)	1999 Per Capita Income (dollars)	2000 Civilian Labor Force	December 2001 Unemployment Rate (%)	2000 Poverty Rate (%)	2000 Rental Vacancy Rate (%)	Major Industry
Maryland	5,296,486	541.9	25,614	2,737,359	3.6	8.5	6.1	Professional, Scientific, Administration Management
Calvert	74,563	346.5	25,410	38,786	2.3	4.4	6.4	Education, Health, and Social Services
Prince George's	801,515	1,651.1	23,360	424,422	3.3	7.7	4.8	Education, Health, and Social Services
Charles	120,546	261.5	24,285	62,951	2.1	5.5	5.0	Public Administration
Pennsylvania	12,281,054	274.0	29,504	5,992,886	4.7	11.0	7.2	Manufacturing
Juniata	22,821	58.3	21,058	10,974	5.2	9.5	5.4	Manufacturing
Centre	135,758	122.3	25,273	68,406	2.9	18.8	3.7	Manufacturing
Mifflin	46,486	112.9	20,558	21,343	7.0	12.5	8.4	Manufacturing
Huntingdon	45,586	52.2	18,537	20,013	9.3	11.3	7.1	Manufacturing
Clinton	37,914	42.6	21,355	17,937	6.6	14.2	5.7	Manufacturing

Source: U. S. Department of Labor, Bureau of Labor Statistics (unemployment rate and labor force for Maryland), http://www.bls.gov/data; U. S. 2000 Census, http://quickfacts.census.gov/; and Appalachian Regional Commission (unemployment rate and per capita income for Pennsylvania, http://www.arc.gov.

During construction of the proposed pipeline facilities, a minor increase in the local population in the areas along the pipelines is anticipated. Table 4.9.1-2 lists the number of temporary construction workers that are expected to work along the pipelines over an approximately six-month period, during spring, summer, and early fall. Most of these workers would live within or near the project areas, and are expected to bring families during the summer construction months. There would be no long-term impacts to local populations because following construction, temporary work crews would disperse from the project areas and no permanent positions would be created from the proposed pipelines.

During construction of the Perulack and Centre Relay Compressor Stations, a temporary, minor increase in the local population is expected. Approximately 100 temporary workers would be required for each compressor station site over an eight-month period, from April to November. Most of these workers would live within or near the project areas, and are expected to bring families during the summer construction months. No long-term impacts to local populations are expected, because following construction the temporary workforce would disperse. One new permanent position would be created at each compressor station facility to support operation.

TABLE 4.9.1-2

Construction Time and Expected Workforce Associated with the Proposed Cove Point Expansion Project Facilities

Facility	Duration of Construction	Construction Workforce (no.)	New permanent Positions Created (no.)
Cove Point Terminal Expansion	24 months	249	148
TL-532 Pipeline	24 weeks	340	0
PL-1 EXT2 Pipeline	26 weeks	280	0
TL-492 EXT3 Pipeline	10 weeks	140	0
TL-453 EXT1 Pipeline	12 weeks	240	0
TL-536 Pipeline	12 weeks	200	0
Perulack Compressor Station	6-7 months	100	1
Centre Relay Compressor Station	6-7 months	100	1
Leidy M&R Station Upgrade	1-6 months	25-100	0
PL-1 Pipeline Replacement and Retest	4 weeks	30	0
Wolf Run Compressor Station Expansion	1-6 months	25-100	0

4.9.2 Economy and Employment

Huntingdon County, Pennsylvania experienced the highest unemployment rate in 2000, with 9.3 percent; the lowest unemployment rate occurred in Charles County, Maryland (2.1 percent). However, with the exception of Huntingdon County, all other Pennsylvania counties had higher unemployment rates than that of the state (4.7 percent); unemployment in all three Maryland counties was lower than the state rate (3.6 percent). The 2000 poverty level ranged from 4.4 percent in Calvert County, Maryland, to 18.8 percent in Centre County, Pennsylvania. The per capita income in 1999 for all counties fell below the average for their respective states ($29,504 in Pennsylvania; $25,614 in Maryland), ranging from $18,537 in Huntingdon County, Pennsylvania, to $25,410 in Calvert County, Maryland. Calvert County, Maryland, experienced the lowest poverty rate in 2000 (4.2 percent); the highest poverty rate occurred in Centre County,

Pennsylvania (18.8 percent). Poverty in all three Maryland counties fell below the state level, whereas all but one Pennsylvania county exceeded the state level.

The total 2000 civilian labor force within the affected counties was 664,832 individuals, representing 19.2 percent and 2.3 percent of the statewide workforces in Maryland and Pennsylvania, respectively. The major industry in two of the Maryland counties in 2000 was education, health, and social services; public administration was the major industry in the third county. Manufacturing was the major industry in all five Pennsylvania counties. Within the Maryland counties, the occupation of a majority of workers in 2000 fell into the categories of government, retail trade, construction, and transportation/public utilities. Mining and agriculture was the least common category. Of the workforce in the Pennsylvania counties, a majority of the workforce fell into the manufacturing, construction, and retail trade categories. Wholesale trade and finance were the least common occupational categories. A majority of the trades that would be required during project construction and operation are available from the labor pool in counties comprising the project area. Table 4.9.2-1 summarizes labor force statistics within the project area.

As described above, an anticipated workforce of 392 workers would be required for the construction and operation of the LNG terminal including 244 (62 percent) during construction and 148 (38 percent) during operations. The construction workforce would consist of both local and non-local workers, with additional construction personnel hired from outside the project area, including construction specialists, supervisory personnel, and inspectors who would temporarily relocate to the project area. Of the 148 jobs created by the operations phase, 26 percent (38 jobs) are direct jobs. The average annual earnings associated with these positions exceed $70,000, which is greater than the prevailing average annual salaries in the region and state. This Project would result in a small permanent decrease in local unemployment rates.

Collectively, the proposed facilities represent an investment of $550 million to local communities (RESI, 2004). Positive short-term economic impacts would result from construction material purchase, sales tax, miscellaneous purchases, labor wages paid to local workers, and construction worker expenditures. Over the long-term, Dominion would pay county property taxes, which could stimulate economic growth within project area communities.

Construction payroll dollars, construction material purchases spent locally, and short-term employee spending, including money spent on food, entertainment, recreation, housing, and miscellaneous purchases, would exhibit a positive economic impact on project area communities. The total Cove Point Expansion Project construction payroll is estimated at $20.4 million, with a total output of $45 million. Contractor payroll, payroll taxes, insurance, employee benefits, and union obligations are estimated at $30 million. Contractor-supplied materials, which are all materials purchased by the contractor and brought to the job, include all materials except pipe, valves, fittings, and major equipment. Contractor-supplied materials are estimated to contribute $40 million to the local economy. Approximately $16 million in construction materials would be purchased from southern Maryland and Maryland area suppliers.

Over the long-term, payroll associated with project operations is estimated at $32.8 million, with a total output of $273 million. In addition, Dominion would pay county property taxes, which would further help stimulate economic growth within project area communities.

TABLE 4.9.2-1

Local Economy and Workforce Composition (number of jobs)

State/County	Total for all Industries	Mining/ Agriculture	Construction	Manufacturing	Transportation and Public Utilities	Wholesale Trade	Retail Trade	Finance	Government
Maryland	2,608,457	16,178	181,280	189,327	127,294	72,621	273,339	186,159	581,611
Calvert	37,604	276	5,134	1,731	2,859	1,018	3,781	1,448	9,952
Prince George's	399,355	635	23,612	13,695	26,753	8,119	37,447	24,058	123,924
Charles	60,836	493	6,376	2,484	3,745	1,354	7,315	3,112	17,773
Pennsylvania	5,653,500	73,459	339,363	906,398	304,335	201,084	684,179	372,148	235,767
Juniata	10,584	578	988	2,499	696	369	983	588	657
Centre	64,663	1,116	3,116	6,824	1,986	838	6,762	2,573	2,265
Mifflin	20,466	888	1,162	6,178	923	632	2,760	624	749
Huntingdon	18,887	739	1,730	4,085	786	409	1,851	555	1,418
Clinton	16,895	458	1,066	4,140	765	356	2,151	454	714

Source: Data compiled from Pennsylvania State Data Center, http://pasda.hbg.psi.edu/pasda/census_2000.

Pipeline Facilities

Most of the workers hired from local workforces for construction of the proposed pipeline facilities would fill positions for clearing, road bores, hydrostatic testing, and right-of-way seeding; specialized workers would be hired from outside the project areas. No new permanent jobs would be created as a result of the proposed pipelines. Construction of the pipelines would result in a short-term decrease in local unemployment rates during the construction season, with pre-construction unemployment rates returning following the construction period.

In general, construction of the proposed pipelines would have a positive economic impact on the project areas through short-term contributions to local economies, which include the purchase of construction materials, sales tax, miscellaneous purchases, labor wages to local workers, and construction worker expenditures.

For the TL-532 Pipeline, the total anticipated workforce would be approximately 340 workers over a six-month period, 20 percent of which would be supplied from local sources. A majority of this workforce would be employed in Calvert and Charles Counties, Maryland, where 86 percent of the pipeline is located. During the first four weeks of construction, less than 100 personnel would be on-site with the majority being involved in clearing and grading operations, increasing to 150 during the next 4 weeks as stringing, pipe, and specialty road boring crews are added. Additional personnel would continue to join the workforce over the next two weeks, including crews involved in coating, lowering in, backfill, tie in, and cleanup operations. The workforce should peak at 340 and remain at that level for approximately 10 weeks, before declining for the remainder of the Project.

For the TL-532 Pipeline, the total construction payroll is estimated at $11 million. Approximately $2.2 million (20 percent) would go to local workers. Contractor-supplied materials expected to affect the local economy is estimated at $7 million. As with the PL-1 Pipeline, short-term spending by workers would create substantial tax revenues within the project area. Additionally, the 80 percent of the workforce that would be non-local would require temporary lodging. Assuming that these workers would stay in an approximately $70 per night hotel establishment, the revenue generated in local sales is approximately $7,840 per night. During the 12 weeks of peak construction, the TL-532 Pipeline would generate $659,000 in revenues for hotels alone. For all proposed pipelines, Dominion would pay annual county property taxes, which would help stimulate economic growth within project area communities.

For the PL-1 EXT2 Pipeline, the anticipated workforce during the primary construction phase would consist of approximately 280 workers over a six-month period, 35 percent of which are expected to come from the local workforce. A majority of that workforce would be distributed between Centre, Clinton, and Mifflin Counties, Pennsylvania, where most of the pipeline (42, 23, and 19 percent, respectively) is located. Approximately 85 workers would be required during the first four to six weeks for clearing and grading operations, with additional stringing, pipe, and road boring crews gradually over the next 4 weeks for a total of 225 workers. Over the next 4 to 6 weeks, the workforce would increase to 280 with crews added for coating, lowering, backfill, tie-in, and cleanup operations, and would remain at this level for an additional 4 to 6 weeks, then decline gradually for the remainder of the Project.

For the PL-1 EXT2 Pipeline, the total construction payroll is estimated at $10 million, including contractor payroll, payroll taxes, insurance, employee benefits, and union obligations, of which approximately $3.5 million (35 percent) would go to local workers. Contractor-supplied materials include material purchased by the contractor and brought to the job. For the pipeline, the contractor would supply most materials except pipe, valves, and fittings. The impact of contractor-supplied materials on the local economy is estimated at $13 million. Short-term spending by construction workers would include money spent on food, entertainment, recreation, housing, and miscellaneous purchases. Since 35 percent of the PL-1 EXT2 Pipeline workforce would be local, the remaining 65 percent would require lodging. During peak pipeline construction, assuming that the non-local workforce would stay in an approximately $55 per night hotel establishment, the revenue generated in local sales would be approximately $10,010 per night. During the four to six weeks of peak construction, the Project would generate approximately $420,420 in revenues for hotels.

New Compressor Stations

The Perulack and Centre Relay Compressor Stations would each require a temporary workforce of 100 workers, 35 percent of which would come from the local labor force. Local workers would primarily be hired for site clearing, grading, and revegetation; specialized workers would be hired from outside of the project areas. Only one permanent position would be created at each of the new compressor stations. Consequently, during the construction season, there would be a temporary reduction in the unemployment rates of the surrounding communities, however once construction ends, unemployment rates would return to pre-construction rates.

The overall revenue from the construction and operation of the compressor stations, including construction material purchase, sales tax, miscellaneous purchases, labor wages to local workers, and construction worker expenditure would have a positive short-term economic impact on local communities. The total construction payroll for the two proposed new compressor stations is estimated at $3.5 million, with approximately $1.2 million (35 percent) going to local workers. Contractor-supplied materials, which are all materials purchased by the contractor and brought to the job, would include all materials except pipe, valves, fittings, and major equipment. Short-term spending generated by the Project would create substantial tax revenue within the project area. Approximately 65 percent of the workforce would require lodging. Assuming that the non-local workforce would stay in an approximately $55 per night hotel establishment, the revenue generated in local sales is approximately $3,575 per night. During the four to six week peak construction period, construction of the Perulack and Centre Relay Compressor Stations would each generate $150,000 in revenues for hotels. During operation, Dominion would pay county property taxes on an annual basis.

4.9.3 Housing

Table 4.9.3-1 provides information on rental vacancy rates and summarizes the potential availability of rental housing by county and state. The 2000 rental vacancy rate ranged from 3.7 percent in Centre County, Pennsylvania, to 8.4 percent in Mifflin County, Pennsylvania. With the exception of one county in Maryland and one county in Pennsylvania, vacancy rates in all counties were lower than that of their respective states (6.1 percent in Maryland; 7.2 percent in Pennsylvania). In 2000, there were a total of 34,441 vacant units in the affected counties, representing 12.2 and 3.2 percent of the vacant units in Maryland and Pennsylvania, respectively.

Prince George's County, Maryland, had the greatest number of vacant units (15,768 units) and Juniata County, Pennsylvania, had the least (1,447 units). Of this total, approximately 31.8 percent were available for seasonal, recreational, or occasional use, ranging from 431 units in Charles County, Maryland, to 3,180 units in Huntingdon County, Pennsylvania. Of currently occupied units, a total of 156,408 units were renter-occupied. In addition to private lodging establishments, state parks provide other housing options with tent/trailer sites available statewide.

TABLE 4.9.3-1

Housing and Property Values in Project Area

State/County	2000 Rental Vacancy Rate (%)	Vacant Housing Units (no.)	Vacant Housing Units - Seasonal, Recreational, or Occasional Use (no.) a/	Renter-Occupied Housing Units (no.) b/	Median Value of Owner Occupied Units ($)	Median Gross Monthly Rent ($)
Maryland	6.1	164,424	38,804	639,108	146,000	689
Calvert	6.4	2,129	1,005	3,768	169,200	837
Prince George's	4.8	15,768	536	109,433	145,600	737
Charles	5.0	2,235	431	9,097	153,000	858
Pennsylvania	7.2	472,747	148,230	1,370,666	97,000	531
Juniata	5.4	1,447	945	1,914	87,000	395
Centre	3.7	3,838	1,536	19,645	114,900	565
Mifflin	8.4	2,332	1,082	4,782	73,300	384
Huntingdon	7.1	4,299	3,180	3,771	72,800	380
Clinton	5.7	3,393	2,557	3,998	78,000	411

Source: U. S. Census Bureau, Census 2000, and Pennsylvania State Data Center, http://pasdc.hbg.psu.edu/pasdu/census_2000.
a/ Includes units used or intended for use only in certain seasons, for weekends, or other occasional uses throughout the year; includes time-share condominiums.
b/ Includes houses, apartments, mobile homes, group of rooms, or single room that is occupied.

Non-local construction workers would temporarily reside at various locations in the vicinity of the proposed facilities and would temporarily increase the demand for housing. Because Dominion would not provide housing or dictate commuting distances, the areas in which workers would seek temporary housing cannot be identified or quantified. However, most construction workers are likely to choose to reside in areas with short commuting distances of the construction sites. Increases in the demand for temporary housing (*e.g.*, hotels, motels, campgrounds, and rental housing units) is likely to be concentrated in the counties where a majority of the pipeline corridors occur, or where aboveground facilities are located (see section 4.8 for miles of pipelines by county). However, due to the relatively short construction periods for all projects, and the nature of pipeline construction where construction crews pass through areas rapidly as they work along the pipeline, impacts to housing would be minimal. Short-term hotel/motel shortages may exist in tourist areas during summer months, however in most areas, the existing temporary housing should be adequate to meet demands required by the construction workforces. Additionally, because few permanent positions would be created, with the exception of the Cove Point Terminal expansion, the demand for housing would return to normal levels following construction. For the Cove Point Terminal expansion, the availability of vacant housing units in Calvert County would be adequate to support the projected increase in permanent employees.

4.9.4 Public Services

The project area provides a spectrum of community services, including law enforcement, fire, rescue, and emergency medical services, planning, and zoning that are administered by county governments, special districts, and municipalities. There are also numerous schools, parks, sanitation, and other special-purpose districts in the area. Public education for grades K through 12 is available throughout the project area, including both public and private schools.

There are numerous hospitals and other healthcare centers within the project area that provide a full spectrum of medical, surgical, and emergency care services. Trauma response and extended care facilities are widely available, however more extensive medical support could require patient transportation from more rural areas to facilities in some of the larger cities within the project area.

The Cove Point Terminal expansion may impact public services, however Dominion plans to minimize the impact on fire, rescue, and police through training and close cooperation of Dominion's contractors. Dominion has established a history of assisting fire departments in areas where facilities are located through contributions, training, and general support. Prior to construction, fire departments and emergency response agencies would be contacted to establish a relationship with these organizations and to establish timely response options and facilitate response coverage in case of an accident or injury. Dominion is currently participating in a program funded by the DOT that is being implemented by the NASFM to develop LNG firefighting training for those localities with LNG facilities. Dominion has participated in this LNG Industry Task Force since its inception and would continue to actively support this effort. See additional discussion of safety-related public service in section 4.12 of this EIS.

Construction of the proposed pipelines and the Perulack and Centre Relay Compressor Stations is not expected to impact public service in the respective project areas. For these facilities, Dominion would implement the same measures described above to minimize impacts to emergency services. Because construction crews are not expected to relocate their families to the project area during winter months, due to the length and timing of the construction season, impacts to other public services, such as schools, would be negligible.

4.9.5 Property Values

Median value of owner-occupied units in 2000 ranged from $72,800 in Mifflin County, Pennsylvania, to $169,200 in Calvert County, Maryland; the median value for owner-occupied units in Maryland and Pennsylvania was $146,000 and $97,000, respectively. Median gross monthly rent ranged from $411 in Clinton County, Pennsylvania, to $858 in Charles County, Maryland. Gross monthly rent for Maryland and Pennsylvania was $689 and $531, respectively. City and county-wide housing information and property values are summarized in table 4.9.3-1.

The proposed Cove Point Terminal expansion facilities would be placed within the existing LNG terminal limits, and would not change the terminal property limits or otherwise directly affect adjacent properties. The proposed new LNG storage tanks would be slightly visible from areas south of the terminal, however the visual impact of the new tanks would be minimal, and would be consistent with the existing views of the terminal facility (see additional discussion in

section 4.8.4). Therefore, the proposed expansion facilities would not alter the existing facility in a manner that would affect adjacent property values.

We received comments during the scoping process regarding potential property devaluation caused by construction and operation of proposed facilities, specifically the TL-532 Pipeline and the Centre Relay Compressor Station. Appraisal methods used to value land are based on objective characteristics of the property and any improvements. The impact that a pipeline or compressor station may have on the value of a tract of land depends on many factors, including the size of the tract, the values and land use of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals. This is not to say that a pipeline or compressor station would not affect resale values. A potential purchaser of property may make a decision to purchase based on his or her planned use, such as agricultural, future subdivision, or second home on the property in question. If the presence of a pipeline renders the planned use infeasible, it is possible that a potential purchaser would decide not to purchase the property. However, each potential purchaser has different criteria and differing capabilities to purchase land.

The effect that a pipeline easement may have on property values is a damage-related issue and should be negotiated between the parties during the easement acquisition process, or would be determined during condemnation proceedings. This negotiation is beyond the scope of this EIS.

Property taxes for a piece of property are generally based on the actual use of the land. Construction of the proposed pipelines would not change the general use of the land, but would preclude construction of aboveground structures on the permanent rights-of-way. If a landowner feels that the presence of a pipeline easement reduces the value of his or her land, resulting in an overpayment of property taxes, he/she may appeal the issue of the assessment and subsequent property taxation to the local property tax agency. This is the proper forum for this issue to be addressed.

4.9.6 Transportation

A network of interstate highways, state highways, county roads, and privately maintained roadways provide access throughout the project areas. Interstate 80 is a major transcontinental corridor connecting California and New York City that serves as the main transportation gateway in the Pennsylvania project areas. U.S. Highway 220 is a major north-south highway connecting central Pennsylvania and Maryland, and runs diagonally from the southwest to the northeast through Centre and Clinton Counties. U.S. Highway 322 connects the northwest and southeastern portions of Pennsylvania, crossing through Centre, Mifflin, and Juniata Counties. Additionally, U.S. Highway 522 runs southwest to northeast across Mifflin County. Finally, State Route 120 traverses Clinton County. In the vicinity of the Cove Point LNG Terminal in southern Calvert County, State Route 2/4 is the primary north-south route. Other major traffic routes that would be crossed by the TL-532 Pipeline in Maryland include State Route 235, U.S. Highway 301, and State Route 210.

Highways are paved and are generally in good condition throughout the year. County and private roads may be paved or dirt and gravel. Transportation hazards include snow and ice during winter months, but public transportation departments are well equipped for removal of normal snow accumulations.

During construction of the Cove Point Terminal expansion facilities, there could be some minor impacts to traffic associated with the transport of construction materials and movement of construction equipment, and daily commuting of workers to the project site. Peak traffic periods would likely be from 6:00 a.m. to 6:00 p.m., Monday through Saturday. Local communities may experience increase in traffic at the beginning and end of construction shifts. Dominion has stated that it is not able to quantify the estimated number of vehicle trips to the site or determine when deliveries would occur. Dominion would attempt to coordinate these activities to minimize impacts to surrounding communities. In addition, if damage to roadways occurs as a result of this Project, Dominion would repair those roadways to previous or improved conditions.

During construction of the proposed pipelines, there would be minor and short-term increases in traffic along the transportation network in the project areas. There would be slight increases in traffic volumes resulting from the movement of construction equipment and materials to work areas along the pipeline right-of-way, and from the daily commuting of pipeline workers. Construction-related traffic would be greatest around pipe/contractor yards where several trips would be made each day and where activity would be concentrated. The amount of construction-related traffic along any one area of the pipeline route would vary depending on the stage of construction at that area.

To minimize construction-related traffic during pipeline construction, workers would park vehicles at warehouses and pipeyards and would be bussed to the construction site. Construction would occur primarily during daylight hours, with peak construction traffic expected from 6:00 a.m. to 6:00 p.m., Monday through Saturday. The communities near designated parking lots may also experience heavy traffic during the beginning and end of construction shifts. Dominion would attempt to arrange construction hours to minimize this impact.

Traffic delays could also be caused by open-cut construction methods used along some unpaved roads. Single-lane excavation and the use of steel decking or temporary road detours would be employed to limit public inconveniences. Dominion would be required to obtain federal, state, or local road crossing permits for certain pipeline road crossings, including those crossed by open cut. Road crossing permits typically include requirements for traffic control and other safety requirements to be employed during road crossings to minimize impact of the construction activity on traffic. To minimize impacts on heavier trafficked roads, Dominion would cross these roadways by boring underneath.

4.10 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires the FERC to take into account the effect of its undertakings (including authorizations under Sections 3 and 7 of the NGA) on properties listed, or eligible for listing, on the NRHP, and to provide the ACHP an opportunity to comment. Dominion, as a non-Federal party, is assisting the FERC in meeting its obligations under Section 106 and the implementing regulations at 36 CFR 800.

4.10.1 Existing Environment

4.10.1.1 Cultural Resource Surveys

Maryland

LNG Terminal

Dominion completed a Phase I cultural resources survey for the proposed Cove Point LNG Terminal expansion facilities project area (GAI, 2004a), and provided a report to the FERC and the Maryland SHPO. No archaeological resources were identified. One structure (the Little Cove Point School) greater than 50 years of age was identified within 1,000 feet of the project area. The Little Cove Point School has been altered and lacks historical and architectural significance and was recommended as not eligible for the NRHP. The Maryland SHPO indicated that it had no concerns regarding the project area.

TL-532 Pipeline

For the TL-532 Pipeline, Dominion conducted a Phase I cultural resources survey (including archaeological and architectural survey) along approximately 43.5 of 47.7 miles of the proposed right-of-way, 21 access roads and one pipeyard. A 150- to 200-foot-wide corridor was surveyed. Archaeological survey was not completed for approximately 4.2 miles of the proposed pipeline due to denied access. Architectural survey was not completed for numerous access roads and pipeyards. A Phase I Interim Report (GAI, 2005b) was provided to the FERC and the Maryland SHPO.

The survey identified a total of 41 archaeological sites (27 prehistoric and 14 historic sites) and nineteen architectural resources. In addition, 70 isolated finds were identified. Twenty of the prehistoric sites (18Cv449, 18Cv451, 18Cv452, 18Pr721, 18Pr723, 18Pr724, 18Pr725, 18Pr727, 18Ch654, 18Ch729, 18Ch731, 18Ch732, 18Ch733, 18Ch734, 18Ch735, 18Ch736, 18Ch737, 18Ch745, 18Ch739, and 18Ch740) were recommended as potentially eligible for the NRHP. Avoidance or Phase II evaluation testing was recommended for these sites. Six prehistoric sites (18Cv450, 18Cv459, 18Cv460, 18Pr722, 18Pr726, and 18Ch730) were recommended as not eligible for the NRHP, and no further work was proposed. One prehistoric site (18Pr101) was recommended as non-contributing to NRHP eligibility within the construction work zone, with no further work proposed. Of the 14 historic archaeological sites identified, 8 (18Cv457, 18Cv458, 18Pr728, 18Pr730, 18Ch741, 18Ch 742, 18Ch 743, and 18Ch 744) were recommended as not eligible for the NRHP with no further work proposed, while 6 (18Cv152, 18Cv453, 18Cv454, 18Cv456, 18Pr729, and 18Pr731) were recommended as potentially NRHP-eligible. Avoidance or Phase II evaluation testing was recommended for these six sites.

Only 2 of the 19 architectural resources (the Woodville School, and the Pope's Creek Branch of the Pennsylvania Railroad) were recommended as potentially eligible for the NRHP. The Woodville School is located outside the construction zone and would be avoided. Dominion would bore beneath the Pope's Creek Branch of the Pennsylvania Railroad to avoid affecting this resource. All of the isolated finds were recommended as not eligible for the NRHP. In addition, Dominion conducted a reconnaissance for deeply buried deposits at two locations along the TL-532 Pipeline. Examination at the western terminus of the project did not reveal the potential for buried deposits. Bucket augering at a second location along the west bank of the Patuxent

River did not reveal the presence of buried soils, however, Dominion proposed additional backhoe trenching at this location. In a letter dated February 15, 2005, the Maryland SHPO concurred with the recommendations in the report with the exception of sites 18Cv453, 18Ch654, and 18Pr101. The SHPO recommended no further study for site 18Cv453, rather than Phase II work. The SHPO indicated site 18Ch654 was eligible for the NRHP, and recommended avoidance or Phase III data recovery. Additionally, the SHPO felt there was insufficient data for an eligibility recommendation for 18Pr101, but recommended no further study. The SHPO also indicated that the project would have "no effect" on the architectural resources. We agree with the SHPO.

Dominion provided an Addendum Report for Supplemental Phase I surveys (GAI, 2005d) and a Second Addendum Report for Additional Phase I Cultural Resources Survey (GAI, 2005h) for some, but not all of the previously denied access areas, reroutes, and alternatives to the FERC and the SHPO. As a result of the supplemental surveys, 7 prehistoric sites (18Cv466, 18Cv467, 18Pr101, 18Ch736, 18Ch737, 18Ch745, and 18Ch747), 5 historic sites (18Cv454, 18Cv462, 18Cv463, 18Cv464, and 18Cv468), 1 prehistoric/historic site (18Cv465), 10 architectural resources, and 38 isolated finds were identified. Of these, previously identified sites (see the above discussion) 18Cv454, 18Cv463, 18Ch736, 18Ch737, and 18Ch745, newly identified sites 18Cv466 and 18Cv467, and one architectural resource (Sedwick Family Cemetery/Oakland Hall) were recommended as potentially eligible for the NRHP. Avoidance or Phase II evaluation testing was recommended for sites 18Cv454, 18Cv463, 18Ch736, 18Ch737, and 18Ch745. It was recommended that 18Cv466, along an access road, be protected with geotextile fabric or timber matting resulting in no effect to this site. Site 18Cv467 would be avoided by directional drill. Dominion also recommended that because the pipeline would be installed underground it would produce no new visual intrusions, and thus there would be no effect on the Sedwick Family Cemetery/Oakland Hall. In addition, remote sensing investigation of one property identified nine anomalies that may be possible gravesites within the right-of-way. Additional archaeological investigation was conducted for seven of these anomalies. Two would be avoided. No evidence of human burials was identified as a result of testing. In letters dated June 15, 2005 and July 25, 2005, the Maryland SHPO concurred with the recommendations in the reports. We also concur.

Dominion provided a Third Addendum Report for a denied access area, two reroutes, and two access roads. As a result of the survey, two prehistoric sites (18Ch749 and 18Ch750) were identified. Site 18Ch750 was recommended as not eligible for the NRHP, and Phase II testing was recommended for site 18Ch749. We are currently awaiting the Maryland SHPO's comments on the Third Addendum report.

In its April 28, 2005 data response, Dominion indicated that, to date, it would avoid and install exclusionary fencing at sites 18Cv449, 18Cv451, 18Cv454, and 18Pr721.

<u>Pennsylvania</u>

PL-1 EXT2 Pipeline

For the PL-1 EXT2 Pipeline, Dominion conducted a Phase I cultural resources survey (including archaeological and architectural survey) along the proposed right-of-way, extra work spaces, access roads, and pipeyards. A 130- to 200-foot-wide corridor was surveyed. A Phase I

Management Summary was provided to the FERC and the Pennsylvania SHPO (GAI, 2004b). Six prehistoric (36Mi103, 36Mi105, 36Ce342, 36Ce518, 36Ce519, and 36Cn218) and four historic archaeological sites (36Ju116, 36Mi102, 36Mi104, and 36Cn217), nine architectural resources, and one isolated find were reported. Four of the six prehistoric sites (36Mi103, 36Ce342, 36Ce518, and 36Ce519) and one historic site (36Mi102 – the Juniata Canal) were recommended as potentially eligible for the NRHP. Avoidance or additional testing/evaluation was recommended for these sites. Four of the architectural resources (the Pennsylvania Railroad, Bald Eagle Valley Railroad, Philadelphia and Erie Railroad, and Philadelphia and Erie Branch of the Pennsylvania Railroad-Renovo Yard) were recommended or determined eligible for the NRHP. Dominion would directionally drill beneath the three railroads to avoid affecting them. Dominion recommended a finding of "no effect" for the Philadelphia and Erie Branch of the Pennsylvania Railroad-Renovo Yard because project use would be limited to a pipe yard, and none of the extant buildings on the property would be disturbed. The isolated find was recommended as not eligible for the NRHP.

In a letter dated December 6, 2004, the Pennsylvania SHPO agreed that sites 36Ju116, 36Mi104, 36Mi105, 36Mi218, and 36Cn217 were not eligible for the NRHP and that sites 36Mi102, 36Mi103, 36Ce342, 36Ce518, and 36Ce519 were eligible for the NRHP. The SHPO also recommended that Phase II investigations should be performed at the eligible sites if they could not be avoided by the project. In a subsequent letter of December 9, 2004, the SHPO indicated that the portion of the Juniata Canal within the project area was non-contributing to NRHP eligibility. In a letter dated January 13, 2005, the SHPO commented on the architectural aspects and concurred with the eligibility recommendations with the exception of the Bald Eagle Valley Railroad, and Philadelphia and Erie Branch of the Pennsylvania Railroad-Renovo Yard, both of which the SHPO indicated were not eligible for the NRHP. The SHPO also indicated that the project would have "no effect on historic properties…". We agree with the SHPO.

Dominion provided a subsequent Phase I-II Archaeological Survey and Testing Report (GAI, 2005e) for survey of additional access roads, pipe yards, and ground beds, and testing of site 36Mi102. The report indicated that potentially eligible sites 36Mi103, 36Ce342, 36Ce518, and 36Ce519 would be avoided by directional drill or reroute, therefore, Phase II testing was not conducted. One new site, the Woods Farm Site, was identified and recommended as not eligible for the NRHP. As a result of testing, site 36Mi102 was recommended as non-contributing to NRHP eligibility in the project area. In a letter dated April 8, 2005, the Pennsylvania SHPO concurred that site 36Mi102 and the Woods Farm site were not eligible for the NRHP. We agree.

Dominion also conducted a supplemental survey of a reroute around a proposed mine. Previous studies covered a portion of this reroute. Dominion provided an Addendum Phase I survey report (GAI, 2005g) and the previous studies (Munford 1990a, Munford 1990b) to the FERC and the Pennsylvania SHPO. No sites were recorded during the current survey, but three sites (36Ce357, 36Ce358, and 36Ce519) were identified by the previous survey. Sites 36Ce357 and 36Ce358 were recommended as not eligible for the NRHP with previous SHPO concurrence. Site 36Ce519 was recommended as eligible for the NRHP. This site would be fenced and avoided. In a letter dated June 21, 2005, the Pennsylvania SHPO agreed with the recommendations in the report. We agree also.

TL-536 Pipeline

Two previous surveys (Kemron, 1995; GAI, 2004) covered most of the proposed TL-536 Pipeline project area. Based on this prior work, the SHPO agreed that no additional work would be required for these areas for the current project. One site (36PO23) was identified by the prior surveys, but would be fenced and avoided by the current construction. The Pennsylvania SHPO agreed that no further work was necessary. Dominion conducted a supplemental survey of previously unsurveyed areas of the proposed TL-536 Pipeline project area and provided a Phase I report (GAI, 2004c) to the FERC and the Pennsylvania SHPO. No cultural resources were identified during the survey. In a letter dated January 26, 2005, the Pennsylvania SHPO agreed that no further archaeological work was necessary. We agree.

TL-453 EXT1 Pipeline

A previous survey covered most of the proposed TL-453 EXT1 Pipeline project area. Dominion conducted a supplemental survey of previously unsurveyed areas of the proposed TL-453 EXT1 Pipeline project area and provided an Addendum Phase I survey report (GAI, 2004d) and the previous survey report (Horizon Research, 2000) to the FERC and the Pennsylvania SHPO. No cultural resources were identified during the previous or current supplemental survey. In a letter dated February 14, 2005, the Pennsylvania SHPO agreed that no further archaeological work was necessary. We agree also.

Dominion provided a supplemental survey (GAI, 2005i) of a reroute for the TL-453 EXT1 pipeline to the FERC and the Pennsylvania SHPO. No cultural resources were identified and no further work was recommended. We are currently awaiting the SHPO's comments on the report.

TL-492 EXT3 Pipeline

Dominion conducted a Phase I survey of the TL-492 EXT3 Pipeline. In addition to a 150-foot-wide corridor for the pipeline right-of-way, 19 access roads and one pipeyard were examined. The Phase I report (GAI, 2004e) resulting from this survey was provided to the FERC and the SHPO. One archaeological site (36GR0278) with both prehistoric and historic materials was identified and recommended as not potentially eligible for the NRHP. In a letter dated February 21, 2005, the Pennsylvania SHPO agreed that the site was not eligible for the NRHP and that no further archaeological work was necessary. We agree.

Perulack Compressor Station

Dominion conducted a Phase I survey of the proposed Perulack Compressor Station and provided a Phase I survey report (GAI, 2005a) to the FERC and the SHPO. One historic site (36Ju117) was identified and Phase II evaluation was recommended. In a letter dated February 23, 2005, the Pennsylvania SHPO agreed with the recommendation for Phase II evaluation at 36Ju117. Dominion conducted Phase II evaluation of site 36Ju117 and provided a Phase II report to the FERC and the SHPO (GAI, 2005c). As a result, 36Ju117 was recommended as not potentially eligible for the NRHP. In a letter dated May 6, 2005, the SHPO concurred and so do we.

Centre Relay Compressor Station

Dominion conducted a Phase I survey of the proposed Centre Relay Compressor Station and provided a Phase I survey report (GAI, 2005a) to the FERC and the SHPO. No archaeological sites were identified. Six architectural resources greater than 50 years of age were identified. Of these resources, only the Abraham S. Valentine Farmstead was recommended as potentially eligible for the NRHP and an assessment of effect was also recommended. In a letter dated February 23, 2005, the Pennsylvania SHPO agreed with these recommendations. Dominion provided a "Criteria of Effects Letter Report" (GAI, 2005j) to the FERC and the SHPO. The report concluded that because visual and audible effects caused by construction of the compressor station would be no greater than intrusions already present in the area (*e.g.*, a railroad, industrial complexes, a stone quarry, and a highway), construction of the Centre Relay Compressor Station would have "no effect" on the Abraham S. Valentine Farmstead. In a letter dated June 28, 2005, the Pennsylvania SHPO indicated that the Abraham S. Valentine Farmstead was eligible for the NRHP, but the Project would have "no effect" on the resource. We agree.

Leidy Measuring and Regulating Station

Dominion conducted a field reconnaissance of the Leidy Measuring and Regulating Station Upgrade work area. Dominion provided a Cultural Resource Notice (January 6, 2005) to the FERC and the Pennsylvania SHPO, in which Dominion reported the area to be entirely disturbed and recommended no additional work. In a letter dated February 11, 2005, the SHPO indicated that there were no eligible or listed historic or archaeological properties in the area of the proposed Project. We agree.

Chambersburg Compressor Station

Dominion contacted the SHPO (Cultural Resource Notice dated October 29, 2002) regarding the Chambersburg Compressor Station under a previous docket (CP03-41-000). In a letter dated November 5, 2002, the SHPO indicated that "there are no National Register eligible or listed historic or architectural properties in the area of this proposed Project." We concur with the SHPO.

PL-1 Pressure Restoration

Dominion conducted a field reconnaissance of the PL-1 Pressure Restoration Sites. Dominion provided a Cultural Resource Notice (January 6, 2005) to the FERC and the SHPO which concluded that the areas to be disturbed have no potential for archaeological sites, would have no effect on architectural resources, and recommended no additional work. In a letter dated January 19, 2005, the SHPO indicated that there were no NRHP eligible or listed historic or archaeological properties in the area of the proposed Project. We agree.

PL-1 Pressure Replacement

Dominion conducted a field reconnaissance of the PL-1 Pressure Replacement Section. Dominion provided a Cultural Resource Notice (January 6, 2005) to the FERC and the SHPO which concluded that the areas to be disturbed have no potential for archaeological sites, would have no effect on architectural resources, and recommended no additional work. In a letter dated January 19, 2005, the SHPO indicated that a Phase I archaeological survey would be necessary.

Dominion conducted a survey of the PL-1 Pressure Replacement Section and provided a report (GAI, 2005f) to the FERC and the Pennsylvania SHPO. No cultural resources were identified. In a letter dated June 3, 2005, the Pennsylvania SHPO agreed with the recommendations in the report and indicated that no further archaeological work was necessary. We agree.

Virginia

Leesburg Compressor Station

Dominion conducted a cultural resources survey for the Leesburg Compressor Station under a previous docket (CP03-41-000). Two previously recorded historic sites were identified, one (44LD461) outside the construction area, and one (44LD460) with no surface evidence. In a letter dated March 27, 2003, the Virginia SHPO indicated that there would be "no adverse effect" on sites 44LD460 and 44LD461, and that no further survey was needed. We agree. In addition, in a letter dated August 11, 2005, the Virginia SHPO indicated that site 44LD460 was not eligible for the NRHP.

West Virginia

TL-492 EXT3 Pipeline

Dominion completed a Phase I survey of the portion of the TL-492 EXT3 Pipeline located within West Virginia and provided a Phase I report (GAI, 2004e) to the FERC and the West Virginia SHPO. No cultural resources were identified. In a letter dated February 2, 2005, the West Virginia SHPO concurred with Dominion's findings and indicated that the Project would have "no effect" on historic properties. We agree.

Mockingbird Hill Compressor Station

Dominion contacted the West Virginia SHPO regarding the Mockingbird Hill Compressor Station under a previous docket (CP03-41-000). In a letter dated December 5, 2002, the SHPO indicated that the proposed Project would have no effect on architectural resources, and that no known NRHP listed or eligible archaeological sites would be affected by the Project. Dominion also provided a cultural resources survey letter report (August 2, 2004) for an access road for the compressor station. A light scatter of historic/modern trash was identified and not considered an archaeological site. In a letter dated August 23, 2004, the SHPO concurred and indicated that "no known archaeological site will be affected by the proposed Project." We agree.

Wolf Run Compressor Station

Dominion conducted a cultural resources survey for the Wolf Run Compressor Station under a previous docket (CP04-365-000). No cultural resources were identified. In a letter dated July 27, 2004, the West Virginia SHPO indicated that no NRHP listed or eligible architectural or archaeological properties would be affected by the Project. We agree.

New York

Quinlan Compressor Station

The Quinlan Compressor Station Upgrade was covered by survey conducted under a previous docket (CP04-365-000). Three historic oil production sites were identified, none of which were recommended as eligible for the NRHP. In a letter dated August 30, 2004, the New York SHPO concurred with these recommendations and indicated the Project would have "no effect" on historic properties. We agree.

Unanticipated Discoveries

Dominion provided plans for handling the unanticipated discovery of historic properties and human remains during construction. We requested revisions to the plans. Dominion has provided revised plans which we find acceptable.

Native American Consultation

Dominion contacted the Seneca Nation of Indians, the Piscataway Conoy Confederacy and Subtribes, and the Maryland Commission of Indian Affairs regarding the proposed Project. Dominion also conducted follow-up telephone calls to these groups. The Seneca Nation Tribal Historic Preservation Office responded and indicated its interest in reviewing the cultural resources reports. The Seneca Nation Tribal Historic Preservation Office also requested that an archaeological monitor be present during pipeline construction along archaeologically sensitive portions of the TL-453, TL-536, and TL-492 Pipelines. Dominion indicated it would have trained environmental inspectors monitoring construction. The Piscataway Conoy Confederacy and Subtribes indicated that they had no questions about the Project to date, but requested a copy of project cultural resources reports. GAI Consultants has provided the Seneca Nation Tribal Historic Preservation Office and Piscataway Conoy Confederacy and Subtribes with copies of project cultural resources reports. In a letter dated August 9, 2005, the Seneca Nation concurred with the results of the Addendum II report for the TL-453 EXT 1 Pipeline. No other comments on the reports have been received to date.

We sent copies of our October 14, 2004 NOI to the Seneca Nation of Indians, the Piscataway Conoy Confederacy and Subtribes, and the Maryland Commission of Indian Affairs. The Seneca Nation Tribal Historic Preservation Office responded and indicated that it did not wish to take part in the project review process, but suggested that the Cayuga be contacted. Dominion contacted the Cayuga regarding the Project. No other responses have been received to date.

4.10.2 Environmental Consequences

4.10.2.1 Impact and Mitigation

Construction and operation of the terminal expansion, pipelines, and associated below- and aboveground facilities could affect historic properties. Project impacts could be direct or indirect. Direct impacts could include the physical destruction or damage to all or a portion of a site, or alteration or removal of a property. Indirect impacts could include the introduction of visual, atmospheric, or audible elements that would diminish the integrity of the site or alter settings associated with historic properties.

Mitigation measures may range from data recovery, including the scientific excavation of archaeological sites; to detailed documentation, including architectural drawings of historic buildings; to the use of landscaping techniques to screen visual intrusions and maintain site settings.

If historic properties would be adversely affected, the FERC would require Dominion to produce treatment plans indicating how impacts on historic properties would be reduced or mitigated. Once approved by the appropriate parties, implementation of the treatment plans would occur only after the FERC issues a certificate for the Project, and provides written notification to proceed.

4.10.2.2 Compliance with NHPA

Dominion has not yet completed cultural resources studies in Maryland and Pennsylvania. Consequently, we have not completed the process of complying with section 106 of the NHPA.

To ensure that the Commission's responsibility under the NHPA and its implementing regulations are met, **we recommend that:**

- **Dominion should defer construction and use of facilities, and use of staging, storage, temporary work areas, and new or to-be-improved access roads, until:**

  a. **Dominion files archaeological and architectural survey reports for the remaining denied access areas and other areas requiring survey on the TL-532 Pipeline, and the Maryland SHPO's comments on the reports;**

  b. **Dominion files a Phase II evaluation report for potentially eligible sites that cannot be avoided on the TL-532 Pipeline, and the Maryland SHPO's comments on the report;**

  c. **Dominion files the report on backhoe testing of the west bank of the Patuxent River on the TL-532 Pipeline, and the Maryland SHPO's comments on the report;**

  d. **Dominion explores avoidance of site 18Ch654 on the TL-532 Pipeline, and files the results of this investigation, and the Maryland SHPO's comments;**

  e. **Dominion files the Maryland SHPO's comments on the TL-532 Pipeline Third Addendum Report (July 2005);**

  f. **Dominion files the Pennsylvania SHPO's comments on the Phase I Survey Report (April 27, 2005) for a reroute on the TL-453 EXT1 Pipeline;**

  g. **Dominion files any required treatment plans for Maryland and Pennsylvania, and the SHPOs' comments on the plans;**

  h. **the Advisory Council on Historic Preservation is afforded an opportunity to comment, if historic properties would be adversely affected; and**

i. **the Director of OEP reviews and approves all cultural resources reports and plans, and notifies Dominion in writing that it may proceed with the treatment plans or construction.**

All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold letter: "CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE."

4.11 AIR QUALITY AND NOISE

4.11.1 Air Quality

Ambient air quality is protected by federal and state regulations. Federal and state air quality standards are designed to protect human health. The EPA has developed National Ambient Air Quality Standards (NAAQS) for criteria air pollutants such as nitrogen oxides (NO_x) and carbon monoxide (CO), the primary pollutants emitted by natural gas-fired compression facilities. Other criteria air pollutants include ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and inhalable particulate matter ($PM_{2.5}$ and PM_{10}). $PM_{2.5}$ includes particles with an aerodynamic diameter less than or equal to 2.5 microns, and PM_{10} includes particles with an aerodynamic diameter less than or equal to 10 microns. The NAAQS were set at levels the EPA believed were necessary to protect human health and welfare.

Air Quality Control Regions (AQCRs) are areas for which implementation plans describe how ambient air quality standards will be achieved and maintained. AQCRs are defined by the EPA and state agencies in accordance with Section 107 of the CAA. If measured ambient air pollutant concentrations for a subject area remain below the NAAQS criteria, the area is considered to be in attainment with the NAAQS.

Federal Air Quality Requirements

The CAA of 1970, 42 USC 7401 *et seq*., as amended in 1977 and 1990, and Title 40 of the CFR Parts 50-99 are the basic Federal statutes and regulations governing air pollution in the United States. We have reviewed the following Federal requirements to determine their applicability to the proposed Cove Point LNG Terminal Expansion.

New Source Review

Separate procedures have been established for Federal pre-construction review of certain large proposed projects in either attainment areas or non-attainment areas. The Federal pre-construction review for new or modified sources located in attainment areas is Prevention of Significant Deterioration (PSD). The review process is intended to prevent the new source from causing existing air quality to deteriorate beyond acceptable levels. The Federal pre-construction review for new or modified major sources located in non-attainment areas is commonly called Non-attainment New Source Review (NNSR). NNSR only applies to the pollutants or their precursors that are classified as non-attainment. A new facility can undergo both PSD and NNSR review, depending on the emissions of various pollutants and the attainment status of the area. Counties in which proposed facilities would be constructed or modified are in attainment

for all criteria pollutants with the exception of ozone and $PM_{2.5}$. Therefore, certain portions of the proposed Project are subject to NNSR permitting.

PSD regulations impose stringent limits (known as PSD Increments) on the amount that a stationary source may degrade the existing air quality levels.

The emission threshold for "major stationary sources" varies under PSD according to the type of facility. As defined by 40 CFR Part 52.21 (b)(1)(i), a facility is considered major under PSD if it emits or has the potential to emit 250 tons per year (tpy) or more of any criteria pollutant or 100 tpy for specified source categories. There are no processes at the any proposed facilities that are included as a specified source category; therefore the PSD threshold for the proposed facilities is 250 tpy.

A change at a major source which results in a net emission increase of 40 tpy for volatile organic compounds (VOCs), NO_x, and SO_2; 100 tpy for CO; or 0.6 tpy for lead is considered a significant emissions increase per 40 CFR 51.165. Major sources and modifications that produce a significant emissions increase are reviewed for compliance with the PSD regulations and must control emissions through the use of best available control technology (BACT). Permit applications to respective state agencies are required for these facilities, which must include review of existing air quality and must apply analytic dispersion models to demonstrate compliance with NAAQS and applicable PSD requirements. Minor sources are not considered to have a significant impact to air quality and are not subject to analysis or review.

PSD review for major stationary sources and major modifications includes: an assessment of the existing air quality; the use of analytic dispersion models to demonstrate compliance with the NAAQS and applicable PSD increments; a demonstration that BACT has been applied to the subject emission sources; and an assessment of the impact of new emissions on the environmental resources such as soils and vegetation. If the source is located within 62 miles of a federal Class I area (Class I areas include selected international parks, national wilderness areas, national parks, and national memorial parks), the impacts must be evaluated at these areas based on the more stringent Class I PSD increments.

The PSD permit would contain emission limits and other operating, monitoring, record keeping, and reporting requirements based on air quality modeling. The air quality modeling includes emissions from the proposed modification and other sources in the area to ensure protection of the NAAQS and to prevent emission increases beyond a specified amount, called a PSD increment. The emission limits contained in the PSD permit are required to represent the BACT. BACT is determined on a case-by-case basis, taking into account energy, environmental, and economic impacts and costs.

Non-attainment New Source Review

Construction of sources in non-attainment areas must be reviewed in accordance with the NNSR regulations. As discussed above, several project areas the project are is designated as "non-attainment" for ozone or within the Northeast Ozone Transport Region (NOTR). As such, there are special requirements for sources of VOC and NOx because these pollutants are precursors to ground-level ozone formation and are regulated by section 182(f) of the CAA for ozone non-

attainment areas. In addition, the MDE may establish requirements under NNSR for emissions of $PM_{2.5}$.

New Source Performance Standards

New Source Performance Standards (NSPS), codified at 40 CFR 60, establish emission limits and associated requirements for monitoring, reporting, and recordkeeping for specific emission source categories. NSPS apply to new, modified, or reconstructed sources. The following NSPS requirements were identified as potentially applicable to the specified sources at the facilities.

Subpart Db of 40 CFR 60, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units. Subpart Db lists affected emission sources as fuel-fired steam-generating units with a heat input capacity of 100 MMBTU/hr to 250 MMBTU/hr. The definition of an applicable unit includes sources that produce steam or hear water or any other heat transfer medium.

Subpart GG of 40 CFR 60, Standards for Performance for Stationary Gas Turbine. Subpart GG applies to new, modified, or reconstructed stationary gas turbines with a heat input at peak load of greater than or equal to 10 million British thermal units per hour (MMBtu/hr). The new turbines that would be installed as a part of the Project are greater than 10 MMBtu/hr and are therefore subject to NSPS subpart GG. Subpart GG establishes NO_x emission limits and fuel sulfur content limits. The gas turbines would meet the requirements of subpart GG by burning only pipeline quality natural gas.

Subparts Ka and Kb of 40 CFR 60, Standards of Performance for Volatile Organic Liquid Storage Vessels. Subparts Ka and Kb list affected emission sources as storage vessels containing volatile organic liquids with regulatory applicability being dependent on the construction date of the storage vessel. No facilities would operate volatile organic liquid storage tanks greater than 10, 566 gallons in capacity that meet the applicability requirements listed in 40 CFR 60.110b. Therefore, these regulations are not applicable.

National Emissions Standards for Hazardous Air Pollutants

The NESHAPs, codified in 40 CFR Parts 61 and 63, regulate hazardous air pollutant (HAP) emissions. Part 61 was promulgated prior to the 1990 Clean Air Act Amendments (CAAA) and regulates only eight types of hazardous substances (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride).

The 1990 CAAA established a list of 189 HAPs, resulting in the promulgation of Part 63. Part 63, also known as the Maximum Achievable Control Technology (MACT) standards, regulates HAP emissions from major sources of HAP emissions and specific source categories that emit HAPs. Part 63 defines a major source of HAPs as any source that has the potential to emit 10 tpy of any single HAP or 25 tpy of HAPs in aggregate.

LNG storage and processing facilities do not fall under one of the source categories regulated by Part 61; therefore, the requirements of Part 61 are not applicable to the Cove Point LNG terminal. Part 63 establishes HAP emission standards for marine vessel loading operations (Subpart Y); oil and gas production facilities (Subpart HHH); natural gas transmission and storage facilities (Subpart HHH); industrial, commercial, and institutional boilers and process

heaters (Subpart DDDDD); Stationary gas turbines (Subpart YYYY) and reciprocating internal combustion engines (Subpart ZZZZ). All of these subparts establish requirements for major sources of HAPs only.

Maximum Achievable Control Technology

Under 40 CFR 63, MACT standards apply to major sources of HAPs in certain source categories. Emissions of HAPs from the proposed Project would not exceed the associated major source thresholds under 40 CFR 63 (10 tpy of any individual HAP and 25 tpy for all HAPs). Therefore, no MACT standards apply to the proposed facility.

Chemical Accident Prevention Provisions

40 CFR Part 68, Chemical Accident Prevention Provisions, is a Federal regulation designed to prevent the release of hazardous materials in the event of an accident and minimize impacts when releases do occur. The regulation contains a list of substances and threshold quantities for determining applicability of the rule to a facility. If a facility stores, handles or processes one or more substances on this list and at a quantity equal or greater than specified in the regulation, the facility must prepare and submit a risk management plan (RMP). If a facility does not have a listed substance on-site, or the quantity of a listed substance is below the applicability threshold, the facility does not have to prepare an RMP. However, it still must comply with requirements of the general duty provisions in Section 112(r)(1) of the CAA 1990 Amendments if it has any regulated substance of other extremely hazardous substance on-site. The general duty of the provision is as follows:

"The owners and operators of stationary sources producing, processing, handling and storing such substances have a general duty …. To identify hazards which may result from such releases using appropriate hazard assessment techniques, to design and maintain a safe facility taking such steps as are necessary to prevent releases, and to minimize the consequences of accidental releases which do occur."

With the exception of natural gas constituents (*e.g.*, methane, ethane, propane, etc.), no regulated substance would be handled or stored in quantities greater than the applicability threshold. Natural gas pipelines are not covered if they are regulated by the U.S Department of Transportation (DOT) or an equivalent state natural gas program certified by DOT in accordance with 49 CFR 6010.5. In addition, storage of natural gas incidental to transportation (*e.g.*, gas taken from a pipeline during non-peak periods and placed in storage, then returned to the pipeline when needed) is not covered. Consequently, an RMP is not required for any portion of the Project. Dominion would be required to maintain awareness of hazard issues and meet the goals of the above-listed general duty provisions.

Title V Operating Permit

The Title V Operating Permit Program, as described in 40 CFR Part 70, requires major sources of air emissions and certain affected non-major sources to obtain a Federal operating permit. The major source emissions thresholds for determining the need for a Title V operating permit are: 100 tpy of any regulated air pollutant, 10 tpy of any individual HAP, or 25 tpy for all HAPs.

Control of Air Pollution from Marine Compression-Ignition Engines

Regulation 40 CFR 94 (*Federal Register*, 2/28/03, 9746-9789) imposes regulations on marine compression-ignition engines manufactured on or after January 1, 2004. This standard does not apply to engines rated <37 kilowatts (kW), or engines on foreign vessels. Any U.S. flagged or registered vessels equipped with affected compression ignition engines manufactured after January 1, 2004 would meet all applicable requirements of this subpart, however, there are currently no U.S. flagged LNG vessels.

Conformity of General Federal Actions

A conformity analysis must be conducted by the lead federal agency if a federal action would generate emissions that would exceed the conformity threshold levels (*de minimis*) of the pollutant(s) for which an air basin is in non-attainment. According to section 176(c)(1) of the CAA (40 CFR section 51.853), a federal agency cannot approve or support any activity that does not conform to an approved State Implementation Plan (SIP). Conforming activities or actions should not, through additional air pollutant emissions:

- cause or contribute to new violations of the NAAQS in any area;
- increase the frequency or severity of any existing violation of any NAAQS; or
- delay timely attainment of any NAAQS or interim emission reductions.

For the Project, the general conformity rule applies to projects with emissions that exceed 10 tpy of NO_x or VOC. A conformity analysis must show that the emissions would conform to the SIP and would not reduce air quality in the air basin, which can be demonstrated through offsets, SIP provisions, or modeling.

As previously discussed, the EPA has designated several areas of the Project as in non-attainment for ozone, and within the Northeast Ozone Transport Region for the various project areas. The area around the LNG terminal is designated as a "moderate" non-attainment area for the 8-hour ozone standard.

The proposed LNG terminal expansion facilities and the TL-532 Pipeline are within an area designated as non-attainment for $PM_{2.5}$. There is currently no General Conformity applicability threshold listed for $PM_{2.5}$ non-attainment areas; however, as recommended in a March 2005 EPA memorandum regarding the implementation of the New Source Review requirements in $PM_{2.5}$ non-attainment areas, a surrogate threshold of 100 tpy for PM_{10} moderate non-attainment areas was used for this analysis. On December 17, 2004, the EPA issued a final rule designating non-attainment areas for $PM_{2.5}$. However, there are currently no applicability thresholds nor are there approved SIPs for $PM_{2.5}$ (states have approximately 3 years to prepare a $PM_{2.5}$ SIP).

We have included a Draft General Conformity Determination for both ozone and $PM_{2.5}$ for the affected project areas to establish if emissions associated with the Project would conform to each SIP and would not reduce air quality in the associated air basin.

To allow the FERC staff to complete the analysis and issue a Final General Conformity Determination, **we recommend that:**

- **Dominion should complete a full air quality analysis and identify any mitigation requirements necessary for a finding of conformity with the applicable SIP. Dominion should file documentation supporting conformity with the Secretary <u>before the end of the draft EIS comment period</u> for review and analysis in the final EIS.**

4.11.1.1 Existing Environment

As part of the Cove Point Expansion Project, new compressor stations would be constructed at the Perulack and Centre Relay Compressor Stations in Pennsylvania, and additional compression or equipment modifications would be made to existing facilities at the Cove Point Terminal in southern Maryland, the Wolf Run Compressor Station in West Virginia, the Mockingbird Hill Compressor Station in West Virginia, and the Quinlan Compressor Station in New York. Modifications at the existing facilities would produce a net increase in pollutant emissions.

Cove Point Terminal [6]

The Chesapeake Bay and the Atlantic Ocean farther to the east generally give the site mild winters and summers. Climatological statistics for Baltimore are generally representative of the climate of the site.

According to the National Oceanic and Atmospheric Administration, typical January daily temperatures range from a minimum of 23.4ºF to a maximum of 40.2ºF. July temperatures typically range from a minimum of 66.8ºF to a maximum of 87.2ºF. The record minimum and maximum temperatures are -7ºF and 105ºF, respectively. Typical morning relative humidity ranges from a low of about 70 percent in the winter to a high of about 85 percent in the early fall. Afternoon relative humidity is generally about 55 percent. The annual average precipitation is about 41 inches and is evenly distributed throughout the year. About one-third of the days have precipitation totaling 0.01 inches or more. Winter precipitation is generally associated with sub-mesoscale weather systems. The average snowfall is about 20 inches per year. Summer precipitation tends to be associated with thunderstorms.

During the summer, the region is generally under the influence of the Bermuda high-pressure system. High-pressure systems are typically associated with low winds and increased potential for air quality problems. Air quality in Calvert County is generally rated as moderate using the EPA Pollution Standards Index (that is an indicator of community-wide air quality). A moderate rating means that there should be few or no health effects for the general population. The primary pollutant contributing to the moderate rating was ozone. Ozone is not emitted directly; it is the product of chemical reaction that involves VOCs and NO_x. There appears to have been a gradual decrease in emissions of VOCs and NO_x in Calvert County during the last 10 years (EPA, 1999).

The State of Maryland has adopted a State Implementation Plan for that portion of Maryland that is within the boundaries of the Washington, D.C., "moderate" non-attainment area for ozone. This plan, which is based upon a plan developed by the Metropolitan Washington Council of Governments, has been approved by the EPA.

[6] Meteorological Information Adapted from the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Calvert Cliffs Nuclear Power Plant (NUREG-1437, Supplement 1), US NRC, 1999.

Calvert County is classified as "Better than National Standards" or "Unclassifiable/Attainment" for the remaining criteria pollutants. The counties surrounding Calvert County have similar designations for the remaining criteria pollutants except for Anne Arundel County, which does not meet secondary standards for total suspended particulates. The terminal is more than 62 miles from the nearest Class I area for the Prevention of Significant Deterioration of Air Quality designated in the CAA (42 USC 7401). Background levels of criteria pollutants at the terminal are illustrated in table 4.11.1.1-1.

TABLE 4.11.1.1-1

Ambient Pollutant Background Levels (μg/m^3) at the Cove Point LNG Terminal a/

Averaging Period	NO_2	SO_2	PM_{10}	CO
1-hr	-	-	-	9000
3-hr	-	191	-	-
8-hr	-	-	-	5000
24-hr	-	71	37	-
Annual	17	17	12	-

a/ Dominion data response June 22, 2005

Perulack and Centre Relay Compressor Stations

The proposed locations for the Perulack Compressor Station and Centre Relay Compressor in Pennsylvania are within the NOTR. According to Pennsylvania Code, facilities in the NOTR are treated as moderate non-attainment for Ozone for NNSR. Background levels of criteria pollutants at the Perulack and Centre Relay Compressor Stations are illustrated in table 4.11.1.1-2.

TABLE 4.11.1.1-2

Ambient Pollutant Background Levels (μg/m^3) at the Perulack and Centre Relay Compressor Stations a/

Averaging Period	NO_2	SO_2	PM_{10}	CO	Ozone
1-hr	-	-	-	-	-
3-hr	-	-	-	-	-
8-hr	-	-	-	1.6	0.092
24-hr	-	-	82	-	-
Annual	0.025	0.009	-	-	-

a/ Dominion Resource Report

Quinlan Compressor Station

According to the EPA, the area surrounding the Quinlan Compressor Station is in attainment with the NAAQS for all criteria pollutants; however the region is located in an Ozone Maintenance Area within the Ozone Transport Region. The New York State Department of Environmental Conservation (NYSDEC) has adopted the EPA's NAAQS for all criteria pollutants. The site of the Quinlan Compressor Station is in the Ozone Transport Region which

requires some sources to apply Reasonably Available Control Technology (RACT) to reduce emission of ozone precursors, NO_x, and VOCs.

Wolf Run and Mockingbird Compressor Station

The site of the Wolf Run and Mockingbird Compressor Stations are classified as in attainment or unclassifiable for all criteria pollutants. The West Virginia Department of Air Quality has adopted the EPA's NAAQS for all criteria pollutants. Background levels of criteria pollutants at the Wolf Run and Mockingbird Compressor Stations are illustrated in table 4.11.1.1-3.

TABLE 4.11.1.1-3

Ambient Pollutant Background Levels (μg/m^3) at the Wolf Run and Mockingbird Hill Compressor Stations a/

Averaging Period	NO_2	SO_2	PM_{10}	CO	Ozone
1-hr	-	-	-	-	-
3-hr	-	-	-	-	-
8-hr	-	-	-	4.4	0.097
24-hr	-	0.051	75	-	-
Annual	-b/	-	-	-	-

a/ Dominion Resource Report
b/ West Virginia does not monitor NO_2

4.11.1.2 Environmental Consequences

Construction Emissions:

Pollutant emissions are described for both construction and operation. Emissions due to construction activities (*i.e.*, operation of vehicles and construction equipment to clear and grade land, to create pipeline rights-of-way, and to then operate equipment in the rights-of-way) generally produce temporary increases in fugitive dust ($PM_{2.5}$ and PM_{10}) and criteria pollutant tailpipe emissions of CO, NOx, SO_2, VOCs, and some HAPs. During construction, a temporary reduction in local ambient air quality could result from emissions and fugitive dust generated by construction equipment.

The quantity of fugitive dust emissions would be dependent on the moisture content and texture of the soils that would be disturbed. Fugitive dust and other emissions due to construction activities generally do not pose a significant increase in regional pollutant levels, however, the effect of construction emissions will be addressed in the General Conformity Analysis, to ensure that during the construction of the above ground facilities (LNG terminal expansion and compressor stations) and pipeline, emissions would not violated the SIP.

Mitigation of fugitive dust during construction would be accomplished by application of water, as needed, on work areas or temporary roads. Stone would also be added to parking lots to minimize fugitive dust emissions during construction. Open burning would not occur during any phase of construction. A general summary of construction emissions and what year they would occur is listed in table 4.11.1.2-1 and summarized by year in table 4.11.1.2-2.

TABLE 4.11.1.2-1 **Construction Emissions for VOCs, CO and NOx**				
Facility	**Year**	**VOC (tons)**	**CO (tons)**	**NOx (tons)**
LNG Terminal	2006	3.8	14.1	42.7
LNG Terminal	2007	3.6	13.1	39.6
LNG Terminal	2008	1.7	6.9	21.3
Perulack Compressor Station	2007	5.7	21.3	69.7
Centre Relay Compressor Station	2007	5.7	21.3	69.7
Wolf Run Compressor Station	- a/	- a/	- a/	- a/
Quinlan Compressor Station	2008	1.1	4.1	13.4
Mockingbird Compressor Station	- a/	- a/	- a/	- a/
Chambersberg Compressor Station	2008	1.2	4.3	14.2
Leesberg Compressor Station	2008	0.6	2.3	7.5
Leidy M&R	2008	0.9	3.2	10.5
PL-1 Pressure Restoration Sites	2008	1.00	3.73	12.3
PL-1 EXT2 Pipeline	2008	48.1	185.0	593.0
TL-532 Pipeline	2008	33.3	128.9	409.4
TL-492 EXT3 Pipeline	2008	8.6	34.1	107.7
TL-536 Pipeline	2008	8.6	34.1	107.7
TL-453 EXT1 Pipeline	2008	8.6	34.1	108.8

a/ Data pending from applicant

TABLE 4.11.1.2-2 **Year-By-Year Estimate of Construction Emissions for VOCs, CO and NOx**			
Year	**VOC (tons)**	**CO (tons)**	**NOx (tons)**
2006	3.8	14.1	42.7
2007	15	55.7	179.0
2008	113.7	440.7	1405.8

Cove Point LNG Terminal Expansion

Operational Emissions:

Proposed modifications at the Cove Point LNG Terminal include installation of seven process heaters to vaporize LNG, two General Electric (GE) MS5001 Frame 5 combustion turbines rated at 21.7 megawatts each, one emergency vent heater, and two diesel-powered emergency generators. The selected combustion turbines are equipped with catalytic reduction and oxidation catalyst systems to reduce NO_x emissions by 90 percent, CO emissions by 94 percent, and VOC emissions by 50 percent. Except for the diesel generators, all proposed combustion units are fired by natural gas only. This minimizes the pollutant emissions and the affects on air quality. Estimated annual emissions for operation of the proposed expansion facilities at the Cove Point LNG Terminal are illustrated in table 4.11.1.2-3.

TABLE 4.11.1.2-3 **Estimated Annual Emissions for Operation of Proposed LNG Terminal Equipment**					
Emission Unit and Quantity	**Total Annual Emissions (tpy)[a]**				
	NO_x	**VOC**	**CO**	**SO_2**	**$PM_{2.5}$ + PM_{10}**
Current Emissions	692.3	19.6	178.5	16.7	35.7
Emissions for Proposed Expansion					
Vaporization Heater (7)	31.57	5.46	79.87	1.61	2.73
GE Frame 5 Combustion Turbines (2)	24.52	7.00	35.04	8.36	16.30
Emergency Vent Heater (1)	0.00	0.00	0.00	0.00	0.00
Emergency Diesel Generator (2)	3.98	0.12	0.08	0.04	0.04
Current Emissions + Proposed Emissions	752.37	32.22	293.5	26.74	54.75
Net Increase	**60.07**	**12.58**	**114.99**	**10.01**	**19.07**

a/ Estimated annual HAP emissions are 9.8 tons per year.

Air quality in Maryland is regulated by the MDE. State regulation of air quality is codified in the Code of Maryland Administrative Regulations. All facilities or new sources are required to obtain a construction permit and operations permit from the MDE to demonstrate compliance with air quality regulations.

Atmospheric dispersion models were applied to estimate the impact of the proposed terminal expansion on ambient air quality. Dominion submitted the "Application for PSD/Non-attainment NSR Approval and Permit to Construct" to the MDE and it was approved on July 22, 2005. Dominion conducted dispersion modeling to determine if impact would cause a significant deterioration of air quality. Source impact analysis was required for NO_2, CO and PM_{10} emissions under PSD review. The impact of these emissions were determined to be below the allowable PSD Class II increment of 25 $\mu g/m^3$. The highest impact due to on-site sources was found to be 12.3 $\mu g/m^3$.

In addition, due to the requirements of NNSR for ozone, Dominion would have emission control devices to achieve the lowest achievable emission rate (LAER) for CO and NOx. They will also be required to acquire offsets for NOx and VOC based on their current 1-hr ozone SIP. Based upon annual NOx and VOC emissions associated with the new emission sources, Dominion would be required to obtain 80.7 tons of NOx and 17.4 tons of VOC emission offsets.

Marine Emissions:

Marine vessels used during project operation would include LNG ships, tugboats, pilot boats, and Coast Guard escort boats. The annual emission inventory accounts for 90 LNG ship arrivals, two tugboats, and three Coast Guard escort boats that would participate in the arrival, berthing, and departure of each LNG ship. Emissions were calculated for each ancillary vessel over the distance it would travel to meet the LNG ship. Emissions from the LNG ship were calculated from the start of the Maryland/Virginia state line. During unloading, emissions would be generated from the ship's boiler as it produces steam to provide auxiliary power to pump LNG and to run the ship's lights and other utilities. In response to our request to determine the environmental impacts of marine emissions, Dominion conducted air dispersion modeling analysis using the EPA approved ISCST3 air dispersion model using 5 years of representative

meteorological data to determine if the NAAQS would be exceeded during LNG carrier unloading. Tables 4.11.1.2-4 and 4.11.1.2-5 list the annual marine emissions and the impact to ambient air quality. The modeling that was conducted was very conservative (the model assumed steady state continuous emissions and marine emission are intermittent) thus we are confident that while marine emissions are large, they would not cause a violation of the NAAQS.

TABLE 4.11.1.2-4

Estimated Annual Marine Emissions (tpy)

NOx	CO	PM_{10}	SO_2	VOC	HAPS
85.7	86.7	8.7	167.6	7.0	0.15

TABLE 4.11.1.2-5

Marine Emission Impacts

Pollutant	Averaging Period	Predicted Impact ($\mu g/m^3$) a/	NAAQS ($\mu g/m^3$)
NOx	Annual	45	100
CO	1-hr	12,936	40,000
	8-hr	6,848	10,000
PM_{10}	24-hr	42	150
	Annual	13	50
SO_2	3-hr	458	1,300
	24-hr	146	365
	Annual	31	80

a/ includes background concentrations

Perulack Compressor Station

The proposed Perulack Compressor Station includes installation of a 4,735-hp natural gas-fired reciprocating internal combustion engine manufactured by Caterpillar, an 814-hp Caterpillar auxiliary generator, and a five million Btu boiler. All equipment would be fueled with natural gas. The compressor station would also include an oxidation catalyst to control HAP and VOC pollutant emissions. Potential annual emissions for operation of the proposed Perulack Compressor Station are illustrated in table 4.11.1.2-6.

TABLE 4.11.1.2-6

Estimated Annual Emissions for Operation of Proposed Perulack Compressor Station

Emission Unit and Quantity	Total Annual Emissions (tpy)					
	NO_x	VOC	CO	SO_2	$PM_{2.5} + PM_{10}$	Pb
Internal Combustion Engine (1)	32.0	9.14	11.43	0.09	4.7	0.00
Auxiliary Generator (1)	1.79	0.64	1.43	0.01	0.03	0.00
Boiler (1)	2.24	0.12	1.89	0.01	0.17	0.00
Totals	**36.03**	**9.90**	**14.75**	**0.11**	**4.90**	**0.00**

Air quality in Pennsylvania is regulated by the PADEP under the Bureau of Air Quality. State regulation of air quality is codified in the Pennsylvania Code. All facilities or new sources are

required to obtain a construction permit and operations permit from the PADEP to demonstrate compliance with air quality regulations.

Based on the estimated annual emissions, operation of the proposed Perulack Compressor Station would not constitute a significant modification for air emissions per 40 CFR 51.165. The nearest Class I area is the Dolly Sods Wilderness located about 153 miles southwest of the proposed Perulack Compressor Station site. The increase in emissions due to construction and operation of the facility would not cause significant impacts to visibility or other air quality volumes at a Class 1 area.

Centre Relay Compressor Station

The proposed Centre Relay Compressor Station includes installation of two 6,200-hp natural gas-fired turbines manufactured by Solar Turbine, an 814-hp Caterpillar auxiliary generator, and a five million Btu boiler. All equipment would be fueled with natural gas. The gas transmission turbines and auxiliary generator would be equipped with lean premix turbine combustion technology to minimize NO_x emissions. For this reason, an oxidation catalyst is not needed and will not be installed. The compressor station will not be equipped with an odorization facility. Potential annual emissions for operation of the proposed Centre Relay Compressor Station are illustrated in table 4.11.1.2-7.

Based on the estimated annual emissions, operation of the proposed Centre Relay Compressor Station would not constitute a significant modification for air emissions per 40 CFR 51.165. The nearest Class I area is the Dolly Sods Wilderness located about 140 miles south of the proposed Centre Relay Compressor Station site. The increase in emissions due to construction and operation of the facility would not cause significant impacts to visibility or other air quality volumes at a Class 1 area.

TABLE 4.11.1.2-7

Estimated Annual Emissions for Operation of Proposed Centre Relay Compressor Station

Emission Unit and Quantity	Total Annual Emissions (tpy)					
	NO_x	VOC	CO	SO_2	$PM_{2.5}$	PM_{10}
Natural Gas-Fired Turbine (2)	47.44	3.31	57.82	0.61	19.84	19.84
Auxiliary Generator (1)	1.79	0.64	1.43	0.01	0.00	0.03
Boiler (1)	2.24	0.12	1.89	0.01	0.00	0.17
Totals	**51.47**	**4.07**	**61.13**	**0.63**	**19.84**	**20.04**

Chambersburg Compressor Station Modification

The current DTI compressor station in Franklin County PA pumps gas from north to south in the PL-1 pipeline. The proposed modification would enable gas to be pumped from south to north. Pipe changes to facilitate this include the installation of new gas filters and two new tie-ins to the current PL-1 pipeline. Construction activities associated with this modification would occur between April 2007 and April 2008.

Emissions due to operation would not be affected by this modification.

Leesburg Compressor Station Modification

The current DTI compressor station in Leesburg VA pumps gas from north to south in the PL-1 pipeline. The proposed modification would enable gas to be pumped from south to north. Pipe changes to facilitate this include the installation of two new 30-inch fire gates and crossover lines to allow for bidirectional flow of the current PL-1 pipeline.

Emissions due to operation would not be affected by this modification.

Leidy M&R Station Modification

The proposed modification at the Leidy M&R station in Clinton County PA would include additional measurement and regulation with two new tie-ins to existing pipelines at the Leidy Hub Complex. The facilities will be used to measure and regulate the increased gas flow of the associated Cove Point Expansion Project. Construction activities associated with this modification would occur between April 2007 and April 2008.

Emissions due to operation would not be affected by this modification.

Mockingbird Hill Compressor Station Upgrade

The proposed Mockingbird Hill Compressor Station Upgrade modification includes the removal of the current 5,000-hp combustion turbine and the installation of a 7,800-hp combustion turbine manufactured by Solar Turbine within the same building. When in operation, the replacement gas turbine would be equipped with lean premix turbine combustion technology to minimize NO_x emissions. Current annual emissions, revised annual emissions, and the net emissions increase for operation of the proposed Mockingbird Hill Compressor Station Upgrade are illustrated in table 4.11.1.2-8.

TABLE 4.11.1.2-8

Estimated Annual Emissions for Operation of the Proposed Mockingbird Hill Compressor Station Upgrade

Emission Unit and Quantity	Total Annual Emissions (tpy)					
	NO_x	VOC	CO	SO_2	$PM_{2.5} + PM_{10}$	Pb
Current Combustion Turbine	23.50	1.64	28.61	0.15	12.28	0.00
Replacement Combustion Turbine	28.03	1.95	34.13	0.18	25.70	0.00
Net Emissions Increase	**4.53**	**0.31**	**5.52**	**0.03**	**13.42**	**0.00**

Air quality in West Virginia is regulated by the WVDEP under the Office of Air Quality. State regulation of air quality is codified in the West Virginia State Code. All facilities or new sources are required to obtain a construction permit and operations permit from the WVDEP to demonstrate compliance with air quality regulations. Based on the estimated annual emissions, operation of the proposed Mockingbird Hill Compressor Station Upgrade would not constitute a significant modification for air emissions per 40 CFR 51.165. The nearest Class I area is the Dolly Sods Wilderness located about 70 miles southeast of the Mockingbird Hill Compressor Station site. The increase in emissions due to construction and operation of the facility would not cause significant impacts to visibility or other air quality volumes at a Class 1 area.

PL-1 Pressure Restoration Sites

Pipe modifications are proposed for the PL-1 pipeline that crosses Franklin County PA. Construction activities associated with this modification would occur between April 2007 and April 2008.

Emissions due to operation would not be affected by this modification.

Quinlan Compressor Station Upgrade

The proposed Quinlan Compressor Station Upgrade modification includes a 15.4 million Btu heater and a 7.5 million Btu regeneration heater. Current annual emissions, revised annual emissions, and the net emissions increase for the proposed Quinlan Compressor Station Upgrade are illustrated in table 4.11.1.2-9.

TABLE 4.11.1.2-9

Estimated Annual Emissions for Operation of Proposed Quinlin Compressor Station Upgrade

Emission Unit and Quantity	Total Annual Emissions (tpy)					
	NO_x	VOC	CO	SO_2	$PM_{2.5} + PM_{10}$	Pb
Current Equipment a/	52.61	49.28	54.21	0.12	6.52	0.00
Proposed Heater	6.75	0.37	5.67	0.04	0.51	0.00
Proposed Regeneration Heater	3.29	0.18	2.76	0.02	0.25	0.00
Totals	**62.65**	**49.83**	**62.64**	**0.18**	**7.28**	**0.00**

a/ Current equipment is not yet constructed, but is currently under review by the Commission in the Northeast Storage Expansion Project, Docket No. CP04-365-000.

Air quality in New York State is regulated by the NYSDEC under the Bureau of Air Quality. State regulation of air quality is codified in the New York State Code. All facilities or new sources are required to obtain a construction permit and operations permit from the NYSDEC to demonstrate compliance with air quality regulations. Based on the estimated annual emissions, operation of the proposed Quinlan Compressor Station Upgrade would not constitute a significant modification for air emissions per 40 CFR 51.165. The nearest Class I area is the Dolly Sods Wilderness located about 250 miles south of the Quinlan Compressor Station site. The increase in emissions due to construction and operation of the proposed upgrade would not cause significant impacts to visibility or other air quality volumes at a Class 1 area.

Wolf Run Compressor Station Expansion

The Wolf Run Compressor Station Expansion construction activities would produce temporary increases in fugitive dust and criteria pollutant tailpipe emissions.

The proposed Wolf Run Compressor Station Expansion would include installation of two 1,775-hp natural gas-fired reciprocating internal combustion engines manufactured by Caterpillar and five 80-hp auxiliary generators manufactured by Capstone Turbine Corporation. The internal combustion engines would be equipped with low emission turbocharge and aftercool technology. An oxidation catalyst would also be installed to help control emission of CO and other hazardous pollutants. Potential annual emissions for the proposed Wolf Run Compressor Station Expansion are illustrated in table 4.11.1.2-10.

TABLE 4.11.1.2-10 **Estimated Annual Emissions for Operation of Proposed Wolf Run Compressor Station**						
Emission Unit and Quantity	**Total Annual Emissions (tpy)**					
	NO_x	**VOC**	**CO**	**SO_2**	**$PM_{2.5}$ + PM_{10}**	**HAPS**
Current Equipment a/	56.4	21.5	20.0	0.1	8.8	U
Natural Gas-Fired Turbine (2)	24.0	20.6	8.6	0.0	0.0	2.2
Auxiliary Generator (5)	0.65	0	1.8	0.05	0.1	0.03
Fugitive Emissions	-	16.1	-	-	-	-
Totals	**71.1**	**58.2**	**30.4**	**0.15**	**8.9**	**2.23**

a/ Current equipment is not yet constructed, but is currently under review by the Commission in the Northeast Storage Expansion Project, Docket No. CP04-365-000.

The nearest Class I area is the Dolly Sods Wilderness located about 50 miles southeast of the Wolf Run Compressor Station site. Previous modeling analysis in Docket No. CP04-365-000 found that the current configuration did not result in impact to any Class I area. Additional analysis will be run to confirm that the Dolly Sods Wilderness, Otter Creek Wilderness or Shenandoah National Park would not have a significant impact. Although the facility is less than 62 miles from a Class I area, the increase in emissions due to construction and operation of the proposed facility expansion would be relatively small and are not anticipated to cause significant impacts to visibility or air quality at these Class 1 areas.

4.11.2 Noise

4.11.2.1 Existing Environment

At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and throughout the week. This variation is caused in part by changing weather conditions and the effects of seasonal vegetative cover. Two measures commonly used by federal agencies to relate the time-varying quality of environmental noise to its known effect on people are the 24-hour equivalent sound level ($Leq_{(24)}$) and the day-night sound level (L_{dn}). The $Leq_{(24)}$ is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. L_{dn} is the $Leq_{(24)}$ with 10 decibels on the A-weighted scale (dBA) added to the nighttime sound levels, between the hours of 10 p.m. and 7 a.m., to account for people's greater sensitivity to sound during nighttime hours.

Noise associated with pipeline construction activities would be intermittent during the construction period at any single location. Neighbors in the vicinity of the right-of-way would hear the construction noise, but the overall impact would be temporary. With the exception of drilling, nighttime noise due to construction would normally be absent, since most construction would be limited to daylight hours. Therefore, because construction noise is temporary and limited to daytime hours, it is unnecessary to provide an analysis of the existing ambient sound levels along the pipeline rights-of-way. During project operation, the noise impact would be limited to the vicinity of the proposed new compressor stations and the expanded LNG terminal. The existing acoustic environments near the proposed facilities are described below and in table 4.11.2-1. Also included are maps showing the location and plot plans for the proposed facilities that would generate noise during operation.

TABLE 4.11.2-1 **Noise-Sensitive Areas Most Affected by the Cove Point Expansion Project**			
Facility	**NSA**	**Distance & Direction from Facility (Feet)**	**Existing L_{dn} (dBA)**
Cove Point LNG Terminal	Residences	1,800 South-southeast	50.7
Perulack Compressor Station	Residence	1,300 Northeast	60.0
Centre Relay Compressor Station	Residence	1,050 North	47.5
Mockingbird Hill Compressor Station	Residence	900 North	52.3
Wolf Run Compressor Station	Residence	5,000 Southwest	38.7

Cove Point LNG Terminal

The existing Cove Point LNG Terminal is located in Calvert County, Maryland, on the western shore of the Chesapeake Bay near Cove Point. A county park and golf course are located to the southwest and a residential area is located to the south immediately south of Cove Point Road (see figure 4.11-1). The nearest noise-sensitive area (NSA) is a group of residences about 1,800 feet south-southeast of the proposed gas turbine generator (GTG) area and 2,400 feet south of the new process area. Existing noise levels were measured by Dominion in January 2004 during typical operations of the LNG facility. Measured L_{eq} levels were 44.2 dBA during the day and 44.3 dBA during the night, equating to an L_{dn} of 50.7 dBA. The largest source of these background noise levels was the LNG terminal at night and general road traffic during the day. Staff inquired into previous complaints from local residents, Dominion replied on June 22, 2005 that while no complaints were received regarding continuous operations, intermittent operations such as venting during nitrogen tank refilling, and ship sirens generated occasional resident complaints.

Perulack Compressor Station

The proposed Perulack Compressor Station site is in a rural forested area of mountainous ridges and valleys about 40 miles west of Harrisburg in Juniata County, Pennsylvania (see figure 4.11-2). Land uses surrounding the proposed site are fields, forests, and industrial areas with some residences and vacation/hunting camps. The Texas Eastern Perulack Compressor Station is adjacent to the site on the east and southeast sides. The nearest NSA is a residence 1,300 feet northeast of the proposed compressor building. Existing noise levels were measured in December 2004, resulting in daytime L_{eq} levels of 51.8 dBA, nighttime levels of 53.8 dBA and an L_{dn} of 60.0 dBA. These high sound levels were due primarily to operation of the existing Texas Eastern Perulack Compressor Station.

Centre Relay Compressor Station

The proposed Centre Relay Compressor Station site is located on Whitrite Road (T-342) off State Route 26 approximately 1 mile northeast of Pleasant Gap, Centre County, Pennsylvania (see figure 4.11-3). Land uses surrounding the proposed site are agricultural, commercial, industrial, and residential. The nearest NSA is a residence 1,050 feet north of the proposed compressor building. Existing noise levels were measured in December 2004, resulting in daytime L_{eq} levels of 48.3 dBA, nighttime levels of 35.7 dBA and an L_{dn} of 47.5 dBA. Typical sounds heard during the survey included highway and rail traffic, wind in trees, birds, dogs barking, aircraft, construction equipment alarms, and other ordinary manmade sounds.

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Figure 4.11-1
Nearest Noise Sensitive Area
Cove Point LNG Terminal Expansion

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Figure 4.11-2
Nearest Noise Sensitive Area
Proposed Perulack Compressor Station

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Figure 4.11-3
Nearest Noise Sensitive Area
Proposed Centre Relay Compressor Station

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Mockingbird Hill Compressor Station Upgrade

The existing Dominion Mockingbird Hill Compressor Station is located in the unincorporated town of Hastings near Pine Grove in Wetzel County, West Virginia (see figure 4.11-4). Dominion proposes to upgrade the 5,000-hp Solar Turbine to a 7,800-hp Solar Turbine engine compressor package. The unit change out will be performed inside the existing insulated compressor building with no additional modifications to the structure required.

Land uses surrounding the proposed site are residential, industrial and forests. The existing Hastings Compressor Station is approximately 2,000 feet west and the Hastings Extraction Plant is approximately 3,500 feet west of the Mockingbird Hill Compressor Station. The nearest NSA is a residence 900 feet north of the existing compressor building. Existing noise levels were measured in October 2002, when six of the seven units at the Hastings Compressor Station were operating. The measured sound levels were adjusted upward by 0.7 dBA to compensate for the one unit that was down. The 5000-hp unit at the Mockingbird Hill Compressor Station was not operational at that time. The resulting daytime L_{eq} level was 51.3 dBA, the nighttime level was also 51.3 dBA and the L_{dn} was 57.7 dBA. The Hastings Compressor Station was the primary source of noise. Subsequently, five of the seven compressors at the Hastings Station have been removed from service, which should have resulted in a net reduction of about 5.4 dBA. Thus, the current existing L_{dn} level is expected to be 52.3 dBA.

Wolf Run Compressor Station Expansion

Dominion is currently constructing this compressor station in Lewis County, West Virginia as part of the Northeast Storage Expansion Project. The station is proposed to be in service by April 1, 2006. As part of the Cove Point Expansion Project, Dominion proposes to add 3,550 hp of compression at this facility.

The Wolf Run Compressor Station, located on Route 9/5 approximately 1.5 miles northeast of Churchville, Lewis County, West Virginia, is currently under construction (see figure 4.11-5). Two 1,775-hp reciprocating engine compressor units in one acoustically insulated compressor building and a dehydration unit with one glycol reboiler will be installed this year. It is planned that two expansion compressor units will be installed in 2007 in addition to the compressor building that is being constructed this year. Land use surrounding the station is forested areas with a few residences, vacation/hunting cabins.

In the Certificate Order for Docket No. CP04-365-000 for the Northeast Expansion proposal, FERC required Dominion to consider a cabin, proposed to be located near the Wolf Run Compressor Station, as a NSA. On February 11, 2004 FERC was notified via fax, and subsequent formal filing that Mr. Smith, the property owner of the planned cabin, and Dominion came to an agreement to designate his planned cabin as a NSA. In a letter to Mr. Smith dated January 6, 2004 Dominion agreed to enter into a contractual agreement *that "ensures [Mr. Smith's] commitment and obligation to continue [his] building plans for the permanent structure."* Thus for the purposes of confirmatory noise surveys (for our review of the noise impacts in Docket No. CP04-365-000) the location of Mr. Smith's proposed cabin is designated as a noise sensitive area. For this expansion, we will also require that Dominion consider Mr. Smith's planned cabin as a NSA, particularly since the cumulative impacts associated with the increase of hp at the Wolf Run Compressor Station needs to be addressed.

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Figure 4.11-4
Nearest Noise Sensitive Area
Mockingbird Hill Compressor Station Upgrade

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Figure 4.11-5
Nearest Noise Sensitive Area
Wolf Run Compressor Station Expansion

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Therefore, to ensure that the cumulative noise impacts at Mr. Smith's cabin and all the NSAs are not considered significant at the Wolf Run Compressor Station, **we recommend that:**

- **Dominion should file with the Secretary a revised acoustical analysis and mitigation plan for the additional horsepower proposed at the Wolf Run Compressor Station, for the review and approval of the Director of the OEP. Dominion should demonstrate that noise at the nearest NSAs that are attributable to the operation of its Wolf Run Compressor Station, including the location of Mr. Smith's planned cabin, is below 55 dBA L_{dn}.**

4.11.2.2 Environmental Consequences

The basis for evaluation of station noise impacts is an L_{dn} of 55 dBA, the level which protects the public from indoor and outdoor activity interference in residential areas. Noise impacts should be mitigated if during operation:

- noise attributable to the operation of a proposed new station, or modifications to an existing station, would exceed an L_{dn} of 55 dBA at nearby NSAs, such as residences or other occupied dwellings; or
- any applicable state and local noise regulations would be exceeded.

The Cove Point LNG Terminal is subject to the State of Maryland noise regulations (COMAR 26.02.03.03), which require that the sound level at residential property lines should not exceed an A-weighted level of 65 dBA during the day or 55 dBA at night. Maryland regulations also include provisions regarding discrete pure tones, periodic noises and vibrations.

General Construction and Operational Impact

The Cove Point Expansion Project pipelines would generally be located in sparsely inhabited areas with few sensitive receptors. Construction of the proposed facilities would only increase noise levels in the immediate vicinity of the project work area. Pipeline construction generally would proceed at rates ranging from several hundred feet to 1 mile per day. However, due to the assembly-line method of construction, construction activities in any one area could last from several weeks to several months on an intermittent basis. Construction equipment would be operated on an as-needed basis during this period and should be maintained to manufacturer's specifications to minimize noise impact. Although individuals in the immediate vicinity of the construction activities would experience an increase in noise, this effect would be local and temporary. Nighttime noise levels normally would be unaffected by construction activities since most construction would occur during daylight hours.

Dominion proposes to cross a number of waterbodies using the HDD technique. HDD is a special situation since the source of noise (the drill engine) remains in a fixed location during construction for a much longer period of time than other pieces of equipment on a pipeline construction right-of-way. HDD may also require nighttime operation. However, mitigation is available for this activity such that it is possible to reduce impacts to an insignificant level in most situations. In a data request, we asked Dominion to provide predicted noise levels at NSAs at the proposed HDD sites. Table 4.11.2.2-1 lists the locations and predicted noise impacts to the nearest NSAs from drilling operations.

TABLE 4.11.2.2-1 **Predicted Noise Impacts due to Horizontal Directional Drilling Operations**			
HDD Location	**NSA Distance and Direction**	**L_{eq} (dBA)**	**L_{dn} (dBA)**
Saint Leonard Creek	500 ft SE	71	77.4
Hunting Creek	300 ft ENE	77	83.4
Patuxent River	450 ft ENE	73	79.4
Zekiah Swamp Run	1250 ft SSE	61	67.4
Jordan River Swamp	1835 ft ENE	57	63.4
Mattawoman Swamp	280 ft WNW	77	83.4

The predicted noise levels at most locations are significantly greater than 55 dBA. Dominion has not yet identified specific noise mitigation measures for these locations. To ensure that NSAs are not exposed to excessive noise during nighttime drilling operations, **we recommend that:**

- **Dominion should file with the Secretary, <u>prior to the end of the draft EIS comment period</u>, a drilling noise analysis and a mitigation and compliance plan. This plan should demonstrate that noise due to drilling operations would be below 55 dBA L_{dn} at the nearest NSAs, and specify all noise mitigation equipment necessary to reduce noise below 55 dBA L_{dn}. Dominion should detail the method by which they would ensure compliance. Where surveys indicate that noise attributable to drilling exceeds 55 dBA L_{dn} at any NSA, Dominion should:**

  a. immediately stop drilling and mitigate the noise at the affected NSAs to reduce the noise levels at those NSAs to 55 dBA L_{dn} or below; or

  b. offer temporary housing until L_{dn} levels at the NSAs are 55 dBA or below.

An increase in noise during the operational phase of the Project would be primarily limited to areas in the vicinity of the LNG terminal and the compressor stations. Principal noise sources at the compressor stations would include the air inlet, exhaust, and casing of the engine or turbine. Secondary noise sources would include cooling fans, yard piping, and valves. Noise from the relief valves, blowdown stacks, and emergency electrical generation equipment would be infrequent. The amount of silencing required for the equipment and piping depends on the station's location, size, and proximity to NSAs. Noise impact from the proposed compressor units can be reduced by using more building insulation, installing acoustic louvers, improving the inlet and exhaust silencers, or using special oil coolers. The amount of noise reduction depends on the extent of noise mitigation measures installed.

Occasionally equipment can malfunction and vibration generated by the compression equipment can be transmitted to the aboveground pipeline. This is more likely to occur in reciprocating engine-driven compressors than in turbine-driven compressors. Aboveground pipeline is usually insulated by noise-absorbing material to prevent any noise or vibration (very low frequency noise) from being transmitted to the air. Once the pipeline is below ground the ground would absorb any vibration or noise. Hearing loss is protected using the Occupational Safety and Health Administration (OSHA) limit of 85 dBA, and the only place where these noise levels would be exceeded would be inside the compressor building or within 6 feet of the engine or

turbine driving the compressors. These areas are not accessible to the general public and the pipeline companies employ hearing protection for exposed personnel.

Site Specific Impact and Mitigation

Table 4.11.2.2-2 identifies the locations of the most affected NSAs, the existing noise levels, and the noise estimated from the proposed modifications for each station. Mitigation measures proposed for each of the stations are listed individually for each station. In general, Dominion proposes to install noise controls that would include acoustical insulation on the turbine building walls and ceilings, silencers on the air intake and exhaust, enclosures and silencers on the building ventilation, and acoustical lagging on aboveground piping.

TABLE 4.11.2.2-2

Noise Impacts at the Nearest Noise-Sensitive Areas from the Proposed Cove Point Expansion Project

Facility	NSA	Distance & Direction from Facility (Feet)	Existing L_{dn} (dBA)	Project L_{dn} (dBA)	Total L_{dn} (dBA)
Cove Point LNG Terminal	Residences	1,800 South-southeast	50.7	43.4	54.2
Perulack Compressor Station	Residence	1,300 Northeast	60.0	44.4	60.1
Centre Relay Compressor Station	Residence	1,050 North	47.5	46.4	50.0
Mockingbird Hill Compressor Station	Residence	900 North	52.3	50.4	54.5
Wolf Run Compressor Station	Residence	5,000 Southwest	38.7	29.4	39.2

Cove Point LNG Terminal

Dominion proposes to install additional process equipment to support off-loading, storage, and regasification of LNG. Additional power generation and sendout equipment at the Cove Point Terminal is also proposed as part of the Project. Noise producing equipment that is proposed at the Cove Point Terminal as part of the Project includes:

- LNG Booster Pumps (2)
- LNG Second Stage Pumps (3)
- Water/Ethylene Glycol Pumps (7)
- Water/Ethylene Glycol Heaters (6)
- BOG Screw Compressors (4)
- BOG Screw Compressor Motors (4)
- Gas Turbine Generator (1)
- Gas Turbine Generator Exhaust Stack (1)
- Dry Transformers (4)
- Instrument Air Compressor (1)
- Vaporizer LNG Inlet Valves (3)
- Fuel Gas Letdown Valves (2)

The proposed equipment is predicted to generate noise equivalent to an L_{dn} of 43.4 dBA at the nearest NSA, a group of residences about 2,600 feet south-southeast of the facility leading to a total noise impact including existing facilities of 54.2 dBA L_{dn}. However manufacturer far field data for some equipment is not available.

To ensure that the noise levels at the NSAs do not exceed an L_{dn} of 55 dBA due to operation of the new expansion equipment proposed for the Cove Point Terminal, **we recommend that:**

- **Dominion should file noise surveys with the Secretary <u>no later than 60 days</u> after placing the expansion facilities in service at the Cove Point LNG Terminal. If the noise attributable to the operation of all of the equipment at the LNG terminal exceeds an L_{dn} of 55 dBA at any nearby NSAs, Dominion should file a report on what changes are needed and should install the additional noise controls to meet the level within 1 year of the in-service date. Dominion should confirm compliance with the above requirement by filing a second noise survey with the Secretary <u>no later than 60 days</u> after it installs the additional noise controls.**

Perulack Compressor Station

Dominion proposes to install one 4,735-hp reciprocating-driven compressor in a new insulated building at the Perulack site. Noise control measures proposed for the Perulack Compressor Station include:

- intake and exhaust silencers on the Caterpillar engine;
- acoustically designed building to house the engine and compressor; and
- acoustical louvers on the building ventilation system.

With the proposed noise mitigation specified, the compressor station would generate noise with an L_{dn} of 44.4 dBA at the nearest NSA, a residence 1,300 feet northeast of the proposed compressor building. This level is significantly below the existing L_{dn} of 60.0 dBA at the residence, attributable to the existing Texas Eastern Perulack Compressor Station. Noise from the proposed Project would only increase the total noise level by 0.1 dBA, which would be imperceptible to the human ear. However, we have received comments from nearby residents concerned about the noise levels generated by the existing Texas Eastern station, and the impact the new station would have on noise levels. Therefore, we have included a recommendation below.

Centre Relay Compressor Station

Dominion proposes to install one 4,700-hp Solar Centaur Model 40 turbine compressor unit and one 7,800-hp Solar Taurus Model 60 turbine compressor unit at the proposed Centre Relay Compressor Station. Proposed noise control measures for the Centre Relay Compressor Station include:

- intake silencers on the two Solar gas turbines to reduce the level of the tone or whine of the compressor to an acceptable level;
- exhaust silencers on the two Solar gas turbines;
- lagging of the exhaust duct;
- acoustically designed compressor building;
- mufflers on the air inlets and discharge hoods to the compressor building;
- low-noise lube oil and gas coolers;
- acoustical lagging on aboveground gas piping; and
- silencers on blowdown vents.

With the proposed noise mitigation specified, the compressor station would generate noise with an L_{dn} of 46.4 dBA at the nearest NSA, a residence 1,050 feet north of the proposed compressor building. When combined with the existing ambient L_{dn} of 47.5 dBA, the total would be 50.0 dBA for a small increase of only 2.5 dBA. The station L_{dn} of 46.4 dBA is significantly below the FERC required level of 55 dBA. However, to ensure that noise does not exceed 55 dBA at any NSA, we have included a recommendation below.

Mockingbird Hill Compressor Station Upgrade

Dominion proposes to replace the existing 5,000-hp Solar turbine with a 7,800-hp Solar turbine. Proposed noise control measures for the Mockingbird Hill Compressor Station Upgrade include:

- intake and exhaust silencers on the Solar gas turbine;
- acoustically designed compressor building; and
- low-noise lube oil and gas coolers.

With the proposed noise mitigation specified, the compressor station would generate noise with an L_{dn} of 50.4 dBA at the nearest NSA, a residence 900 feet north of the existing compressor building. When combined with the existing ambient L_{dn} of 52.3 dBA, the total would be 54.5 dBA for a net decrease of 3.2 dBA. The decrease is a result of five units being removed from service at the nearby Hastings Compressor Station. The Mockingbird Hill Compressor Station L_{dn} of 50.4 dBA is significantly below the FERC required level of 55 dBA. However, to ensure that noise does not exceed 55 dBA at any NSA, we have included a recommendation below.

Wolf Run Compressor Station Expansion

Dominion proposes to expand the Wolf Run Compressor Station by adding two 1,775-hp reciprocating engine/compressor units to the existing station within a new addition to the existing compressor building. Proposed noise control measures for the Wolf Run Compressor Station include:

- intake and exhaust silencers on the reciprocating engines;
- acoustically designed compressor building; and
- mufflers on the building ventilation inlet and discharge openings.

With the proposed noise mitigation specified, the compressor station expansion would generate noise with an L_{dn} of 29.4 dBA at the nearest NSA, a residence 5,000 feet southwest of the existing compressor building. When combined with the existing ambient L_{dn} of 38.7 dBA, the total would be 39.2 dBA for a net increase of only 0.5 dBA. The Wolf Run Compressor Station Expansion L_{dn} level of 29.4 dBA is significantly below the FERC required level of 55 dBA. However, to ensure that noise does not exceed 55 dBA at any NSA, we have included a recommendation below.

Compressor Station Blowdown

Dominion also would install blowdowns at each of the compressor stations to evacuate natural gas from the facility in the event of an emergency, accident, or maintenance. Typically, emergency blowdowns are triggered during an emergency station shutdown, which is a very rare event. Maintenance or "unit" blowdowns, occur when gas from the compressors and piping

must be evacuated. This may happen several times per month, although the exact number is difficult to quantify. Emergency blowdowns typically are much longer and louder than unit blowdowns. Noise from both types of unsilenced blowdown events can be upwards of 100 dBA L_{eq} at 50 feet. Dominion has proposed to install blowdown silencers at the proposed Perulack and Centre Relay Compressor Stations. The Existing Wolf Run Compressor Station is required to have a blowdown under CP34-365-000; however, Dominion does not propose to install additional silencers on the modifications to the Wolf Run or the Mockingbird Hill Compressor Stations.

Conclusions on Noise

We believe that the project-operation noise levels as predicted would not result in significant impacts to local residents. However, to ensure that noise levels from operation of the proposed new compressor stations and/or compressor station upgrades are below acceptable levels, **we recommend that:**

- **Dominion should file a noise survey with the Secretary no later than 60 days after placing each of the authorized compressor station facilities and/or upgrades (Perulack, Centre Relay, Mockingbird Hill Upgrade, and Wolf Run Compressor Station Expansion) in service. If the noise attributable to the operation of any of these facilities at full load exceeds an L_{dn} of 55 dBA at any nearby NSAs, Dominion shall install additional noise controls to meet that level within 1 year of the in-service date. Dominion should confirm compliance with the L_{dn} of 55 dBA requirement by filing a second noise survey for each station with the Secretary no later than 60 days after it installs the additional noise controls.**

4.12 RELIABILITY AND SAFETY

Three federal agencies share in the oversight of the safety and security of LNG import terminals: the Coast Guard, the Pipeline and Hazardous Materials Safety Administration of the DOT, and the FERC.

The FERC authorizes the siting and construction of LNG import terminals and is the lead federal agency under NEPA to analyze the environmental, safety, security, and cryogenic design of proposed facilities. The Coast Guard has authority over the safety of LNG vessels and the marine transfer area. The Coast Guard also has authority over the security of the LNG vessels and the entire LNG facility. The DOT has exclusive authority to promulgate and enforce safety regulations and standards over the onshore LNG facilities beginning at the last valve immediately before the LNG storage tank(s).

In February 2004, the three participating agencies entered into an Interagency Agreement to assure that they work in a coordinated manner to address the full range of issues regarding safety and security at LNG import terminals, including the terminal facilities and tanker operations, and to maximize the exchange of information related to the safety and security aspects of the LNG facilities and related marine operations. The Interagency Agreement ensures a seamless safety and security review by the three federal agencies.

The operation of the proposed expansion facilities at the Cove Point LNG Terminal poses a potential hazard that could affect the public safety without strict design and operational measures

to control potential accidents. The primary concerns are those events that could lead to an LNG spill of sufficient magnitude to create an offsite hazard. However, it is also important to recognize the stringent requirements for the design, construction, operation and maintenance of the facility as well as the extensive safety systems to detect and control potential hazards.

With the exception of the October 20, 1944 fire at the LNG facility in Cleveland, Ohio, the operating history of U.S. LNG facilities has been free of LNG safety-related incidents resulting in adverse effects to the public or the environment.[7] More recently, an operational accident occurred in 1979 at the Cove Point LNG Terminal when a pump seal failed, resulting in gas vapors entering an electrical conduit and settling in a confined space. When a worker switched off a circuit breaker, the gas ignited, resulting in heavy damage to the building and a worker fatality. Lessons learned from this accident resulted in changing the national fire codes, with the participation of the FERC, to ensure that the situation would not occur again. The proposed facilities would be designed, constructed, and operated in compliance with these codes.

On January 19, 2004, a blast occurred at Sonatrach's Skikda, Algeria LNG liquefaction facility that killed 27 and injured 56 workers. No members of the public were injured. Preliminary findings of the accident investigation suggest that a cold hydrocarbon leak occurred at Liquefaction Train 40 and was introduced to the high-pressure steam boiler by the combustion air fan. An explosion developed inside the boiler fire box which subsequently triggered a larger explosion of the hydrocarbon vapors in the immediate vicinity. The resulting fire damaged the adjacent liquefaction process and LPG separation equipment of Train 40, and spread to Trains 20 and 30. Although Trains 10, 20, and 30 had been modernized in 1998-1999, Train 40 had been operating with its original equipment since start-up in 1981. Although there are major differences between the equipment involved in the accident at Skikda and that of the proposal by Dominion (*i.e.*, high-pressure steam boilers that power refrigerant compressors would not be used here nor are they used at any LNG facility under FERC jurisdiction), the sequence of cascading events identifies potential failure modes that warrant further evaluation. As a result, we have provided a recommendation in section 4.12.2 to address this issue.

A discussion of the principal properties and hazards associated with LNG is presented in section 4.12.1. A summary of our preliminary design and technical review of the cryogenic aspects of the LNG terminal expansion facilities is presented in section 4.12.2. Storage and retention systems are discussed in section 4.12.3. An analysis of the thermal radiation and flammable vapor cloud hazards resulting from a credible land-based LNG spill is presented in section 4.12.4, while the safety aspects of LNG transportation by ship is discussed and summarized in section 4.12.5. A discussion on security awareness related to terrorism is presented in section 4.12.6. The reliability and safety issues related to the natural gas pipeline are discussed in section 4.12.7.

4.12.1 LNG Hazards

LNG's principal hazards result from its cryogenic temperature (-260° F), flammability, and vapor dispersion characteristics. As a liquid, LNG will neither burn nor explode. Although it

[7] For a description of the incident and the findings of the investigation, see "U.S. Bureau of Mines, Report on the Investigation of the Fire at the Liquefaction, Storage, and Regasification Plant of the East Ohio Gas Co., Cleveland, Ohio, October 20, 1944, February 1946."

can cause freeze burns and, depending on the length of exposure, more serious injury, its extremely cold state does not present a substantial hazard to the public, which rarely, if ever, comes in contact with it as a liquid. As a cryogenic liquid, LNG will quickly cool materials it contacts, causing extreme thermal stress in materials not specifically designed for ultra-cold conditions. Such thermal stresses could subsequently subject the material to brittleness, fracture, or other loss of tensile strength. These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296° F) or several other cryogenic gases that have been routinely produced and transported in the U.S.

Methane, the primary component of LNG, is colorless, odorless and tasteless, and is classified as a simple asphyxiant. Methane could, however, cause extreme health hazards, including death, if inhaled in significant quantities within a limited time. At very cold temperatures, methane vapors could cause freeze burns. Asphyxiation, like freezing, normally represents a negligible risk to the public from LNG facilities.

When released from its containment vessel and/or transfer system, LNG will first produce a vapor or gas. This vapor, if ignited, represents the primary hazard to the public. LNG vaporizes rapidly when exposed to ambient heat sources such as water or soil, producing 620 to 630 standard cubic feet of natural gas for each cubic foot of liquid. LNG vapors in a 5 to 15 percent mixture with air are highly flammable. The amount of flammable vapor produced per unit of time depends on factors such as wind conditions, the amount of LNG spilled, and whether it is spilled on water or land. Depending on the amount spilled, LNG may form a liquid pool that will spread unless contained by a dike. Once a flammable vapor-air mixture from an LNG spill has been ignited, the flame front will propagate back to the spill site if the vapor concentration along this path is sufficiently high to support the combustion process.

LNG is not explosive as it is normally transported and stored. However, LNG vapors (primarily methane) can explode if contained within a confined space, such as a building or structure, and ignited. There is no evidence, however, suggesting that LNG is explosive in unconfined open areas. Experiments to determine if unconfined methane-air mixtures will explode have been conducted and, to date, have all been negative. Unconfined methane-air mixtures will burn but will not explode. Nevertheless, a number of experimental programs have been conducted to determine the "amount of initiator charge" required to detonate an unconfined methane-air mixture.

Over the years, various parties have occasionally expressed the energy content of an LNG storage tank or LNG ship in equivalent tons of trinitrotoluene (TNT), as an implied measure of its explosive potential. However, such a simplistic analogy fails to consider that explosive forces are not just a function of the total energy content but also of the rate of energy release. For an explosion to occur, the rate of energy release must be nearly instantaneous, such as with a TNT charge initiated by a blasting cap. Unlike TNT or other explosives which inherently contain an oxidizer, an unconfined vapor cloud must be mixed with oxygen within the flammability range of the fuel for combustion to occur. For a large unconfined vapor cloud, the flammability range tends to exist at the mixing zone at the edges of the cloud. When ignited, flame speeds about 20 - 25 meters per second (66 - 82 feet/second) and local over pressures up to 0.2 psig have been estimated for hydrocarbon vapor clouds, well below the flame speeds and over pressures associated with explosion.

A rapid phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction as described above, an RPT is the result of heat transferred to the liquid inducing a change to the vapor state. The rapid expansion from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the overpressures generated were strong enough to damage test equipment in the immediate vicinity of the LNG release point. The sizes of the overpressure events have been generally small and are estimated to be equivalent to several pounds of TNT. Such a small overpressure is not expected to cause significant damage to an LNG vessel. However, the RPT may increase the rate of LNG pool spreading and the LNG vaporization rate.

4.12.2 Cryogenic Design and Technical Review

The cryogenic design and technical review emphasizes the engineering design and safety concepts as well as the projected operational reliability of the proposed facilities. The principle areas of coverage include: materials in cryogenic environments; insulation systems; cryogenic safety; thermodynamics; heat transfer; instrumentation; cryogenic processes; and other relevant safety systems.

Study and evaluation of information for the proposed expansion of the Cove Point LNG Terminal has been performed by the FERC staff. The design and specifications submitted for the proposed facility to date are considered to be preliminary but would be the basis for any detailed design to follow. A significant amount of the design involving final selection of equipment manufacturers, process conditions, and resolution of some safety related issues would be completed in the next phase of the project development if authorization is granted by the Commission. This information would need to be submitted to FERC staff for review and approval.

As a result of the technical review of the information provided in the submittal documents, a number of concerns were identified by staff relating to the reliability, operability, and safety of the proposed design. In response to staff's questions, Cove Point provided written answers prior to the technical conference on July 27, 2005. However, several areas of concern are noted that require additional consideration and/or action on behalf of the company. Follow up on those items requiring additional action should be documented in reports to be filed with the FERC. As a result, **we recommend that:**

The following measures should apply to the LNG terminal expansion facilities design and construction details. Information pertaining to these specific recommendations should be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific recommendation. Items relating to Resource Report 13-*Engineering and Design Material* and security should be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR § 388.112 and PL01-1. Information pertaining to items such as: offsite emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. This information should be submitted a minimum of 30 days before approval to proceed is required.

- **A complete plan and list of the hazard detection equipment should be filed prior to initial site preparation. The information shall include a list with the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings should clearly show the location of all detection equipment.**

- **Dominion Cove Point LNG should provide a technical review of its proposed facility design that:**

  a. **Identifies all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids, and flammable gases).**

  b. **Demonstrates that these areas are adequately covered by hazard detection devices and indicate how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.**

  Dominion Cove Point LNG should file this review prior to initial site preparation.

- **A complete plan and list of the fixed and wheeled dry-chemical, fire extinguishing, and high expansion foam hazard control equipment should be filed prior to initial site preparation. The information should include a list with the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings should clearly show the planned location of all fixed and wheeled extinguishers.**

- **Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system should be filed prior to initial site preparation.**

- **A copy of the hazard design review and list of recommendations that are to be incorporated in the final facility design should be provided prior to initial site preparation.**

- **The final design of the hazard detection equipment should identify manufacturer and model.**

- **The final design of the hazard detection equipment should provide flammable gas and UV/IR hazard detectors with local instrument status indication as an additional safety feature.**

- **The final design of the fixed and wheeled dry-chemical, fire extinguishing, and high expansion foam hazard control equipment should identify manufacturer and model.**

- **The final design should include details of the LNG tank tilt settlement and differential settlement limits between each LNG tank and piping and procedures to be implemented in the event that limits are exceeded.**

- **The final design should include resistance temperature detectors(s) (RTDs) in the outlet stacks of the LNG tank relief valves to continuously monitor for relieving and fire conditions.**
- **The final design should include provisions to measure the discharge flow of each LNG pump.**
- **The final design should specify, in the piping specifications for hazardous fluids, that pipe and nipples two inches and less shall not be less than schedule 80.**
- **The final design should include a separate line from the minimum flow recycle valve ADV-3142 to the LNG storage tanks.**
- **The final design should include provisions to ensure that glycol/water circulation is operable at all times when LNG is present in the LNG sendout pump discharge piping or when the temperature in the LNG inlet channel to any vaporizer is below 0°F.**
- **The final design should include automatic shutoff isolation valves for the boiloff compressors located on the suction and discharge outside of the boiloff compressor building.**
- **The final design should include a fire protection evaluation carried out in accordance with the requirements of NFPA 59A, chapter 9.1.2.**
- **The final design should include details of the shut down logic, including cause and effect diagrams for alarms and shutdowns.**
- **The final design should include emergency shutdown of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable.**
- **The final design should include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system. Each air gap should vent to a safe location and be equipped with a leak detection device that: should continuously monitor for the presence of a flammable fluid; should alarm the hazardous condition; and should shutdown the appropriate systems.**
- **The final design should include a HAZOP review of the completed design. A copy of the review and a list of the recommendations should be provided.**
- **All valves including drain, vent, instrument root, main, and car sealed valves should be tagged in the field during construction and prior to commissioning.**
- **Operation and Maintenance procedures and manuals (49 CFR § 193.2053 and § 193.2605), as well as emergency plans, emergency evacuation plans and emergency procedure manuals (49 CFR § 193.2509), should be filed prior to commissioning.**

- **The contingency plan for failure of the LNG tank outer shell should be filed prior to commissioning.**
- **A copy of the criteria for horizontal and rotational movement of the inner vessel for use during and after cool down should be filed prior to commissioning.**
- **The FERC staff should be notified of any proposed revisions to the security plan and physical security of the facility prior to commencement of service.**
- **Progress on the construction of the LNG terminal should be reported in monthly reports filed with the Secretary. Details should include a summary of activities, problems encountered and remedial actions taken. Problems of significant magnitude should be reported to the FERC within 24 hours.**

In addition, **we recommend that the following recommendations be applied throughout the life of the facility:**

- **The facility should be subject to regular FERC staff technical reviews and site inspections on at least a biennial basis or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, Dominion should respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted annual report, should be submitted.**
- **Semi-annual operational reports should be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas, etc.), plant modifications including future plans and progress thereof. Abnormalities should include, but not be limited to: unloading/shipping problems, potential hazardous conditions from offsite vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility also should be reported. Reports should be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section entitled "Significant plant modifications proposed for the next 12 months (dates)" also should be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.**

- **In the event the temperature of any region of any secondary containment, including imbedded pipe supports, becomes less than the minimum specified operating temperature for the material the Commission should be notified <u>within 24 hours</u> and procedures for corrective action should be specified.**

- **Significant non-scheduled events, including safety-related incidents (*i.e.*, LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security-related incidents (*i.e.*, attempts to enter site, suspicious activities) should be reported to FERC staff <u>within 24 hours</u>. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification should be made immediately, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. This notification practice should be incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include:**

  a. fire;

  b. explosion;

  c. estimated property damage of $50,000 or more;

  d. death or personal injury necessitating in-patient hospitalization;

  e. free flow of LNG for five minutes or more that results in pooling;

  f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;

  g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;

  h. any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its MAOP (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;

  i. a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;

  j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;

  k. any safety-related condition that could lead to an imminent hazard and cause (either directly or indirectly by remedial action of the operator), for purposes other than abandonment, a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility that contains or processes gas or LNG;

l. safety-related incidents to LNG vessels occurring at or en route to and from the LNG facility; or

m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, FERC staff would determine the need for a separate follow-up report or follow-up in the upcoming semiannual operational report. All company follow-up reports should include investigation results and recommendations to minimize a reoccurrence of the incident.

4.12.3 Storage and Retention Systems

LNG storage tanks come in a variety of categories. The following are descriptions of the tank designs most commonly used worldwide:

- Single containment cylindrical metal tanks (predominately used in the U.S., proposed by Dominion in this Project);
- Spherical storage tanks (predominately used in LNG carriers);
- Double containment cylindrical metal inner tank and metal or concrete outer tank (commonly thought of as an LNG tank with a high wall dike);
- Full containment cylindrical metal inner tank and metal or concrete outer tank (five authorized by the Commission; several applications currently proposed to the Commission);
- Pre-stressed cylindrical concrete tank with an internal metal membrane (membrane tank) (none in the U.S.); and
- Cryogenic cylindrical concrete tank; internal cryogenic tank and pre-stressed concrete outer tank (one operational in the U.S.; the remainder worldwide).

These tank categories are described in Annex H of the European Standard for LNG facilities (EN 1473) and are summarized below for the LNG storage tanks commonly found in proposals before the Commission.

H.1 Single containment tank

A single primary container enclosed within an outer shell designed and constructed so that only the primary container is required to meet the low temperature ductility requirements for storage of the product.

The outer shell of a single containment storage tank is primarily for the retention and protection of insulation and to contain the purge gas pressure, but is not designed to contain refrigerated liquid in the event of leakage from the primary container. An above

ground single containment tank shall be surrounded by a bund (dike) wall to contain any leakage. Examples of single containment are given in figure H.1.

H.3 Double containment tank

A double containment tank is designed and constructed so that both the inner self supporting primary container and the secondary container are capable of independently containing the refrigerated liquid stored. To minimize the pool of escaping liquid, the secondary container should be located at a distance not exceeding 6 meters from the primary container. The primary container contains the refrigerated liquid under normal operating conditions. The secondary container is intended to contain any leakage of the refrigerated liquid, but it is not intended to contain any vapor resulting from this leakage. Examples of double containment tanks are given in figure H.3. Figure H.3 does not imply that the secondary container is necessarily as high as the primary container.

H.4 Full containment tank

A tank designed and constructed so that both self supporting primary container and the secondary container are capable of independently containing the refrigerated liquid stored and for one of them its vapor. The secondary container can be 1 or 2 meters distance from the primary container.

The primary container contains the refrigerated liquid under normal operating conditions. The outer roof is supported by the secondary container. The secondary container shall be capable both of containing the refrigerated liquid and of controlled venting of the vapor resulting from product leakage after a credible event. Examples of full containment tanks are given in figure H.4.

Single-, double- and full-containment LNG storage tanks have been authorized by the Commission for use at new LNG import facilities or expansions of existing terminals; and single- and double-containment tanks have been constructed and operated. Dominion proposes a single containment design for the LNG storage tanks. NFPA 59A requires a separation of 0.7 times the diameter from the property line. The proposed tanks for the Cove Point Expansion Project would meet the separation requirement.

Dominion has proposed to install a mechanically stabilized earth berm around the LNG tanks. The structure would have a height of 36 feet high and would enclose an area of approximately 385 feet by 430 feet around each tank. The structure's volumetric capacity would exceed 110 percent of a single LNG tank's maximum liquid capacity. Rainwater collected by the dike would be drained into a sump and pumped out in accordance with 49 CFR 193.2173. This barrier would confine LNG on the project property in the event of any hypothetical catastrophic event.

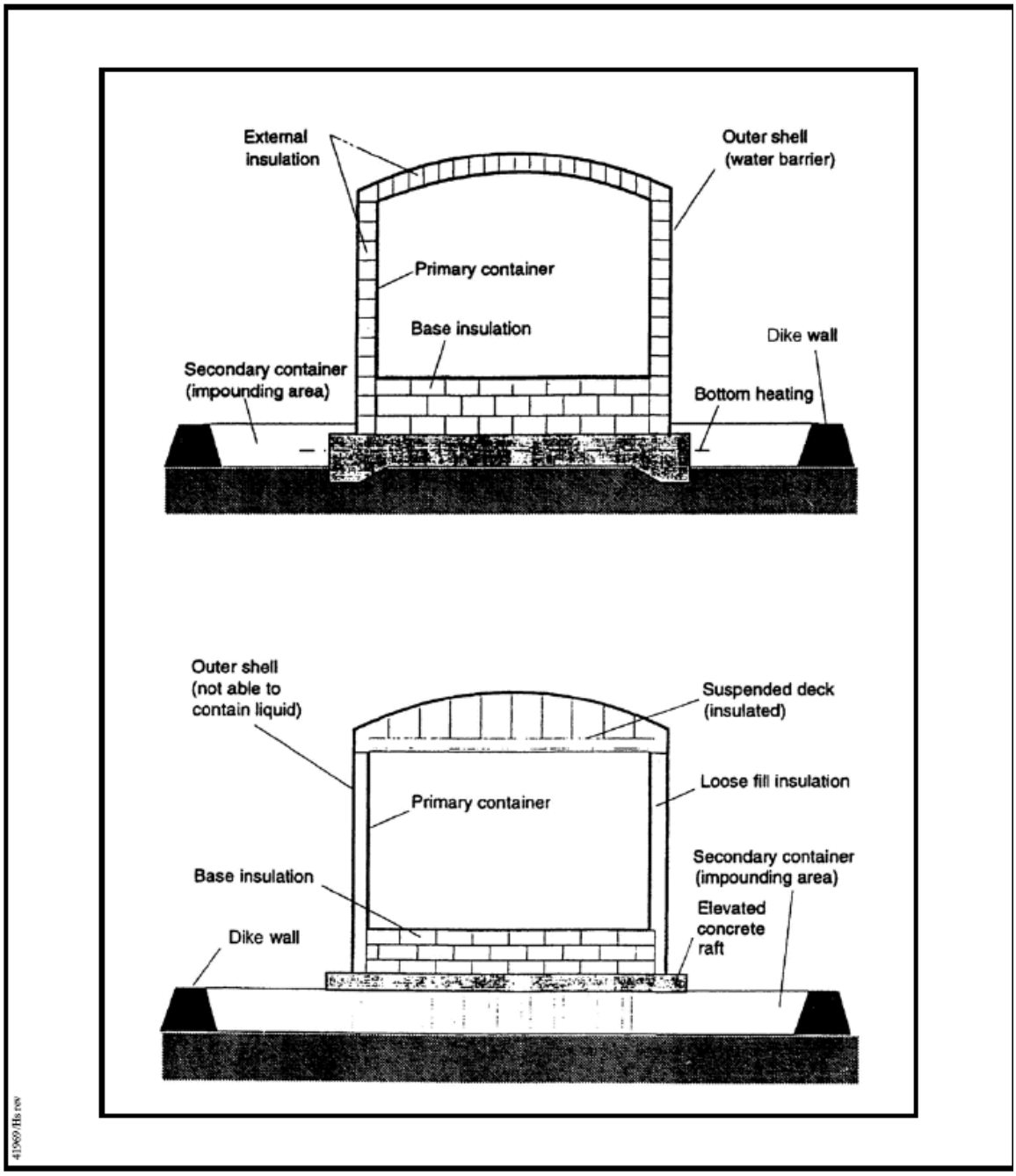

Figure H-1

Examples of Single Containment Tanks

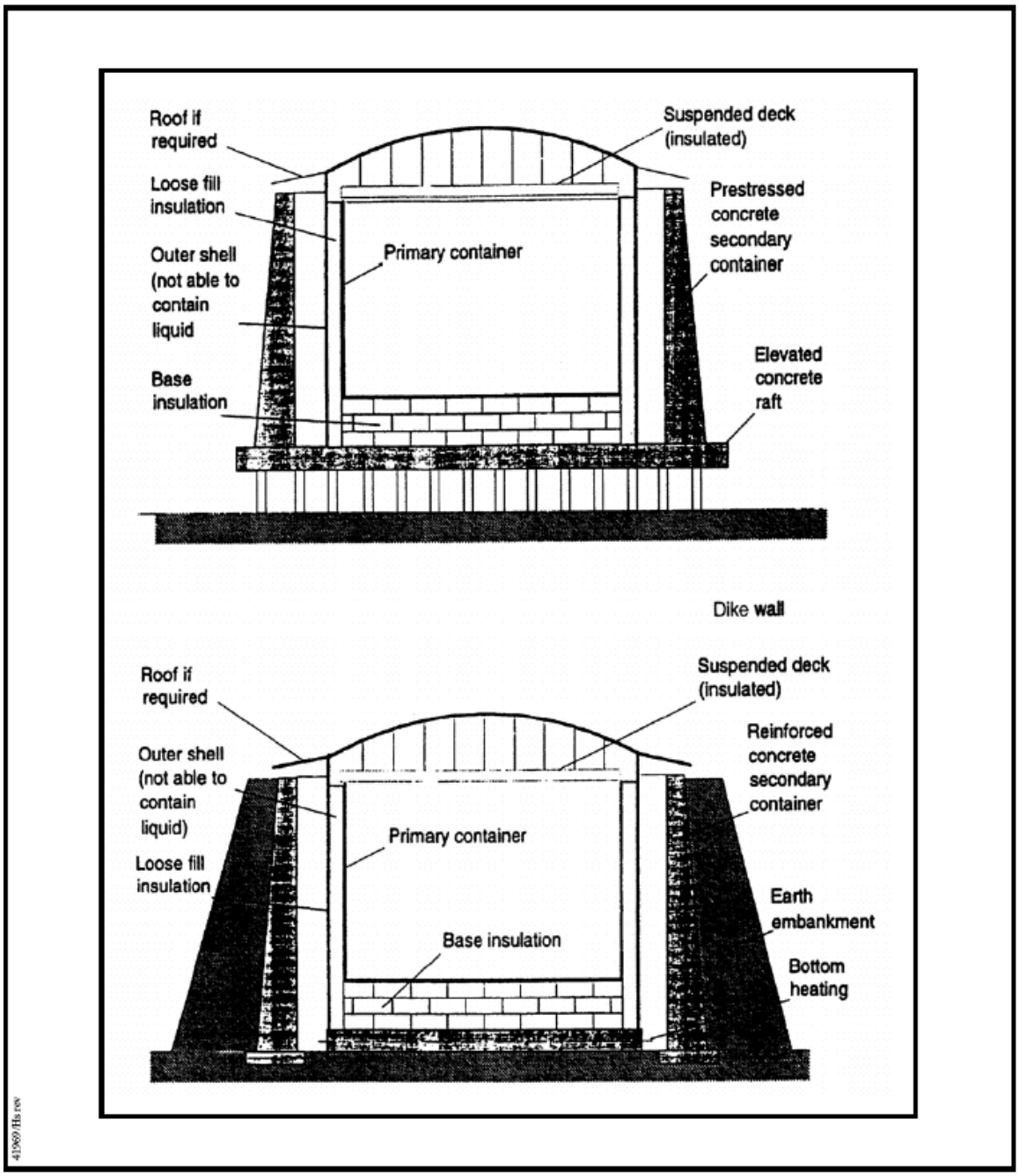

Figure H-3

Examples of Double Containment Tanks

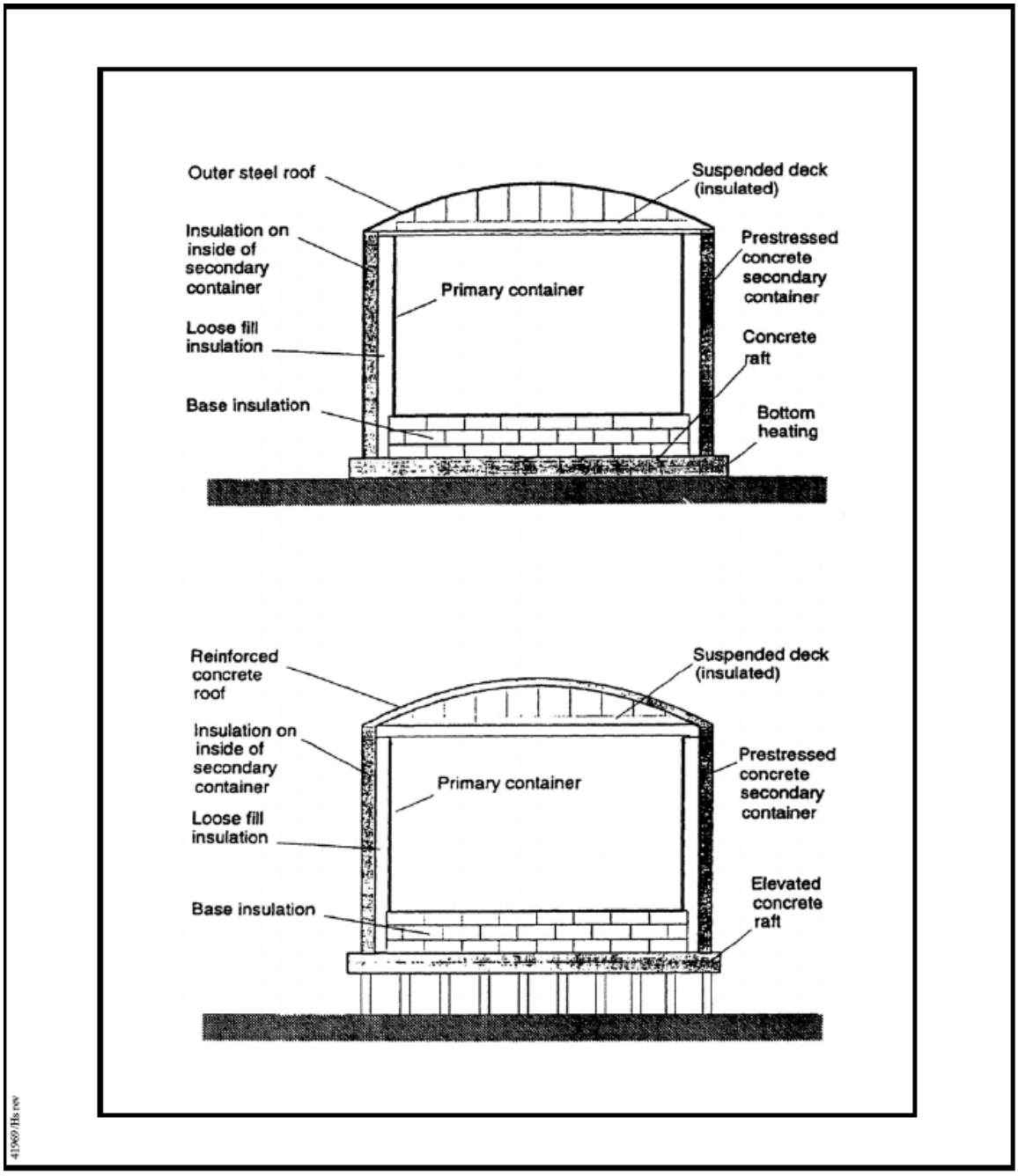

Figure H-4

Examples of Full Containment Tanks

4.12.4 Siting Requirements – Thermal and Dispersion Exclusion Zones

Regulatory Requirements

The LNG facilities proposed in this Project must comply with the siting requirements of 49 CFR 193, Subpart B. On March 30, 2000, the DOT revised 49 CFR 193 to incorporate NFPA 59A (1996 edition) into the LNG regulations. On April 9, 2004, the DOT further revised 49 CFR 193 to incorporate the 2001 edition of NFPA 59A. The following sections specifically address offsite hazards:

- **Part 193.2001, Scope of part**, excludes any matter other than siting provisions pertaining to marine cargo transfer systems between the marine vessel and the last manifold or valve immediately before a storage tank.
- **Part 193.2051, Scope**, states that each LNG facility designed, replaced, relocated or significantly altered after March 31, 2000, must be provided with siting requirements in accordance with subpart B and NFPA 59A. In the event of a conflict with NFPA 59A, then Part 193 prevails.
- **Part 193.2057, Thermal radiation protection**, requires that each LNG container and LNG transfer system have thermal exclusion zones based on three radiation flux levels in accordance with Section 2.2.3.2 of NFPA 59A.
- **Part 193.2059, Flammable vapor-gas dispersion protection**, requires that each LNG container and LNG transfer system have a dispersion exclusion zone in accordance with Section 2.2.3.3 and 2.2.3.4 of NFPA 59A.

For the following LNG facilities that are proposed in this Project, we have identified the applicable siting requirements from Part 193 and NFPA 59A:

- Two 1,000,000-barrel LNG storage tanks - Parts 193.2057 and 2059 require the establishment of thermal radiation and flammable vapor exclusion zones for LNG tanks. NFPA 59A Section 2.2.3.2 specifies four thermal radiation exclusion zones based on the design spill and the impounding area. Sections 2.2.3.3 and 2.2.3.4 specify a flammable vapor exclusion zone for the design spill which is determined in Section 2.2.3.5.
- Three low pressure LNG tank withdrawal pumps and four second-stage sendout pumps - Parts 193.2057 and 2059 require thermal radiation and flammable vapor exclusion zones. NFPA 59A Section 2.2.3.2 specifies the thermal radiation exclusion zone and Section 2.2.3.4 specifies the flammable vapor exclusion zone based on the design spill in a process area.
- Six shell-and-tube vaporizers - Same requirements as for LNG pumps.

The incorporation of the NFPA 59A requirements into Part 193 has resulted in some confusion and possible misinterpretation in applying the siting requirements:

Parts 193.2057 and 2059 require exclusion zones for LNG transfer systems, which are defined to include transfer piping. However, NFPA 59A only requires exclusion zones for "transfer areas"

which are defined as the part of the plant where liquids are introduced or removed from the facility such as truck loading or ship unloading areas. The definition of transfer area in NFPA 59A specifically excludes permanent plant piping such as cargo transfer lines. Additionally, NFPA 59A Section 2.2.3.1 (2001) specifically excludes transfer area at the water edge of marine terminals. When the DOT incorporated NFPA 59A into its regulations, it removed the requirement for impounding systems around transfer piping (old Part 193.2149). In the preamble to the final rule, the DOT determined that the most likely sources of leaks within LNG plant are LNG storage tanks, cargo transfer areas, and vaporizers and process equipment, which are all addressed in NFPA 59A Section 2.2.1.2. The result is that while Part 193 retains exclusion zones for LNG transfer systems, neither Part 193 nor NFPA 59A requires the impoundment from which to base the calculations. We do not believe that this was the intent, nor do we believe that omitting containment for transfer piping is a sound engineering practice. FERC staff will continue to require containment for all LNG transfer piping within a plant site.

The incorporation of NFPA 59A also changed the way in which design spills and impoundment capacities may be determined. Under Section 2.2.2.2, the capacity of impounding areas for vaporization, process, or LNG transfer areas must equal the greatest volume during a 10-minute period from any single accidental leakage source or during a shorter time period based upon demonstrable surveillance and shutdown provisions acceptable to the authority having jurisdiction. Similar criteria appear in Section 2.2.3.5 for determining the design spill used in thermal and flammable vapor exclusion zone calculations. Prior to the incorporation of NFPA 59A, the design spill in Part 193 assumed the rupture of a single transfer pipe with the greatest overall flow capacity, for not less than 10 minutes (old Part 193.2059(d)). As a result, the spill rate for vaporization, process, or LNG transfer areas may be assumed to be an "accidental leakage source" rather than a full pipe rupture; however, the spill duration must be 10 minutes unless the authority having jurisdiction (*i.e.*, DOT), determines that a shorter time is acceptable. Again, given the confusion in applying the two requirements, the FERC staff will continue to utilize the 10-minute spill criteria at the maximum flow possible for containment sizing. This will ensure that impoundments are sized for a catastrophic failure, while recognizing that less conservative spill scenarios may be appropriate to calculate flammable vapor exclusion zones. In giving recognition to the integrity of all-welded transfer piping, the determination of the single accidental leakage source should be based on an evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc, and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. This approach is the result of discussion with DOT concerning the basis for design spills and application to exclusion zone determinations for proposals before the Commission.

Impoundment Systems and Sizing Spills

Part 193.2181 specifies that the impoundment system serving a single LNG storage tank must have a volumetric capacity of 110 percent of the LNG tank's maximum liquid capacity. Dominion proposes two additional single containment LNG storage tanks (Tank 101-FF and 101-FE). Each new tank would be installed within its own mechanically stabilized earth berm that would be 430-feet long by 385-feet wide with a usable depth of 36-feet. An irregularly shaped sub-impoundment would be located within each mechanically stabilized earth berm and would be approximately 385-feet long by 96-feet wide with a usable depth of 12.8 feet. When full, the storage tanks would hold 42,685,355 gallons of LNG. The mechanically stabilized earth

berms and the sub-impoundment would have a capacity of 48,132,157 gallons and would meet the 110 percent requirement in Part 193.2181.

In accordance with Section 2.2.3.5 of NFPA 59A, the design spill for an LNG storage tank with penetrations below the liquid level and internal shutoff valves is defined as the flow through the penetration from an initially full container for an 1-hour spill. This spill from the 24-inch-diameter bottom fill/withdrawal line is 3,505,977 gallons and would be contained by the sub-impoundment adjacent to each tank. The sub-impoundment would have a capacity of 3,549,757 gallons.

Both of the proposed LNG storage tanks would utilize common first-stage LNG pumps located in Tank 101-FF's sub-impoundment area. The rupture of the pump discharge header would result in a 10-minute spill volume of 160,927 gallons and would be contained by Tank 101-FF's sub-impoundment.

The area containing the vaporizers and sendout pumps would be curbed and graded so that any spilled LNG would be directed to the process area sump and the existing Tank 101-FE pipe-rack impoundment. The process area sump would be 15-feet wide by 20-feet long with a usable depth of 9 feet and is located between the tank area and the process area. The existing pipe-rack impoundment located next to existing Tank 101-FE would be 500-feet wide by 50-feet long. Dominion did not list a depth for this impoundment, but based on the provided volume of 586,847 gallons, we estimate the depth to be at least 3.14 feet. The combined process area sump and Tank 101-FE pipe-rack impoundment would contain a 10-minute spill at the proposed maximum second stage pump discharge, or 75,964 gallons. The process area sump and the existing Tank 101-FE pipe-rack impoundment would also accommodate a 10-minute spill from the 36-inch-diameter line supplying the LNG storage tanks from the marine unloading berths at the maximum unloading rate, a spill of 528,380 gallons. Table 4.12.4-1 presents the impounding areas and spill size volume for the tank and each of the 10-minute full-flow spills.

TABLE 4.12.4-1

Impoundment Areas

Source	Spill Size (gallons)	Impoundment System	Impoundment Size (gallons)
LNG Storage Tank	46,953,891	Mechanically Stabilized Berm with Sub-Impoundment	48,132,157
LNG Storage Tank Design Spill	3,505,977	LNG Tank Sub-Impoundment	3,549,757
Marine Lines	528,380	Process Area Sump with Existing 101-FE Pipe-Rack Impoundment	607,044
First Stage LNG Pumps	160,927	LNG Tank Sub-Impoundment	3,549,757
Sendout Pumps and Vaporizers	75,964	Process Area Sump with Existing 101-FE Pipe-Rack Impoundment	607,044

Thermal Exclusion Zone

If a large quantity of LNG is spilled in the presence of an ignition source, the resulting LNG pool fire could cause high levels of thermal radiation. Exclusion distances for various flux levels were calculated according to 49 CFR 193.2057 and Section 2.2.3.2 of NFPA 59A, using the "LNGFIRE III" computer program model developed by the Gas Research Institute. NFPA 59A

establishes certain atmospheric conditions (0 miles per hour [mph] wind speed, 70°F, and 50 percent relative humidity) which are to be used in calculating the distances. However, Part 193.2057 supercedes these requirements and stipulates that wind speed, ambient temperature, and relative humidity which produce the maximum exclusion distances must be used, except for conditions that occur less than 5 percent of the time based on recorded data for the area. For its analysis, Dominion selected the following ambient conditions to produce the maximum distances: wind speed of 21 mph; ambient temperature of 34 °F; and 39 percent relative humidity. These conditions yield longer distances than the 0 mph wind speed, 70°F ambient temperature, and 50 percent relative humidity specified in NFPA 59A. We agree with Dominion's selection of atmospheric conditions.

In accordance with 49 CFR 193.2057, Dominion provided thermal radiation calculations for the LNG storage tank impoundments and the process area containment sump. Using the atmospheric conditions selected by Dominion, the FERC staff calculated thermal radiation distances for incident flux levels ranging from 1,600 to 10,000 Btu/ft^2-hr for a fire in each LNG storage impoundment. Our results agree with the distances determined by Dominion for this scenario. The modeled exclusion zones remain completely on the plant site.

However, in selecting the design spill specified by Section 2.2.3.5 of NFPA 59A, Dominion determined that the single accidental leakage source to be considered for the process area sump was a 1-inch-diameter connection on the sendout pump discharge. This spill of 18,785 gallons would contained by the process area sump alone. As previously stated, the FERC staff believe the determination of the single accidental leakage source should be based on an evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc, and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. Consequently, we considered the failure of the 6-inch-diameter recirculation line on the sendout pump discharge as the accidental leakage source. This leakage source would yield a design spill of 75,717 gallons which would overflow the process area sump, with the excess flowing into the 101-FE pipe-rack impoundment and connecting troughs.

Using the atmospheric conditions selected by Dominion, the FERC staff calculated thermal radiation distances for the 1,600 Btu/ft^2-hr incident flux level from a fire in the process area sump and the 101-FE pipe rack impoundment. Although larger than the distances calculated by Dominion, these exclusion zone remains within the plant boundary.

Table 4.12.4-2 presents the thermal radiation exclusion zones as calculated by the FERC staff. Based on these values, the proposed Project meets the requirements of 49 CFR 193.2057.

Vapor Dispersion Zone

A large quantity of LNG spilled without ignition would form a flammable vapor cloud that would travel with the prevailing wind until it either disperses below the flammable limits or encounters an ignition source. Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A and Part 193.2059 require that provisions be made to minimize the possibility of flammable vapors from reaching a property line that can be built upon and that would result in a distinct hazard. Part 193.2059 requires that dispersion distances be calculated for a 2.5 percent average gas concentration (½ the lower flammability limit [LFL] of LNG vapor) under meteorological conditions which result in the longest downwind distances at least 90 percent of the time. Alternatively, maximum

downwind distances may be estimated for stability Class F, a wind speed of 4.5 mph, 50 percent relative humidity, and the average regional temperature. The section allows the use of the DEGADIS Dense Gas Dispersion Model, or the FEM3A model, to compute dispersion distances. Design spills into impounding areas serving LNG containers, transfer systems, and piping are to be determined in accordance with Section 2.2.3.5 of NFPA 59A.

TABLE 4.12.4-2

Thermal Exclusion Zones

Source	Exclusion Area NFPA 59A Section 2-2.3.2(a)	Incident Flux (Btu/ft^2 hr) (a/)	Exclusion Zone (feet)
Process area sump	Property line that can be built upon.	1,600	114
Tank 101-FE pipe rack impoundment	Property line that can be built upon.	1,600	496
LNG storage tank sub-impoundment	Property line that can be built upon.	1,600	537
LNG storage tank impoundment	Outdoor assembly area occupied by 50 or more people.	1,600	1,423
LNG storage tank impoundment	Offsite structures used for occupancies or residences.	3,000	1,152
LNG storage tank impoundment	Property line that can be built upon.	10,000	771

a/ The 1,600 Btu/ft^2-hr flux level is associated with an exposed person experiencing burns within about 30 seconds. At 3,000 Btu/ft^2-hr, an exposed person would experience burns within 10 seconds, however a wooden structure would not be expected to burn and affords protection to sheltered persons. At 10,000 Btu/ft^2-hr, clothing and wood can ignite spontaneously.

The design spill for an LNG storage tank with penetrations below the liquid level and internal shutoff valves is defined by Section 2.2.3.5 of NFPA 59A as the flow through an assumed penetration which results in the largest flow from an initially full container. In the case of the Dominion's proposed design, the failed penetration would be the 24-inch-diameter bottom fill/withdrawal line. The liquid level above this penetration would be 103.46 feet for an initially full container. Based on the design spill criteria specified by Section 2.2.3.5 of NFPA 59A, this would result in a spill of 58,433 gpm for 1 hour. This spill volume would be completely contained by the sub-impoundment within the LNG storage tank impoundment.

In performing the vapor dispersion analysis required by 49 CFR 193.2059, Dominion selected a windspeed of 4.5 mph, an atmospheric temperature of 88°F, a relative humidity of 39 percent, and atmospheric stability Class F. A ground temperature of 70°F was also assumed. Using SOURCE5 and DEGADIS, Dominion calculated a distance of 991 feet to the 2.5 percent average gas concentration isopleth. Dominion's selected meteorological criteria result in longer downwind distances than the alternate values of 50 percent relative humidity and average regional temperature allowed by Part 193.2059. While we agree with the meteorological conditions selected by Dominion, we note that the SOURCE5 results indicate over 4 hours pass from the beginning of the spill until vapor overtops the LNG storage tank impoundment. Although the impoundment would retard the downwind dispersion of the some vapor during this time, it is unreasonable to assume that the vapor remains at -260°F and that no vapor is entrained by the 4.5 mph wind during the 4-hour period.

Consequently, the FERC staff performed a supplementary vapor dispersion analysis for the same design spill into the sub-impoundment by conservatively assuming no vapor holdup by the LNG storage tank impoundment height outside of the sub-impoundment. The results of SOURCE5

show approximately 15 minutes until vapor overflows the sub-impoundment with an initial evolution rate of 18 kg/sec and a sump pool radius of 33.47 meters. Based on this input, DEGADIS indicates a distance of approximately 1,200 feet to the 2.5 percent average gas concentration isopleth. In either case, the vapor dispersion distance does not extend beyond the plant property line. The vapor exclusion zone for a tank design spill into the LNG storage tank impoundment is consistent with the siting requirements set forth in 49 CFR 193.

The area containing the vaporizers and sendout pumps would be curbed and graded so that any LNG spill would flow into the process area sump. In performing the vapor dispersion analysis required by 49 CFR 193.2059 for the process area sump, Dominion selected an accidental leakage source of a failed 1-inch-diameter connection on the sendout pump discharge. This spill of 18,785 gallons would be contained by the process area sump alone. As in the thermal radiation calculations, the FERC staff considered the accidental leakage source to be a failure of the 6-inch-diameter recirculation line on the sendout pump discharge for 10 minutes. This design spill of 75,717 gallons would overflow the process area sump, with the excess flowing into the 101-FE pipe-rack impoundment and connecting troughs.

Consequently, we calculated downwind dispersion for this spill using the same atmospheric conditions submitted by Dominion. In order to simulate the geometry of Dominion's containment configuration, equipment dike dimensions (500-feet by 350-feet) with a negligible depth were used. Sump dimensions were set to those of the 101-FE pipe-rack impoundment (500-feet by 50-feet). A depth of 3.25 feet was used to simulate the retention area provided by both the 101-FE pipe-rack impoundment and the process area sump. Dominion's trough dimensions of 300-feet long, 17-feet wide, and 4.3-feet deep were also used. The results of SOURCE5 show approximately 6 seconds until vapor overflows the 101-FE pipe-rack impoundment and process area sump. An initial evolution rate of 472 kg/sec with a pool radius of 27 meters was calculated. Based on this input, DEGADIS indicates a distance of approximately 4,000 feet to the 2.5 percent average gas concentration isopleth. This distance would extend beyond the plant property boundary. Therefore, **we recommend that:**

- **Dominion re-evaluate the design of the process area sump and existing 101-FE pipe impoundment. Specifically, Dominion should provide revised flammable vapor dispersion calculations to verify that the exclusion zone resulting from a spill through the 6-inch-diameter recirculation line on the sendout pump discharge would not extend beyond the property line. The revised flammable vapor calculations should be supported by:**

  a. drawings indicating the size and location of the line proposed for the single accidental leakage source;

  b. plan, profile, and cross-section drawings showing the dimensions and configuration of the proposed containment system;

  c. source strength calculations;

  d. DEGADIS program output and results; and

  e. a drawing clearly delineating the property line and the resulting exclusion zone.

  This information should be provided in Dominion's comments on the draft EIS.

4.12.5 Marine Safety[8]

The February 2004 Interagency Agreement provides the framework for the participating agencies to work in a coordinated manner to address the full range of issues regarding safety and security at LNG import terminals. The FERC closely coordinated its pre-certificate review of the proposal with the Coast Guard, which has authority over the safety of LNG vessels and the marine transfer area as well as the security of the LNG vessels and the entire LNG facility.

The hazards associated with the marine transportation of LNG differ from land-based hazards. Whereas the land-based facilities have features to both limit the duration of LNG spills and contain credible spill volumes, any LNG spill on water would be unconfined and would vaporize rapidly due to heat input from the water. The history of LNG shipping has been free of major incidents, and none have resulted in significant quantities of cargo being released (see section 4.12.5.3). No incidents have occurred at existing LNG terminals during the 50 years of operation that resulted in any significant quantities of cargoes being released. However, the possibility of an LNG spill from a ship over the duration of the proposed Project must be considered. Historically, the events most likely to cause a significant release of LNG were a ship casualty such as:

- a vessel colliding with an LNG ship in transit;
- a vessel transiting the Chesapeake Bay colliding with an LNG ship in the maneuvering area;
- an LNG ship alliding[9] with the terminal or a structure in the Chesapeake Bay;
- a vessel alliding with an LNG ship while moored at the Cove Point terminal; or
- a grounding sufficiently severe to puncture an LNG cargo tank.

However, the attacks on September 11, 2001, have made the public keenly aware of additional risks that must be considered in the evaluation of marine safety and security:

- a deliberate attack on an LNG ship by a terrorist group.

Any of the above events would have to occur with sufficient impact to breach the LNG ship's double hull and cargo tanks. Previous incidents with LNG ships have primarily involved grounding, and none of these have resulted in the breach of the double hull and subsequent release of LNG cargo. The following discussion provides a chronology of the LNG ship voyage from the liquefaction facility to the import terminal, disclosing the risks at each step and how they are managed. Details and analysis are provided in subsequent sections.

<u>LNG Vessels and Ocean Voyage</u>

Imported LNG could be obtained from exporting terminals throughout the world and delivered by LNG ships to the proposed expanded facilities at the existing Cove Point Terminal. Exporting countries include Algeria, Australia, Brunei, Indonesia, Malaysia, Nigeria, Oman,

[8] This section was written with the cooperation and assistance of the Coast Guard, Sector Baltimore.
[9] "Allision" is the action of dashing against or striking upon a stationary object (*e.g.*, the running of one ship upon another ship that is docked) – distinguished from "collision", which is used to refer to two moving ships striking one another.

Qatar, Trinidad, and United Arab Emirates. In 2003, LNG imports to the U.S. included: 72 percent from Trinidad, 12 percent from Nigeria, 10 percent from Algeria, 3 percent from Qatar, 2 percent from Oman, and 1 percent from Malaysia.

As is the case with the LNG ships currently delivering to the existing facility, any LNG tankers used to import LNG to the expanded facilities would be constructed and operated in accordance with the International Maritime Organization (IMO) Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, the International Convention for Safety of Life at Sea (SOLAS), and 46 CFR 154, which contain the U.S. safety standards for vessels carrying bulk liquefied natural gas. Foreign flag LNG tankers would be required to possess a valid IMO Certificate of Fitness and a Coast Guard Certificate of Compliance.

In 1993, amendments to the IMO's Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk require all tankers to have monitoring equipment with an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a cargo tank. In addition, the cargo tanks are heavily instrumented, with gas detection equipment in the hold and interbarrier spaces, temperature sensors, and pressure gauges. Fire protection must include the following systems:

- a water spray (deluge) system that covers the accommodation house control room and all main cargo valves;
- a traditional firewater system that provides water to fire monitors on deck and to fire stations found throughout the ship;
- a dry chemical fire extinguishing system for hydrocarbon fires; and
- a carbon dioxide system for protecting machinery including the ballast pump room, emergency generators and compressors.

As a result of September 11, 2001, the IMO agreed to new amendments to the 1974 SOLAS addressing port facility and ship security. The International Ship and Port Facility Security Code was adopted in 2003 by the IMO. This code requires both ships and ports to conduct vulnerability assessments and to develop security plans. The purpose of the code is to: prevent and suppress terrorism against ships; improve security aboard ships and ashore; and reduce the risk of passengers, crew, and port personnel on board ships and in port areas, for vessels and cargoes. All LNG vessels as well as other cargo vessels 300 gross tons and larger, as well as ports servicing those regulated vessels, must adhere to these IMO and SOLAS standards. Some of the IMO requirements for ships are as follows:

Ships:

- ships must develop security plans and have a Ship Security Officer;
- ships must be provided with a ship security alert system. These alarms transmit ship-to-shore security alerts to a competent authority designated by the Administration, which may include the company, identifying the ship, its location and indicating that the security of the ship is under threat or has been compromised;
- ships must have a comprehensive security plan for international port facilities, focusing on areas having direct contact with ships;

- ships may have certain equipment onboard to help maintain or enhance the physical security of the ship.

Port Facilities:

- the port facility must have a security plan and a Facility Security Officer (FSO); and
- certain security equipment may be required to maintain or enhance the physical security of the facility.

Both ships and ports must:

- monitor and controlling access;
- monitor the activities of people and cargo;
- ensure the security and availability of communications; and
- complete a Declaration of Security.

LNG Vessel Transit in the Chesapeake Bay

Currently the Cove Point Terminal receives approximately 90 LNG ships annually. The maximum number of ships that could presently be accommodated at the facility on an annual basis is approximately 120. Dominion would expect to receive approximately 200 ships per year should the proposed facilities be placed in service.

As is the case for existing LNG cargoes arriving at the Cove Point LNG Terminal, the agents for the shipping companies would have the responsibility for notifying the Coast Guard and Dominion upon the arrival of an LNG tanker at the entrance of the Chesapeake Bay, in accordance with a notification policy to be developed with the affected parties. The LNG tankers would transit the Chesapeake Bay under the control of Virginia and Maryland pilots at an anticipated speed of 12 knots. In addition to the pilots, the Coast Guard would control the transit of the LNG vessel within Chesapeake Bay and while unloading cargo. In accordance with 33 CFR 160, Subpart C, Coast Guard requirements include a 96- and 24-hour advance notification of the LNG vessel arrival. Upon arrival at the entrance to the Bay, Coast Guard personnel may board the LNG vessel for an inspection of the ship safety systems, review of the crew manifest, and conduct a security sweep of the vessel. Other requirements may include: a Coast Guard escort to the dock, establishment of a moving safety/security zone around the vessel while en route and during unloading operations, an inspection of the dock safety systems prior to commencing cargo transfer, and maintaining security of the dock and vessel (see section 4.12.5.2, Requirements for LNG Ship Operations).

Deliberate Attack on an LNG Vessel

In addition to addressing the potential hazards from LNG vessel casualties, the possibility of a deliberate attack on an LNG ship by a terrorist group must also be considered. Security of the LNG vessel is the responsibility of the owner/operator and the master of the vessel. Security of the facility is the responsibility of the owner/operator of the facility. Protection of the LNG vessel and the import terminal involves personnel from Dominion's security staff and State and local law enforcement. The Coast Guard conducts random shoreside and waterside security

patrols to include visits/passes of the LNG facility. In addition, the Coast Guard may establish a safety and/or security zone around the LNG vessels in transit and while docked. Only personnel or vessels authorized by the Captain of the Port or the District Commander would be permitted in the safety/security zone. Dominion provides security for the terminal according to its amended Facility Security Plan prepared under 33 CFR Part 105 and approved by the Coast Guard and Captain of the Port (see section 4.12.6). Some of the requirements include:

- a Facility Security Assessment to identify site vulnerabilities, possible security threats, consequences of an attack, and facility protective measures;
- a Facility Security Plan with procedures for responding to security incidents;
- a designated Facility Security Officer responsible for implementing and periodically updating the Facility Security Plan and Assessment;
- scalable security measures to provide increasing levels of security at increasing Maritime Security (MARSEC) levels;
- security exercises at least once each calendar year and drills at least every 3 months; and
- mandatory reporting of all breaches of security and security incidents.

Security at the facility is provided by both active and passive systems. The entire LNG site is surrounded by a protective enclosure (*e.g.*, fence) with sufficient strength to prevent unauthorized access. The enclosure illuminated with not less than 2.2 lux between sunset and sunrise. Intrusion detection systems and day/night camera coverage identify unauthorized access. A separate security staff conducts periodic patrols of the plant, screen visitors and contractors, and assist in maintaining security of the marine terminal during cargo unloading. In order to ensure that the responsible parties of Dominion's security staff enhances overall security, **we recommend that: Dominion coordinate, as needed, with the Coast Guard to define the responsibilities of Dominion's security staff in supplementing other security personnel and in protecting the LNG ships and terminal.**

A detailed evaluation of the consequences of a terrorist attack on a modern membrane LNG tanker was prepared by Lloyd's Register North America for the proposed Weaver's Cove Project in Fall River, Massachusetts (see section 4.12.5.3). This analysis provides a basis for estimating the potential magnitude of a hazard from a successful terrorist attack, and for developing LNG vessel and waterfront security plans. In addition, the DOE released a study by Sandia National Laboratories, Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water (Sandia Report), in December 2004. The report included an LNG cargo tank breach analysis using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for credible accidental and intentional LNG spill events. The analysis of accidental events found that groundings and low speed collisions could result in minor ship damage but not a cargo spill; while high speed collisions could cause a 0.5 to 1.5 m^2 cargo tank breach area. For intentional scenarios, the size of the cargo tank hole depends on the location of the ship and source of threat. Intentional breach areas were estimated to range from 2 to 12 m^2. In most cases, an intentional breaching scenario would not result in a nominal hole of more than 5 to 7 m^2, which is a more appropriate range to use in calculating potential hazards from spills. These hole sizes are equivalent to circular hole diameters of 2.5 and 3 meters.

The methodology described in the ABSG Consulting Inc. (ABSG) study, Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers, and revised in staff's responses to comments on the report (issued June 18, 2004), was used to calculate the thermal radiation distances for several holes ranging in diameter from 1 meter to 3.9 meters. Using the methodology, we have estimated distances for a nominal 2.5-meter and 3-meter diameter hole to range from 4,265 to 4,745 feet for a thermal radiation of 1,600 Btu/ft^2-hr, the level which is hazardous for persons located outdoors and unprotected; from 3,300 to 3,665 feet for 3,000 Btu/ft^2-hr, an acceptable level for wooden structures; and from 1,990 to 2,200 feet for 10,000 Btu/ft^2-hr, a level sufficient to damage process equipment.

These intentional breach scenarios provide guidance in developing the operating restrictions for LNG vessel movements in Chesapeake Bay, as well as in establishing potential impact areas for emergency response and evacuation planning.

Emergency Response and Evacuation Planning

Prior to commencing operations, Dominion would be required to update its existing emergency procedures manuals, as required by 49 CFR Part 193.2509 that provide for: (a) responding to controllable emergencies and recognizing an uncontrollable emergency; (b) taking action to minimize harm to the public including the possible need to evacuate the public; and (c) coordination and cooperation with appropriate local officials. Specifically, Section 193.2059(b)(3) requires "Coordinating with appropriate local officials in preparation of an emergency evacuation plan…" Typically, the manuals are prepared at the later stages of the construction process and submitted to FERC as a requirement prior to placing the facilities in service.

While the worst-case scenarios evaluated for the onshore facility in section 4.12.3 and for marine spills in section 4.12.5 provide guidance on the maximum extent of potential hazards, they should not be assumed to represent the evacuation zone for *every* potential incident. As with any other fuel or hazardous material, the actual severity of the incident would determine what area needs to be evacuated, if any, rather than a worst-case maximum zone. It is anticipated that the emergency evacuation plans would identify evacuation distances based upon increasing severity of events. Section 311 of the Energy Policy Act of 2005 stipulates that the FERC must require the LNG operator to develop an Emergency Response Plan in consultation with the Coast Guard and state and local agencies. The FERC must approve the Emergency Response Plan prior to any final approval to begin construction. To satisfy this requirement, **we recommend that**:

- **Dominion develop an updated Emergency Response Plan (including evacuation) as needed to reflect the proposed expansion activities and coordinate procedures with local emergency planning groups, fire departments, state and local law enforcement, and appropriate federal agencies. This plan should include at a minimum:**

  a. designated contacts with state and local emergency response agencies;

  b. scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;

c. **procedures for notifying residents and recreational users within areas of potential hazard;**

d. **evacuation routes for residents of Cove Point, Maryland and other public use areas that are within any transient hazard areas;**

e. **locations of permanent sirens and other warning devices; and**

f. **an "emergency coordinator" on each LNG vessel to activate sirens and other warning devices.**

The Emergency Response Plan should be filed with the Secretary for review and written approval by the Director of OEP <u>prior to initial site preparation</u>. Dominion should notify the FERC staff of all planning meetings in advance and should report progress on the development of the updated Emergency Response Plan at 3-month intervals.

4.12.5.1 Chesapeake Bay

As discussed in the July 2001 EA prepared for the reactivation of the Cove Point LNG facility (Docket No. CP01-76-000), the Chesapeake Bay is a key commercial waterway containing two major North Atlantic ports. The Hampton Roads Complex (Portsmouth, Norfolk, Hampton, and Newport News) is located at the mouth of the bay, while the Port of Baltimore is located at the northern end of the bay. Commercial vessels that regularly trade in these ports include dry cargo ships (*e.g.* container, roll on/roll off, bulk), tankers, and barges. The Cove Point terminal is located between these two ports, approximately 120 nautical miles from the Hampton Roads Complex at the mouth of the bay and approximately 60 miles from the Port of Baltimore. Commercial vessels transporting cargo to and from the Port of Baltimore pass by the existing LNG terminal.

In the July 2001 EA, the number of commercial vessels passing the Cove Point Terminal on an annual basis was estimated using 1998 waterborne commerce data for the Port of Baltimore (U.S. Army Corps of Engineers, 1998) and methods recommended by the U.S. Army Corps of Engineers (McGee, 2001). Based on the results of this analysis, it was estimated that approximately 22,000 vessels passed by the terminal in 1998. Approximately 19,000 of these vessels had drafts less than 20 feet and approximately 300 of these vessels had drafts greater than 35 feet.

While an LNG tanker is docked at the marine terminal, an extensive channel, approximately 2 nautical miles wide, would remain available for ships and boats to pass the facility. Due to this wide passing area, unloading operations at Cove Point terminal should not impede or otherwise adversely affect vessel traffic in the bay.

4.12.5.2 Requirements for LNG Ship Operations

The arrival, transit, cargo transfer, and departure of LNG ships in Chesapeake Bay currently adheres to the procedures of a Liquefied Natural Gas Vessel Management and Emergency Plan developed by the Coast Guard. As part of the proposed expansion, Dominion would update its Operations and Emergency manuals in consultation with the Coast Guard. The updated

procedures would be developed to ensure the safety and security of all operations associated with LNG ship transit and unloading for both the existing and expanded facilities. The plan would contain specific requirements for the LNG ship, pre-arrival notification, transit through Chesapeake Bay, the waterfront facility, cargo transfer operations, Coast Guard inspection and monitoring activities, and emergency operations. The Coast Guard would monitor each LNG ship in accordance with the plan.

The Coast Guard regulations in 33 CFR 127, apply to the marine transfer area of waterfront facilities between the LNG ship and the last manifold or valve located immediately before a storage tank. Further, title 33 CFR 127 regulates the design, construction, equipment, operations, inspections, maintenance, testing, personnel training, fire fighting, and security of LNG waterfront facilities. The safety systems, including the communications, emergency shut down, gas detection, and fire protection must comply with the regulations in 33 CFR 127. Under 33 CFR 127.019, Dominion would be required to submit two copies of its updated Operations Manual and Emergency Manual to the Captain of the Port, Sector Baltimore.

33 CFR 127 separates cargo transfer operations into three distinct phases: Preliminary Transfer Inspection (Section 127.315); Declaration of Inspection (Section 127.317); and LNG Transfer (Section 127.319).

These different sections require specific actions to be completed prior to and during the transfer. Additionally, there are specific actions required in the case of a release of LNG (Section 127.321). In accordance with 33 CFR 127.007, Dominion submitted a Letter of Intent (LOI) to the Coast Guard on April 14, 2005 conveying its intention to initiate new construction at the existing Cove Point marine terminal. In addition, Dominion submitted a letter to the Coast Guard on April 28, 2005 which requested approval to receive LNG tankers at the south berth (see discussion in section 2.1.1). Upon completion of their review, the Coast Guard may issue a Letter of Recommendation (LOR) to address the proposed expanded operations at the Cove Point Terminal with respect to the following items:

- density and character of marine traffic;
- locks, bridges, or other manmade obstructions;
- depth of water;
- tidal range;
- protection from high seas
- underwater pipelines and cables; and
- distance of berthed vessels from the channel.

Due to numerous planned and proposed LNG import terminals at various ports across the U.S. and the maritime security implications of LNG marine traffic on a port, the Coast Guard issued Navigation and Vessel Inspection Circular No. 05-05 – Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic (NVIC). The purpose of this NVIC is to provide Coast Guard Captains of the Port/Federal Maritime Security Coordinators, members of the LNG industry, and port stakeholders with guidance on assessing the suitability of a waterway for LNG marine traffic that takes into account conventional navigation safety/waterway management issues contemplated by the existing LOI/LOR process, but in addition, also takes into account maritime security implications. The NVIC also provided

specific guidance on the timing and scope of the waterway suitability assessment (WSA), which will address both safety and security of the port, the facility, and the vessels transporting the LNG. Preparation of this guidance was referenced in the Coast Guard's March 18, 2005 Report to Congress on Liquefied Natural Gas Terminals.

The WSA process addresses the transportation of LNG from an LNG tanker's entrance into U.S. territorial waters, through its transit to and from the LNG receiving facility, and includes operations at the vessel/facility interface. In addition, the WSA addresses the navigational safety issues and port security issues introduced by the proposed LNG operation. The Coast Guard's report on the WSA identifies the relevant safety and security issues from the broad viewpoint of impact on the entire port, as well as provides a detailed review of specific points of concern along the LNG tanker's proposed transit route. The WSA will be reviewed on an annual basis and updated as needed until the facility is placed in service.

After consulting with the Coast Guard, we have determined that a WSA is necessary for the proposed Cove Point LNG Expansion Project. Dominion is currently preparing a preliminary WSA and will submit it directly to the Captain of the Port/Federal Maritime Security Coordinator at the Coast Guard, Sector Baltimore. Once the preliminary WSA is submitted, the Coast Guard would validate the WSA, as outlined in the NVIC. As part of its review, the Coast Guard would need input from Dominion, port stakeholders, law enforcement officials, emergency response officials, and other local officials. The Coast Guard would use input from these parties to assess the WSA, which may need to be updated based on the Coast Guard's comments. Therefore, **we recommend that:**

- **Dominion submit a follow-on waterway suitably assessment to the Captain of the Port, Sector Baltimore/Federal Maritime Security Coordinator for review and validation and provide a copy to the FERC staff.**

Once the follow-on WSA has been validated, the Coast Guard would provide a WSA report to FERC. The Coast Guard's summary review of Dominion's WSA will be included in the final environmental impact statement issued for this Project.

FERC staff recognizes that the initial assessment would be prepared well before the additional import operations would commence, and that the port's overall operation/security picture may change over that time period. New port activities may commence, infrastructure may be added, or population density may change. Improvements in technology to detect, deter, and defend against intentional acts may also develop. Therefore, **we recommend that:**

- **Dominion annually review its waterway suitability assessment for the Project; update the assessment to reflect changing conditions; provide the updated assessment to the Captain of the Port, Sector Baltimore/Federal Maritime Security Coordinator for review and validation; and provide a copy to the FERC staff.**

While the LOR would address the suitability of the Chesapeake Bay for LNG ship transportation, it would not constitute a final authority to commence LNG operations. It is anticipated that the Coast Guard would decide on a LOR as soon as possible after the Commission issues the final EIS, or wait until after the Commission makes an overall public interest determination of the proposal.

The Coast Guard's recommendation is subject to certain safety and security provisions, as well as Dominion updating its LNG Vessel Management and Emergency Plan. This plan would be reviewed and updated as necessary to address issues specific to the Chesapeake Bay.

4.12.5.3 LNG Ship Safety

Since 1959, LNG has been transported by ship without a major release of cargo or a major accident involving an LNG ship. Starting in 1971, LNG began arriving at the Distrigas facility in Everett, Massachusetts. To date, more than 450 cargoes, with volumes ranging from 60,000 to 125,000 m^3, have been delivered into the Port of Boston without incident. During 2003, a total of 506 Bcf (204 cargoes) of LNG was imported into the U.S. For 30 years, LNG shipping operations have been safely conducted in the U.S. The world's LNG ship fleet numbers 173, with an additional 57 ships contracted for delivery by 2006.

Over the last 40 years, LNG ships have made over 33,000 voyages and safely transported over 2.72 billion cubic meters of LNG. This includes over 1,500 voyages to or from U.S. ports. Currently, all of the ships in the LNG fleet operate under a foreign flag with foreign crews. A foreign flag ship must have a Certificate of Compliance inspection by the Coast Guard to ensure compliance with International safety standards.

<u>History</u>

During the 33,000 voyages that have been completed since the inception of LNG maritime transportation, there have been only eight significant incidents involving LNG ships, none of which resulted in spills due to rupturing of the cargo tanks. These incidents are described below:

- **Pollenger** had an LNG spill onto the steel cover of cargo tank number one during unloading at Everett, Massachusetts in April 1979. The spill caused cracking of the steel plate.
- **Mostafa Ben Boulaid** had a check valve fail when unloading at Cove Point, Maryland, in April, 1979, releasing a small quantity of LNG onto the ship and causing some minor fracture of the deck plating. Activation of the ship's safety systems (*i.e.*, the emergency shutdown system and water spray system), along with excellent response of the crew, kept the incident from propagating, thus minimizing any serious damage.
- **El Paso Paul Kayser** grounded on a rock in June 1979 in the Straits of Gibraltar during a loaded voyage from Algeria to the U.S. Extensive bottom damage to the ballast tanks resulted; however, the cargo tanks were not damaged, and no cargo was released. The complete cargo of LNG was subsequently transferred to another LNG ship and delivered to its U.S. destination.
- **LNG Libra**'s propeller shaft fractured while the ship was en route to Japan with a full cargo in October 1980. The ship was taken under tow, and the cargo was safely transferred to another LNG ship and delivered to its destination.
- **LNG Taurus** grounded in December 1980 near the entrance to Taboata Harbor, Japan. The grounding resulted in extensive bottom damage, but the cargo tanks were not affected. The ship was refloated and the cargo unloaded.

- **Isabella** had LNG spill onto its deck due to a cargo tank overflow in June 1985, causing severe cracking of the steelwork. The spill had been attributed to a cargo valve failure during discharging of cargo.
- **Tellier** was blown from its docking berth at Skikda, Algeria in February 1989 during severe winds causing damage to the loading arms and the ship and shore piping. The cargo loading had been secured just before the wind struck, but the loading arms had not been drained. Consequently, the LNG remaining in the loading arms spilled onto the deck causing fracture of some plating.
- **Norman Lady** was struck by the USS Oklahoma City nuclear submarine while rising to periscope depth near the Strait of Gibraltar in November 2002. The 87,000 cubic meter LNG tanker, which had just unloaded its cargo at Barcelona, Spain, sustained only minor damage to the outer layer of its double hull but none to its cargo tanks.

There have also been some incidents that involved the release of small quantities of LNG, such as minor leaks from seals and gaskets, some of which required that operations be temporarily stopped in order to rectify the malfunction.

Vessel Construction

In 1980, at the initial peak of LNG import activity in the U.S., the Coast Guard published the report, Liquefied Natural Gas and Liquefied Petroleum Gas – Views and Practices – Policy and Safety. The report summarized the Coast Guard's extensive research into the safety hazards of LNG and its view that "...the nature of both LNG and LPG presents an acceptable risk for transportation in maritime commerce." This is due to the fact that LNG ships are well constructed, robust vessels designed to withstand low-energy type incidents that are prevalent in harbors and during docking operations. Moreover, safety measures, both equipment and training, are planned and designed into these LNG ships to prevent or control all types of potential incidents.

The insulation of cargo tanks on LNG carriers is a complex assembly of many layers. The relief valve capacity of LNG carriers is designed to compensate for over-pressure caused by fire. The potential that impingement by a cryogenic liquid could cause brittle fracture of the ship's hull was known to the Coast Guard in the mid-1970s when the U.S. regulation for LNG carriers in 46 CFR Part 154 was being developed. Accordingly, the regulations require the use of special crack-arresting steel in strategic locations throughout the vessel's hull. LNG carriers used in the U.S. waters must also be constructed in accordance with the IMO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk. This standard requires that the vessel inner hull adjacent to the cargo tanks be protected against contact from liquid cargo through a combination of proper material selection, adequate insulation, and use of heating systems.

As required by the IMO conventions and design standards, hold spaces and insulation areas on an LNG carrier are equipped with gas detection and low temperature alarms. These devices monitor for leaks of LNG into the insulation between primary and secondary LNG cargo tank barriers. In addition, hazard detection systems are also provided to monitor the hull structure adjacent to the cargo tank, compressor rooms, motor rooms, cargo control rooms, enclosed spaces in the cargo area, specific ventilation hoods and gas ducts, and air locks.

LNG carriers are equipped with a firewater system with the ability to supply at least two jets of water to any part of the deck in the cargo area and parts of the cargo containment and tank covers above-deck. A water spray system is also available for cooling, fire prevention, and crew protection in specific areas. In addition, certain areas of LNG carriers are fitted with dry chemical powder-type extinguishing systems and CO_2 smothering systems for fighting fires.

Unlike many conventional crude oil tankers, all LNG ships used to deliver LNG to this proposed Project would have double-hull construction, with the inner and outer hulls separated by about 10 feet. Furthermore, the cargo tanks are normally separated from the inner hull by a layer of insulation approximately 1-foot thick. As a result, many grounding incidents severe enough to cause a cargo spill on a single-bottom oil tanker would be unable to penetrate both inner and outer hulls of an LNG ship. An earlier Federal Power Commission (FPC, predecessor to the FERC) study estimated that the double bottom of an LNG ship would be sufficient to prevent cargo tank penetration in about 85 percent of the cases that penetrated a single-bottom oil tanker.

The probability of an LNG ship sustaining cargo tank damage in a collision would depend on several factors – the displacement and construction of both the struck and striking vessels, the velocity of the striking vessel and its angle of impact with the struck vessel, and the location of the point of impact. The previous FPC study estimated the additional protection afforded by the double-hull would be effective in low energy collisions, overall it would prevent cargo tank penetration in about 25 percent of the cases that penetrated a single-hull oil tanker.

In 1995, to assist the Coast Guard in San Juan, Puerto Rico, EcoEléctrica L.P. prepared an analysis of the damage that could result from an oil tanker striking an LNG ship at berth (FERC, 1996). The analysis assumed a 125,000 cubic meter LNG ship and an 82,000 dead weight ton tanker carrying number 6 fuel oil, without tug assistance. The analysis determined the minimum striking speed to penetrate the cargo tanks of an LNG ship for a range of potential collision angles. The resulting minimum striking speeds are presented in table 4.12.5.3-1 for the two principal cargo systems.

TABLE 4.12.5.3-1

Minimum Striking Speed to Penetrate LNG Cargo Tanks

Angle of Impact	Minimum Striking Speed (knots)	
	Spherical Tanks	Membrane Tanks
Greater than 60 degrees	4.5	3
45 degrees	6.3	4
30 degrees	9	6
15 degrees	18	12

For membrane tanks, the critical on-beam striking speed is 3.0 knots, and for spherical tanks, the critical on-beam speed is 4.5 knots. For both containment types, lower angles of impact result in much greater minimum striking speeds to penetrate LNG cargo tanks. In the July/August 2002 issue of the "LNG Journal", the SIGTTO General Manager provides a table that shows the critical speed necessary for a 20,000-ton vessel to puncture the outer hull of an LNG carrier is 7.3 knots. For a 93,000-ton ship, the impact speed is 3.2 knots. In neither case does such an impact result in damage to the LNG cargo containment system or the release of LNG.

In December 2004, the DOE released a study by Sandia National Laboratories, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water* (Sandia Report). The Sandia Report included an LNG cargo tank breach analysis using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for credible accidental and intentional LNG spill events. The analysis of accidental events found that groundings, collisions with small vessels and low speed (less than 7 knots) collisions with large vessels striking at 90 degrees could cause minor ship damage but would not result in a cargo spill. This is due to the protection provided by the double hull structure, the insulation layer, and the primary cargo tank of an LNG vessel. High speed (12 knots) collisions with large vessels striking at 90 degrees were found to potentially cause cargo tank breach areas of 0.5 to 1.5 square meters.

Hazards

In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In a grounding of sufficient magnitude to rupture an LNG cargo tank, the damage would occur under water and the potential for ignition would be less than for collisions or allisions. In either case, an LNG spill would rapidly vaporize from contact with the water and form a potentially flammable cloud. If not ignited, the flammable vapor cloud would drift downwind until the effects of dispersion would dilute the vapors below the lower flammable limit for methane. The maximum range of potentially flammable vapors (*i.e.*, the distance to the lower flammable limit) is a function of the volume of LNG spilled, the rate of the spill, and the prevailing meteorological conditions. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site. In the Chesapeake Bay the presence of a relatively soft bottom and lack of underwater pinnacles makes an LNG cargo spill unlikely in a grounding incident.

The final EIS for the Calcasieu LNG Project (Lake Charles, Louisiana) (September 1976) analyzed the maximum range of a flammable vapor cloud and hazardous radiation levels from an instantaneous one tank spill. As was consistent with risk analyses at that time and for nearly 25 years thereafter, the instantaneous spillage of one cargo tank was considered to be the "worst case" scenario. Physical constraints on maximum vessel speeds and maximum depths of penetration required to rupture one LNG cargo tank render the possibility of an instantaneous release of more than one cargo tank to be implausible. This is not to imply that the loss of multiple cargo tanks could never occur, but that the extent of the hazard would not exceed that of the instantaneous spillage of one tank.

For an instantaneous one-tank spill with ignition, the final EIS for the Calcasieu LNG Project estimated that a hazardous thermal radiation level of 5,300 Btu/hr-ft^2 would extend 3,595 feet from the center of the spill. For an instantaneous one-tank spill without ignition, the final EIS for the Yukon Pacific LNG Project (FERC, March 1995) estimated that potentially flammable vapors could travel up to 3.3 miles with a 10 mph wind and typical atmospheric stability.

In October 2001, the use of a one-tank instantaneous release as the "worst case" scenario was reexamined by Quest Consultants, Inc. (Quest) as part of an effort by the U.S. Department of Energy to determine the hazards associated with reopening the Distrigas LNG import terminal following the terrorist attacks of September 11, 2001. It was determined that time-release spills through 1-meter and 5- meter diameter holes would more accurately simulate credible "worst

case" damage scenarios. Maximum flammable vapor cloud and radiation hazards were calculated for the two spill scenarios. For a spill on water with ignition, the maximum distance to a radiant flux level of 1,500 Btu/ft^2-hr was estimated to be 1,770 feet. For a spill on water without ignition, a flammable vapor cloud of 2.5 miles was estimated. In November 2003, in response to comments concerning its October 2001 study, Quest clarified that its study only applied to LNG spills resulting from a collision with a large ship in Boston's Outer Harbor where waves would restrict the spreading of LNG on water.

During the past several years, there has been an emergence of studies by various parties to define the "worst case" scenario that would result from a deliberate terrorist attack on an LNG vessel and the subsequent release of cargo. Distances have been estimated to range from 1,770 to 4,200 feet for a thermal radiation level of 1,500 Btu/ft^2-hr. Part of the reason for the apparent discrepancies is the lack of large-scale historical incidents, and the need to extrapolate small-scale field test data to a worst case event. This inevitably leads to differing conservative assumptions among the various parties. For example, some models calculate a time-release cargo discharge through 1-meter or 5-meter diameter holes, while others assume that the cargo tank empties instantaneously.

As a result, FERC commissioned a study by ABSG to search and review the literature on experimental LNG spills and on consequence methodologies that are applicable to modeling incidents of LNG spills on water. Further, the goal of the study was to identify appropriate methods for estimating flammable vapor and thermal radiation hazard distances for potential LNG vessel cargo releases during transit and while at berth. The resulting study, Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers, was released for public comment on May 14, 2004. On June 18, 2004, staff's responses to comments on the consequence assessment methods were issued. As discussed in greater detail in staff's responses, various components of the consequence assessment methodologies were revised based on comments received. The revised study provides the methodology for calculating: (1) the rate of release of LNG from a cargo tank penetration for various sized holes; (2) the spreading of an unconfined LNG pool on water for both continuous spills and rapid (nearly instantaneous) releases; (3) the rate of vapor generation from an unconfined spill on water; (4) thermal radiation distances for LNG pool fires on water; and (5) and flammable vapor dispersion distances.

A detailed evaluation of the consequences of a terrorist attack on a modern membrane LNG tanker was prepared by Lloyds Register North America for the Weaver's Cove LNG Project and filed under CEII. The study evaluated the consequences of attacks on an LNG tanker by missiles and explosives. Finite element analysis was used to evaluate the effect of various sized charges on both the outer <u>and</u> inner hulls. A 1-meter diameter hole of the inner hull at the waterline was found to be the average most probable "worst case" scenario for hazard consequence assessments. This finding is consistent with the attack on the double-hull oil tanker Limberg which caused greater than a 5-meter diameter hole on the outer hull but only minor damage to the inner hull. A failure modes and effects analysis was used to understand internal LNG release characteristics; and a residual strength analysis was used to investigate damage scenarios for a loaded LNG tanker.

The December 2004 Sandia Report included an LNG cargo tank breach analysis using modern finite element modeling and explosive shock physics modeling to estimate a range of breach

sizes for credible accidental and intentional LNG spill events. The analysis of accidental events found that groundings and low speed collisions could result in minor ship damage but not a cargo spill; while high speed collisions could cause a 0.5 to 1.5 m^2 cargo tank breach area. For intentional scenarios, the size of the cargo tank hole depends on the location of the ship and source of threat. Intentional breach areas were estimated to range from 2 to 12 m^2. In most cases, an intentional breaching scenario would not result in a nominal hole of more than 5 to 7 m^2, which is a more appropriate range to use in calculating potential hazards from spills.

The Sandia Report also included guidance on risk management for intentional spills, based on the findings that the most substantial impacts to public safety and property exist within approximately 500 meters (1,640 feet) of a spill due to thermal hazards from a fire, with lower public health and safety impacts beyond 1,600 meters (5,250 feet). Large, unignited LNG vapor releases were found to be unlikely, but could extend to 2,500 meters (8,200 feet) for nominal intentional spill.

Cascading damage due to brittle fracture from exposure to cryogenic liquid or fire-induced damage to foam insulation was evaluated and while possible under certain conditions is not likely to involve more than two or three cargo tanks. Cascading events are not expected to increase the overall fire hazard by more than 20 to 30 percent (1,920 to 2,080 meters or 6,300 to 6,825 feet), but would increase the expected fire duration. Rapid phase transitions are possible for large spills but the effects will be localized near the spill source and should not cause extensive structural damage.

The methodology described in the ABSG study and revised in staff's responses to comments was used to calculate the thermal radiation and flammable vapor dispersion distances for several holes ranging in diameter from 1 meter to 3.9 meters. Based on the penetration of the largest cargo tank of a 140,000 cubic meter LNG ship, a potential spill of 23,000 cubic meters is estimated for the volume of LNG above the waterline. The estimated pool spread results and thermal radiation hazard distances are identified in table 4.12.5.3-2. Thermal radiation calculations are based on an ambient temperature of 34ºF, a relative humidity of 39 percent, and a 20 mph wind speed.

Flammable vapor dispersion calculations were based on an ambient temperature of 50°F, 50 percent relative humidity, a 4.5 mph wind speed and atmospheric stability class F. Based on a 1-meter diameter hole, an unignited release would result in an estimated pool radius of 421 feet. The unignited vapor cloud would extend to 8,672 feet to the lower flammability limit and 12,070 feet to one half the lower flammability limit. It is important to identify certain key assumptions of conditions that must exist in order to achieve the maximum vapor cloud distances. First it would be necessary for an event to create a 1-meter diameter hole by penetrating the outer hull, the inner hull, and cargo containment <u>without ignition</u>. Far more credible is that the event creating a 1-meter diameter hole would also result in a number of ignition sources that would lead to an LNG pool fire and subsequent thermal radiation hazards. It is also unlikely that a flammable vapor cloud could achieve its maximum distance over land surfaces without encountering an ignition source, and subsequently burning back to the source. Flammable vapor dispersion for larger holes was not performed since, realistically, the cloud would not even extend to the maximum distance for a 1-meter diameter hole before encountering an ignition source.

TABLE 4.12.5.3-2 **LNG Spills on Water**				
LNG Release and Spread				
Hole Area	0.8 square meters	5 square meters	7 square meters	12 square meters
Hole Diameter	1.0 meter	2.5 meters	3.0 meters	3.9 meters
Spill Time	94 minutes	15 minutes	11 minutes	7 minutes
Pool Fire Calculations				
Maximum Pool Radius	340 feet	816 feet	939 feet	1,103 feet
Fire Duration	94 minutes	15 minutes	11 minutes	7 minutes
Distance to:				
1,600 BTU/ft^2-hr	2,200 feet	4,265 feet	4,745 feet	5,360 feet
3,000 BTU/ft^2-hr	1,720 feet	3,330 feet	3,665 feet	4,130 feet
10,000 BTU/ft^2-hr	1,060 feet	1,990 feet	2,200 feet	2,475 feet

The LNG ship route to the terminal is at least 2 nautical miles from the nearest shoreline for the entire route except at Cove Point, Maryland. As LNG ships approach the terminal, they would pass within approximately 1 nautical mile of Cove Point. There are scattered residential areas in the vicinity of Cove Point. The remoteness of the LNG shipping route, as well as the configuration of the marine terminal, would minimize the potential hazards to the general public in the unlikely event of a spill of cargo from an LNG ship.

By focusing on the "worst case" intentional breach scenarios for LNG transportation, there is a tendency to dismiss the potential hazards for other fuels and products commonly transported on our waterways. Some of the previously identified studies that calculate long hazard distances for LNG cargo fires also estimate similarly long distances for gasoline, propane and jet fuel cargo fires. Also, it should not be assumed that the hazard distances identified are the assured outcome of an LNG vessel accident or attack, given the conservatisms in the models and the level of damage required to yield such large scale releases. Further, these "worst case" intentional breach scenarios should not be misconstrued as defining an exclusionary zone. Rather they provide guidance in developing the operating restrictions for LNG vessel movements in route to the Cove Point Terminal, as well as in establishing potential impact areas for emergency response and evacuation planning.

4.12.6 Terrorism and Security Issues

The security requirements for the onshore component of the proposed Project are governed by 49 CFR 193, Subpart J - Security. This subpart includes requirements for conducting security inspections and patrols, liaison with local law enforcement officials, design and construction of protective enclosures, lighting, monitoring, alternative power sources, and warning signs. Requirements for maintaining safety of the marine terminal are in the Coast Guard regulations in 33 CFR Part 127. Requirements for maintaining security of the marine terminal are in 33 CFR Part 105.

In the aftermath of the terrorist attacks that occurred on September 11, 2001, terrorism has become a very real issue for the facilities under the Commission's jurisdiction. The FERC, like

other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the FERC has removed energy facility design plans and location information from its website to ensure that sensitive information filed under CEII is not readily available (RM02-4-000 and PL02-1-000 issued February 20, 2003).

Since September 11, 2001, the FERC has been involved with other federal agencies in developing a coordinated approach to protecting the energy facilities of the U.S. The FERC continues to coordinate with theses agencies, specifically with the Coast Guard to address this issue. The Coast Guard now requires arriving ships to provide them with a 96-hour advance notice of arrival that includes key information about the vessel and its crew which allows the Coast Guard to conduct a terrorism risk assessment and put in place appropriate mitigation before the ship reaches the ship channel. In addition, interstate natural gas companies are actively involved with several industry groups to chart how best to address security measures in the current environment. A Security Task Force has been created and is addressing ways to improve pipeline security practices, strengthen communications within the industry and the interface with government, and extend public outreach efforts.

In September 2002, the DOT's OPS issued non-public guidelines to LNG operators that direct them to develop new security procedures for onshore facilities. Operators were required to prepare a security plan within 6 months that responds to the five threat levels defined by the Office of Homeland Security. OPS conducts subsequent on-site reviews of the security procedures.

On October 22, 2003, the Coast Guard issued a series of six final rules, which promulgated the maritime security requirements of the Maritime Transportation Security Act of 2002: Implementation of National Maritime Security Initiatives; Area Maritime Security; Vessel Security; Facility Security; Outer Continental Shelf Facility Security; and the Automatic Identification System. The entire series of rulemakings establishes a new subchapter H in 33 CFR. In support of the rulemakings, the Coast Guard applied a risk-based decision making process to comprehensively evaluate the relative risks of various target and attack mode combinations and scenarios for those vessel types and port facilities that pose a risk of a security incident. This approach provides a more realistic estimation of risk than a simple "worst-case outcome" assessment. Risk management principles acknowledges that while risk generally cannot be eliminated, it can be reduced by adjusting operations to lower consequences, threats, or vulnerability, recognizing that it is easier to reduce vulnerabilities by adding security measures.

On December 29, 2003, terminal owners or operators subject to 33 CFR Part 105 were required to submit a Facility Security Assessment and Facility Security Plan to the Coast Guard Captain of the Port for review and approval. The Facility Security Plans were required to be implemented no later than July 1, 2004 or for facilities constructed after July 1, 2004, 60 days prior to operations. Some of the principal owner or operator responsibilities include:

- Designating a Facility Security Officer with a general knowledge of current security threats and patterns, risk assessment methodology, and the responsibility for implementing the Facility Security Plan and Assessment and performing an annual audit for the life of the Project;

- Conducting a Facility Security Assessment to identify site vulnerabilities, possible security threats and consequences of an attack, and facility protective measures;
- Developing a Facility Security Plan based on the Facility Security Assessment, with procedures for responding to transportation security incidents, notification and coordination with local, state and federal authorities, prevent unauthorized access; measures and equipment to prevent or deter dangerous substances and devices, training and evacuation;
- Implementing scalable security measures to provide increasing levels of security at increasing MARSEC levels for facility access control, restricted areas, cargo handling, vessel stores and bunkers, and monitoring;
- Conducting security exercises at least once each calendar year and drills at least every 3 months; and
- Reporting of all breaches of security and security incidents.

Increased security awareness has occurred throughout the industry and the nation. President Bush established the Office of Homeland Security with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and recover from terrorist attacks within the U.S. The Commission, in cooperation with other federal agencies and industry trade groups, has joined in the efforts to protect the energy infrastructure, including the more than 300,000 miles of interstate natural gas transmission pipeline and associated LNG facilities.

Safety and security are important considerations in any Commission action. The attacks of September 11, 2001 have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities. However, the likelihood of future acts of terrorism or sabotage occurring at the Cove Point LNG Terminal, or at any of the myriad natural gas pipeline or energy facilities throughout the U.S., is unpredictable given the disparate motives and abilities of terrorist groups. The continuing need to construct facilities to support the future natural gas pipeline infrastructure is not diminished by the threat of any such unpredictable acts.

4.12.7 Pipeline Reliability and Safety

The transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture. Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an ignition temperature of 1,000°F and is flammable at concentrations between 5.0 percent and 15.0 percent in air. Unconfined mixtures of methane in air are not explosive. However, a flammable concentration within an enclosed space in the presence of an ignition source can explode. It is buoyant at atmospheric temperatures and disperses rapidly in air.

Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC Chapter 601. The DOT administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. The OPS ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state may also act as DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement action. The majority of the states have either 5(a) certifications or 5(b) agreements, while nine states act as interstate agents.

The DOT pipeline standards are published in 49 CFR Parts 190-199. Part 192 specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993 between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with Section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipeline under the Commission's jurisdiction. The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee, which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and associated aboveground facilities that are proposed in the Cove Point Expansion Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Part 192 also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location

unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined as follows:

Class 1 Location with 10 or fewer buildings intended for human occupancy.

Class 2 Location with more than 10 but less than 46 buildings intended for human occupancy.

Class 3 Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people during normal use.

Class 4 Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil or 18 inches in consolidated rock. All pipelines installed in navigable rivers, streams, and harbors must have a minimum cover of 48 inches in soil or 24 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil or 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (*e.g.*, 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. The class locations of Dominion's proposed pipeline facilities are listed in table 4.12.7-1.

If a subsequent increase in population density adjacent to the right-of-way indicates a change in class location for any of the pipelines, Dominion would be required to reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness, if required to comply with the DOT code of regulations for the new class location.

In 2002, Congress passed an act to strengthen the Nation's pipeline safety laws. The pipeline Safety Improvement Act of 2002 (HR 3609) was passed by Congress on November 15, 2002 and signed into law by the President in December 2002. No later than December 17, 2004, gas transmission operators were required to develop and follow a written integrity management program that contained all the elements described in Part 192.911 and addressed the risks on each covered transmission pipeline segment. Specifically, the law establishes an integrity management program which applies to all high consequence areas (HCAs). The DOT (68 FR 69778, 69 FR 18228, and 69 FR 29903) defines HCAs as they relate to the different class zones, potential impact circles, or areas containing an identified site as defined in Part 192.903 of the DOT regulations.

TABLE 4.12.7-1

DOT Class Locations By Milepost

TL-492 EXT2 Pipeline			TL-536 Pipeline		
Begin Mile Post	**End Mile Post**	**Class Location**	**Begin Mile Post**	**End Mile Post**	**Class Location**
0.0	10.7	1	0	9.5	1
PL-1 EXT2 Pipeline, Section 1			**TL-453 EXT1 Pipeline**		
Begin Mile Post	**End Mile Post**	**Class Location**	**Begin Mile Post**	**End Mile Post**	**Class Location**
0	11.48	1	0	2.14	1
11.48	12.21	2	2.14	3.71	2
12.21	14.06	1	3.71	6.58	1
14.06	15.22	2	6.58	6.65	3
15.22	18.77	1	6.65	11.55	1
18.77	18.91	3			
18.91	19.71	1			
19.71	20.20	3			
20.20	26.80	1			
PL-1 EXT2 Pipeline, Section 2			**TL-532 Pipeline, Section 1**		
Begin Mile Post	**End Mile Post**	**Class Location**	**Begin Mile Post**	**End Mile Post**	**Class Location**
0	5.74	1	0	0.19	1
5.74	6.82	2	0.19	0.31	3
6.82	9.78	1	0.31	0.49	1
9.78	11.45	3	0.49	0.72	3
11.45	14.15	1	0.72	0.88	1
14.15	14.97	2	0.88	0.99	3
14.97	15.81	1	0.99	2.64	1
15.81	15.94	3	2.64	3.92	2
15.94	17.01	1	3.92	11.37	1
17.01	17.35	2	11.37	12.76	2
17.35	19.46	1	12.76	13.71	1
19.46	19.73	3	13.71	14.78	2
19.73	28.65	1	14.78	15.97	1
			15.97	17.11	3
			17.11	17.46	1
			17.46	21.31	2
			21.31	24.76	1
			24.76	24.93	2
			24.93	25.01	3
PL-1 EXT2 Pipeline, Section 3			**TL-532 Pipeline, Section 2**		
Begin Mile Post	**End Mile Post**	**Class Location**	**Begin Mile Post**	**End Mile Post**	**Class Location**
0	24.67	1	0	0.03	3
24.67	25.50	2	0.03	3.95	2
			3.95	7.77	1
			7.77	10.90	3
			10.90	11.76	1
			11.76	12.16	2
			12.16	12.93	1
			12.93	15.64	3
			15.64	17.63	1
			17.63	19.36	3
			19.36	19.85	1
			19.85	21.47	2
			21.47	22.99	1

The OPS published a series of rules from August 6, 2002 to May 26, 2004 (69 FR 29903) that defines HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate in 49 USC 60109 for the OPS to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCA may be defined in one or two ways. In the first method, an HCA includes:

- current class 3 and 4 locations;
- any area in Class 1 or 2 where the potential impact radius[10] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle;[11] or
- any area in Class 1 or 2 where the potential impact circle includes an identified site.[12]

In the second method, an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy; or
- an identified site.

Once a pipeline operator has determined the HCAs on its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The DOT regulations specify the requirements for the integrity management plan at Part 192.911. The HCAs have been determined based on the relationship of the pipeline centerline to other nearby structures and identified sites. Of the 162 miles of proposed pipeline route, Dominion has identified approximately 17 areas totaling 12.89 miles that would be classified as a high consequence area. The pipeline integrity management rule for HCAs requires inspection of the entire pipeline in HCAs every seven years.

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under Section 192.615, each pipeline operator must also establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;

[10] The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in psi multiplied by the pipeline diameter in inches.

[11] The potential impact circle is a circle of radius equal to the potential impact radius.

[12] An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

- emergency shutdown of system and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

Part 192 requires that each operator must establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. Dominion would comply with this requirement by inviting local fire departments to the closest compressor station site for a tour. The tour would include a description of the properties of natural gas and the equipment used. In addition to a tour, a "fire school" may be conducted by Dominion, which allows the fire departments to experience a natural gas fire. Funding, in addition to tax dollars to the county, usually consists of an annual donation by Dominion to the first responder fire departments. After the initial training, every three years there would be an informational program to which all emergency personnel would be invited. Tours of Dominion's facilities by emergency response groups are always available.

Pipeline Accident Data

Since February 9, 1970, 49 CFR 191 has required all operators of transmission and gathering systems to notify the DOT of any reportable incident and to submit a report on form F7100.2 within 20 days. Reportable incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization;
- required taking any segment of transmission line out of service;
- resulted in gas ignition;
- caused estimated damage to the property of the operator, or others, or both, of a total of $5,000 or more;
- required immediate repair on a transmission line;
- occurred while testing with gas or another medium; or
- in the judgment of the operator was significant, even though it did not meet the above criteria.

The DOT changed reporting requirements after June 1984 to reduce the amount of data collected. Since that date, operators must only report incidents that involve property damage of more than $50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. Table 4.12.7-2 presents a summary of incident data for the 1970 to 1984 period, as well as more recent incident data for 1986 through 2003, recognizing the difference in reporting requirements. The 14.5-year period from 1970 through June 1984, which provides a larger universe of data and more basic report information than subsequent years, has been subject to detailed analysis, as discussed in the following sections (Jones *et al*., 1986).

TABLE 4.12.7-2 **Natural Gas Service Incidents by Cause**		
Cause	**Incidents per 1,000 Miles of Pipeline (percentage)**	
	1970-1984	**1986-2003**
Outside force	0.70 (53.8)	0.10 (38.64)
Corrosion	0.22 (16.9)	0.06 (23.81)
Construction or material defect	0.27 (20.8)	0.04 (15.4)
Other	0.11 (8.5)	0.06 (23.12.8)
Total	**1.30**	**0.26**

During the 14.5-year period, 5,862 service incidents were reported over the more than 300,000 total miles of natural gas transmission and gathering systems nationwide. Service incidents, defined as failures that occur during pipeline operation, have remained fairly constant over this period with no clear upward or downward trend in annual totals. In addition, 2,013 test failures were reported. Correction of test failures removed defects from the pipeline before operation.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.12.7-2 provides a percentage distribution of the causal factors as well as the annual frequency of each factor per 1,000 miles of pipeline in service.

The dominant incident cause is outside forces, constituting 53.8 percent of all service incidents. Outside forces incidents result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage. Table 4.12.7-3 shows that human error in equipment usage was responsible for approximately 75 percent of outside forces incidents. Since April 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (*e.g.*, oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts. The 1986 through 2003 data show that the portion of incidents caused by outside forces has decreased to 38.6 percent.

TABLE 4.12.7-3 **Outside Forces Incidents by Cause (1970-1984)**	
Cause	**Percent**
Equipment operated by outside party	67.1
Equipment operated by or for operator	7.3
Earth movement	13.3
Weather	10.8
Other	1.5

The pipelines included in the data set in table 4.12.7-2 vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of service incidents is strongly dependent on pipeline age. While pipelines installed since 1950 exhibit a fairly constant level of service incident frequency, pipelines installed before that time have a significantly higher rate, partially due to corrosion. Older pipelines have a higher frequency of corrosion incidents, since corrosion is a time-dependent process. Further, new pipe generally uses more advanced coatings and cathodic protection to reduce corrosion potential.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Table 4.12.7-4 clearly demonstrates the effectiveness of corrosion control in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to unprotected or partially protected pipe. The data shows that bare, cathodically protected pipe actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

TABLE 4.12.7-4

External Corrosion by Level of Control (1970-1984)

Corrosion Control	Incidents per 1,000 Miles per Year
None-bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

Impacts on Public Safety

The service incident data summarized in table 4.12.7-2 include pipeline failures of all magnitudes with widely varying consequences. Approximately two-thirds of the incidents were classified as leaks and the remaining third classified as ruptures, implying a more serious failure.

Table 4.12.7-5 presents the average annual fatalities that occurred on natural gas transmission and gathering lines from 1970 to 2003. Fatalities between 1970 and June 1984 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Of the total 5.0 nationwide average, fatalities among the public averaged 2.6 per year over this period. The simplified reporting requirements in effect after June 1984 do not differentiate between employees and nonemployees. However, the data show that the total annual average for the period 1984 through 2003 decreased to 3.8 fatalities per year. Subtracting

two major offshore incidents in 1989, which do not reflect the risk to the onshore public, yields a total annual rate of 2.9 fatalities per year for this period.

TABLE 4.12.7-5

Annual Average Fatalities - Natural Gas Transmission and Gathering Systems a/, b/

Year	Employees	Nonemployees	Total
1970-June 1984	2.4	2.6	5.0
1984-2003 c/	-	-	3.8
1984-2003 c/	-	-	2.9 d/

a/ 1970 through June 1984 - American Gas Association, 1986.
b/ DOT Hazardous Materials Information System.
c/ Employee/nonemployee breakdown not available after June 1984.
d/ Without 18 offshore fatalities occurring in 1989 – 11 fatalities resulted from a fishing vessel striking an offshore pipeline and 7 fatalities resulted from explosion on an offshore production platform.

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 4.12.7-6 in order to provide a relative measure of the industry-wide safety of natural gas pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Nevertheless, the average 2.6 public fatalities per year is relatively small considering the more than 300,000 miles of transmission and gathering lines in service nationwide. Furthermore, the fatality rate is approximately two orders of magnitude (100 times) lower than the fatalities from natural hazards such as lightning, tornadoes, floods, earthquakes, etc.

The available data show that natural gas pipelines continue to be a safe, reliable means of energy transportation. Based on approximately 302,000 miles in service, the rate of public fatalities for the nationwide mix of transmission and gathering lines in service is 0.01 per year per 1,000 miles of pipeline. Using this rate, the Cove Point Expansion Project might result in a public fatality related to the proposed pipeline facilities every 615 years. This would represent a slight increase in risk to the nearby public.

TABLE 4.12.7-6

Nationwide Accidental Deaths a/

Type of Accident	Fatalities
All accidents	90,523
Motor vehicles	43,649
Falls	14,985
Drowning	3,488
Poisoning	9,510
Fires and burns	3,791
Suffocation by ingested object	3,206
Tornado, flood, earthquake, etc. (1984-93 average)	181
All liquid and gas pipelines (1986-2003 average) b/	27
Gas transmission and gathering lines, nonemployees only (1970-84 average) c/	2.6

a/ All data, unless otherwise noted, reflects 1996 statistics from the U.S. Department of Commerce, Bureau of the Census, "Statistical Abstract of the United States 118th Edition."
b/ U.S. Department of Transportation, Office of Pipeline Safety, www.ops.dot.gov/stats.
c/ American Gas Association, 1986.

4.13 CUMULATIVE IMPACTS

NEPA requires the lead federal agency to consider the cumulative impacts of proposals under their review. Cumulative impacts may result when the environmental effects associated with the proposed action are superimposed on or added to either temporary or permanent impacts associated with past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Generally, we believe that cumulative impact could result only from the construction of other projects in the same vicinity and time frame as the proposed facilities. In such a situation, although the impact associated with each project might be minor, the cumulative impact resulting from all projects being constructed in the same general area could be greater. In its January 13, 1989 Order Affirming the Administrative Law Judge's Initial Decision for the Mojave-Kern River-El Dorado Project, the Commission concluded that the general impact of building more than one pipeline would be primarily additive, and the cumulative impact may be calculated simply by adding together the impact of each individual project. Any synergistic impact would be short-term and relatively insignificant.

For this analysis, we looked at potential impacts from known projects, existing or proposed, with facilities that would be within the same counties as those proposed in the Cove Point Expansion Project. More distant projects are not addressed because these projects generally do not have regional effects, and therefore, do not contribute substantially to cumulative impacts in the proposed project area.

4.13.1 Other Existing and Proposed Projects

In addition to the Cove Point Expansion Project, we identified three projects that have either been recently constructed, are currently under construction, or are proposed for construction in the same general area. We reviewed other natural gas pipeline projects that are currently under FERC review, and scoping comments on the Cove Point Expansion Project to determine other projects identified for construction within the project area. Additional concerns may be identified in comments on this draft EIS, and we will address them in the final EIS.

The following projects were recently constructed in the vicinity of facilities proposed under the Cove Point Expansion Project:

- *Mid-Atlantic Expansion Project/Dominion Expansion Project.* This project included facilities constructed by Texas Eastern and Dominion in 2003 and 2004 to improve Dominion's capacity to move natural gas from its existing storage facilities in West Virginia and Pennsylvania and provide additional service to customers in Virginia. The project included construction of two new compressor stations (Mockingbird Hill Compressor Station near Pine Grove, Wetzel County, West Virginia and Quantico Compressor Station in Fauquier County, Virginia); additional compression at three existing compressor stations (Crayne Compressor Station in Greene County, Pennsylvania, Chambersburg Compressor Station in Franklin County, Pennsylvania, and Leesburg Compressor Station in Loudoun County, Virginia), and the removal and replacement of 34.3 miles of pipeline in the counties of Greene, Fayette, Somerset, Fulton, and Franklin, Pennsylvania. This project resulted in an increase in natural

gas transportation capacity to Dominion's customers in the Mid-Atlantic Region by 223,000 Dth/d. Counties in which facilities were constructed for the Mid-Atlantic Expansion Project/Dominion Expansion Project and proposed for construction under the Cove Point Expansion Project include Wetzel County, West Virginia; Greene and Franklin Counties, Pennsylvania; and Loudoun County, Virginia.

- *Cove Point LNG Project.* In 2001 Cove Point LNG, L.P. proposed to reactivate its existing Cove Point LNG Terminal in Calvert County, Maryland, and construct an additional on-site LNG storage tank. The project was approved by FERC, and was completed and put into operation in November 2004. The purpose of the project was to reactivate the existing Cove Point LNG Facility to operate as a base load LNG import terminal as it was originally designed and constructed in the 1970s.

The following project is located in the same area as the proposed Project and was recently approved by the FERC, and construction was authorized to proceed in August 2005:

- *Northeast Storage Project.* Dominion Transmission, Inc. filed an application for the Northeast Storage Project with FERC on July 16, 2004 under Docket No. CP04-365-000. This project consists of 22.3 miles of pipeline to be constructed in New York, Pennsylvania, and West Virginia, and includes the addition of four new gas storage wells at the existing Quinlan Storage Field in Cattaraugus County, New York. This project also includes the construction of two new compressor stations (Quinlan Compressor Station in Cattaraugus New York, and Wolf Run Compressor Station in Lewis County, West Virginia). FERC issued an EA for the project in March 2005. The target in-service date for this project is the winter of 2006-2007. The outcome of this project would result in an additional 9.4 Bcfs of natural gas storage service and 163,018 Dth/d of transportation service to area customers during the winter season. Counties in which facilities would be constructed for both the Northeast Storage Project and the Cove Point Expansion Project include Cattaraugus County, New York, and Potter and Clinton counties, Pennsylvania.

Table 4.13.1-1 presents a summary of the expected cumulative impact of the Cove Point Expansion Project and the other identified industrial/commercial and natural gas pipeline projects identified in the project area. The following is a brief analysis of the cumulative impacts on land, water, and air resources resulting from the proposed Cove Point Expansion Project and the three projects listed in table 4.13.1-1.

4.13.2 Land Resources and Use

The Cove Point Expansion Project would be located on agricultural, forest, industrial/ commercial, open, rangeland, open water, and residential lands in various counties in Maryland, Pennsylvania, and Virginia. The Mid-Atlantic Expansion Project/Dominion Expansion Project, the Cove Point LNG Project, and the Northeast Storage Project have resulted or would result in impacts to the same types of land uses in each of these states. Combined, these projects would have a permanent affect on about 1,350 acres of land. The majority of the impacts associated with these projects would be to previously disturbed commercial/industrial lands, would be at existing facility sites, or would be pipeline right-of-way that would be allowed to revert to most pre-construction land uses. As a result, the proposed Cove Point Expansion Project would not substantially contribute to cumulative effects on land use in these states.

TABLE 4.13.1.1

Summary of Cumulative Impacts of the Cove Point Expansion Project and Other Past, Present, and Future Projects

State/Environmental Factor	Unit	Cove Point Expansion Project	Northeast Storage Project	Mid-Atlantic Expansion and Dominion Expansion Project	Cove Point LNG Project	Cumulative
Maryland						
Pipeline Length	mi.	47.8	0	0	0	47.8
Construction disturbance a/						
Temporary	ac.	528.78	0	0	18.2	546.98
Permanent	ac.	414.25	0	0	6	420.25
Waterbodies crossed b/	no.	100	0	0	0	100
Wetlands crossed	ft.	30227	0	0	0	30227
Residences within 50 feet	no.	47	0	0	0	47
Annual air emissions						
NO_X	tons/yr	469.51	0	0	10.6	480.11
CO	tons/yr	243.92	0	0	8.8	252.72
VOC	tons/yr	45.81	0	0	0.6	46.41
$PM_{2.5}$ + PM_{10}	tons/yr	19.1	0	0	0.8	19.9
SO_2	tons/yr	10	0	0	0.06	10.06
Pb	tons/yr	0.0026	0	0	0	0.0026
New York						
Pipeline Length	mi.	0	0.1	0	0	0.1
Construction disturbance a/						
Temporary	ac.	0	17.8	0	0	17.8
Permanent	ac.		18.1	0	0	18.1
Waterbodies crossed b/	no.	0		0	0	0
Wetlands crossed	ft.	0	0	0	0	0
Residences within 50 feet	no.	0	0	0	0	0
Annual air emissions						
NO_X	tons/yr	62.64	69.9	0	0	132.54
CO	tons/yr	62.64	39.7	0	0	102.34
VOC	tons/yr	49.83	17	0	0	66.83
$PM_{2.5}$ + PM_{10}	tons/yr	7.28	6.9	0	0	14.18
SO_2	tons/yr	0.18	0.13	0	0	0.31
Pb	tons/yr	0	0	0	0	0
Pennsylvania						
Pipeline Length	mi.	113.53	22.3 c/	34.51	0	170.34
Construction disturbance a/						
Temporary	ac.	1282.57	208.7	578.1	0	2069.37
Permanent	ac.	725.2	134.2	0	0	859.4
Waterbodies crossed b/	no.	182	35	13	0	230
Wetlands crossed	ft.	17265.77 d/	15708	3480	0	36453.77
Residences within 50 feet	no.	13	1	14	0	28
Annual air emissions						
NO_X	tons/yr	652.66 e/	0	141.5	0	794.16
CO	tons/yr	205.92 e/	0	159.8	0	365.72
VOC	tons/yr	52.36 e/	0	16.77	0	69.13

TABLE 4.13.1.1

Summary of Cumulative Impacts of the Cove Point Expansion Project and Other Past, Present, and Future Projects

State/Environmental Factor	Unit	Cove Point Expansion Project	Northeast Storage Project	Mid-Atlantic Expansion and Dominion Expansion Project	Cove Point LNG Project	Cumulative
$PM_{2.5}$ + PM_{10}	tons/yr	0	0	0	0	0
SO_2	tons/yr	0	0	0	0	0
Pb	tons/yr	0	0	0	0	0
West Virginia						
Pipeline Length	mi.	0	0.6	0	0	0.6
Construction disturbance a/						
Temporary	ac.	20.8	27.9	4.5	0	53.2
Permanent	ac.	20.8	26.9	1.5	0	49.2
Waterbodies crossed b/	no.	0	0	0	0	0
Wetlands crossed	ft.	0	0	0	0	0
Residences within 50 feet	no.	0	0	0	0	0
Annual air emissions						
NO_X	tons/yr	109.59	56.4	26	0	191.99
CO	tons/yr	44.4	20	31.1	0	95.5
VOC	tons/yr	63.04	21.5	0.95	0	85.49
$PM_{2.5}$ + PM_{10}	tons/yr	13.45	8.8	0	0	22.25
SO_2	tons/yr	0.2	0.1	0	0	0.3
Pb	tons/yr	0	0	0	0	0
Virginia						
Pipeline Length	mi.	0	0	0	0	0
Construction disturbance a/						0
Temporary	ac.	0	0	9.4	0	9.4
Permanent	ac.	0	0	3.3	0	3.3
Waterbodies crossed b/	no.	0	0	0	0	0
Wetlands crossed	ft.	0	0	0	0	0
Residences within 50 feet	no.	0	0	0	0	0
Annual air emissions						
NO_X	tons/yr	0	0	41	0	41
CO	tons/yr	0	0	162.5	0	162.5
VOC	tons/yr	0	0	44.15	0	44.15
$PM_{2.5}$ + PM_{10}	tons/yr	0	0	0	0	0
SO_2	tons/yr	0	0	0	0	0
Pb	tons/yr	0	0	0	0	0

a/ Values for temporary and permanent construction disturbance include total acres of forests, open land, commercial/industrial lands, residential lands, agricultural croplands and rangelands, and affected wetlands.
b/ Perennial waterbodies.
c/ Includes the portion of the pipeline located in Cattaraugus County, New York.
d/ Includes wetlands crossed for Pennsylvania Project Pipelines and miscellaneous facilities. At the Compressor Station, an additional 2.89 acres of wetlands will be temporarily disturbed during construction of which 0.28 will be permanently impacted.
e/ Emissions will occur only during the following project periods – PL-EXT2: 16-week project period; TL-492, TL-536, and TI-4538: 8-week project period.

A total of 75 residents (47 in Maryland and 28 in Pennsylvania) have been or would be impacted by the construction and/or operation of the proposed, past, and foreseeable future projects listed in table 4.13.1-1. Residents would be compensated for impacts to their properties or the properties have been or would be protected and/or restored from construction activities. Therefore cumulative impacts to residents associated with the construction and operation these projects are not anticipated to be substantial.

4.13.3 Water Resources

The proposed Cove Point Expansion Project would require the crossing of 282 perennial waterbodies within the state of Maryland and Pennsylvania. The Mid-Atlantic Expansion Project/Dominion Expansion Project and the Northeast Storage Project also involved or would involve the crossing of 48 perennial waterbodies in Pennsylvania (35 for the Mid-Atlantic Expansion Project/Dominion Expansion Project, and 13 for the Northeast Storage Project). To minimize impacts each project proponent has or would implement crossing methods such as the uses of our Procedures. In addition, each proponent has or would comply with local, state, and federal permit requirements for each waterbody crossing.

In general, impacts from pipeline construction across surface waters are short-term, and no long-term or cumulative effects on the waterbodies crossed by the proposed, past, and foreseeable future projects would be expected following mitigation and restoration.

4.13.4 Wetlands

In total, the projects included in this analysis would cross approximately 6.9 miles of wetlands in Pennsylvania and approximately 5.7 miles of wetlands in Maryland. The majority of these wetland impacts has been or would be temporary and these projects have or would result in only minor losses to wetland function. Each of the project proponents has or would be required by the terms and conditions of their respective Section 404 permits to provide compensatory mitigation for unavoidable wetland impacts. In addition, mitigation measures have or would be implemented to restore disturbed wetlands in accordance with other local, state, and federal permit requirements.

4.13.5 Air Quality

Construction of the proposed Cove Point Expansion Project, as well as past projects and reasonably foreseeable future projects listed in table 4.13-1.1 would involve the use of heavy equipment that produces air contaminants, and dust. Operation of the proposed Project (including the LNG terminal and ships delivering LNG to the terminal) and some of the reasonably foreseeable projects would also contribute cumulatively to ongoing air emissions. Table 4.13.1-1 lists the air emissions associated with the construction and operation of the projects in Maryland, New York, Pennsylvania, West Virginia, and Virginia. Increases in point industrial sources could have a deleterious effect on local and regional air quality. If all current projects remain in operation and proposed projects are built, there would be a moderate increase in the overall NO_x, CO_2, and VOC emissions and only a slight increase in overall emissions of PM, SO_2 and Pb in theses states. However, the majority of these emissions has been or would be the result of construction activities (the operation of pipelines will not result in the routine release of air pollutant emissions) and therefore will or would not have long-term detrimental

effects on air quality in the region. In addition, to minimize potential air quality impacts facilities associated with the proposed Cove Point Expansion Project would include state of the air emission control measures and would utilized clean-burning natural gas exclusively. Emissions associated with other current and future proposed projects in this analysis have or would implement air quality protection measures to ensure that air emissions remain at or below local, state, and federal emission standards for criteria air pollutants. As a result, the cumulative air impacts associated with the construction and operation of the current and proposed future projects in the region are not anticipated to be substantial. In addition, we have prepared a Draft General Conformity Determination, and have recommended that Dominion complete a full air conformity analysis that will allow us to complete the General Conformity Determination.

4.13.6 Conclusions about Cumulative Impacts

This draft EIS provides a detailed environmental analysis of the proposed Cove Point Expansion Project and recommendations to mitigate environmental impacts. No additional mitigation is required to address the residual environmental impacts of this Project.

We believe that the impacts associated with other past, present, or reasonably foreseeable future projects that could be identified are additive to the Cove Point Expansion Project. For the projects already approved by the FERC, we take the impacts into account in the formulation of the environmental conditions attached to the Order. For any project that still requires a FERC Certificate, we would evaluate the impact during our NEPA review process.