5.4 SOCIOECONOMIC AND CULTURAL IMPACTS

5.4.1 *Employment and Income*

Employment and income impacts from construction of the proposed facility would be sizable. UniStar estimates that the average annual construction labor force would be approximately 2,755 over a 68-month construction period, earning an average wage of $34 per hour (2007 dollars). Construction, projected to commence in December 2008, would peak at 3,950 during December 2012 through the following November. In total, construction requirements amount to more than 15,600 person-years of employment and $1.1 billion in direct earnings over the more than five-year construction period.

Using state-wide IMPLAN multipliers from the Maryland Department of Business and Economic Development (DBED), the stimulus to the economy would result in the creation of about 9,350 additional person-years of employment and more than $541 million of additional income region-wide. To put this in perspective, the project would create an average of 1,650 additional jobs each year of construction if an average of 2,755 construction workers are on-site.

Construction expenditures for materials and supplies, exclusive of construction worker wages but including subcontracts were not disclosed in the application, but are likely to be substantial. Overnight capital costs for nuclear power plants are uncertain, but estimates from studies published between 2003 and 2007 range from $2,000 to $6,000 (current dollars) per kilowatt (Makhijani, 2008). Using the midpoint, a construction cost (exclusive of labor) of $5.7 billion would generate more than $9 billion in direct and indirect output through the multiplier effect. Because many reactor components are highly specialized and are likely to be manufactured out-of-state or overseas, Maryland would capture a fraction of the benefit.

Once the facility is operational, employment requirements of the facility would be 363 employees with an average annual payroll of $28 million. As a result, operations and maintenance (O&M) employment and earnings would have a smaller, though positive effect upon the regional economy. DBED multipliers suggest that the employment at the facility would add another 969 jobs and $24.16 million in annual earnings overall to the region in addition to that attributable directly to the generating facility. Unlike the construction era, jobs generated both directly and indirectly by the project would be permanent over the operational life of the project.

Other economic benefits from operating the facility would be O&M expenditures, which were not disclosed by the applicant. However, the average non-fuel O&M cost for a nuclear power plant in 2006 was 1.26 cents per kilowatt-hour, or nearly 1.3 cents in 2007 dollars (NEI, 2008). On this basis, non-labor O&M costs could exceed $130 million annually generating over $90 million in indirect sales. Given that current costs are for reactor types other than the EPR, O&M estimates are necessarily speculative. Nevertheless, they suggest that the long term economic impact from CCNPP 3 could be significant to Maryland and surrounding states.

Unit 3's construction labor demand is also significant in the context of Southern Maryland's economy. In 2004, there were 8,005 persons in construction and extraction occupations in the Southern Maryland workforce investment area (Calvert, Charles, and St. Mary's Counties). Department of Labor, Licensing and Regulation (DLLR) projects this to increase to 10,425 occupations by 2014. Combined with other nearby counties in Maryland, more than 109,000 are projected to be employed in construction and extraction occupations in 2014 (Table 5-13). To the extent that Maryland's construction labor force has the skills to construct a nuclear power plant, this suggests that construction labor demand for Calvert Cliffs Unit 3 would largely be satisfied by Maryland labor, much of which is within daily commuting distance of the construction site.

Table 5-13 ***2004-2014 Occupational Projections, Construction and Extraction Occupations***

WIA	Employment 2004	Employment 2014	Employment Change	Replacement Openings	Total Openings
Southern Maryland	8,005	10,425	2,420	1,690	4,110
Anne Arundel	15,275	20,560	5,285	2,960	8,250
Prince George's	28,860	35,035	6,175	5,745	11,920
Baltimore County	23,680	27,520	3,840	4,575	8,430
Baltimore City	15,140	15,925	785	2,920	3,870
Total	90,960	109,465	18,505	17,890	36,580

Source: DLLR, Office of Labor Market Analysis and Information

5.4.2 *Population and Housing*

The degree to which population and housing are affected by construction of Unit 3 will depend largely upon the number of workers who migrate with their families into the region. As noted, a substantial pool of construction labor resides in Southern Maryland and nearby counties which could reduce migration into the region. However, traffic congestion on regional highways and over the Governor Thomas Johnson Memorial Bridge, commuting cost, the attractiveness of Southern Maryland as a place to live, and shortages of particular skills among local construction workers could stimulate in-migration during the construction period.

Traffic congestion is most evident in the morning and evening on MD 2/4 in Prince Frederick from high volumes of commuting traffic and highway oriented commercial traffic which results in increased travel delays (BCC, 2004). Traffic congestion on the Governor Thomas Johnson Memorial Bridge during rush hours is well known to Southern Marylanders and funds have been allocated for the planning, but not construction, of additional capacity over the Patuxent River. Even UniStar has noted that capacity constraints on MD 2/4 north of Calvert Cliffs and on the Governor Thomas Johnson Memorial Bridge could inhibit how much construction worker traffic can actually be delivered to the construction site (KLD, 2007).

The extent to which the regional labor pool can deliver the necessary skills to the construction site is unknown. UniStar's management has publicly expressed concerns about whether there are enough skilled workers to build nuclear power plants (WSJ, 2008). Construction workers recruited from outside the area would likely migrate to Southern Maryland.

In its application for a CPCN to the Maryland Public Service Commission, UniStar analyzed two in-migration scenarios using the peak construction workforce as the basis for estimating the number of households that could move into Calvert and St. Mary's Counties. The basis for the percentage of construction workers migrating into the region was a 1981 NRC analysis of construction workforce characteristics for 13 nuclear power plants, which found that between 17 and 34 percent had moved their families. On this basis, UniStar formulated two scenarios where 20 and 35 percent of construction workers would migrate with their families into Calvert and St. Mary's Counties. In other words, either 720 or 1,260 households (1,880 or 3,285 people) would migrate into the two-county region. (This estimate excludes non-migrating workers who stay in temporary quarters such as motels on a weekly basis.) The analysis concluded that, relative to the combined population of the two-county area, the impacts from an in-migrating workforce would be small.

However, in the context of Calvert County's residential build-out strategy, the impact of in-migration is more significant. If construction worker families were to migrate to Calvert and St. Mary's Counties in roughly the same proportions as households were distributed in 2005, an additional 333 or 583 households would reside in Calvert County in 2013, the peak construction year. Maryland Department of Planning baseline household projections for Calvert County interpolate to approximately 34,360 households residing in the county in 2013. Construction would increase the number to 34,693 and 34,943 in the two in-migration scenarios, still under the residential build-out limit but effectively advancing the date when build-out occurs. The date would be further advanced if a higher proportion of households move to Calvert County, as assumed by UniStar. In the formulation of the 1997 Comprehensive Plan, Calvert County Department of Planning and Zoning noted that before the county reaches 37,000 residential dwellings, it would have to:

- Build the Prince Frederick Loop Road, including 3 overpasses;
- Build the MD 4 and 260 interchange (completed);
- Widen MD 4 to six lanes from Broomes Island Road to Plum Point Road; and
- Build the fourth high school and related middle and elementary schools (completed).

Construction of Calvert Cliffs Unit 3 would not trigger these needs.

There is no question that population and household impacts are speculative. As noted, a significant pool of labor in construction occupations is within commuting distance of the site. Furthermore, creative transportation management strategies, such as busing and shift scheduling, could mitigate some of the regional choke-points that could encourage migration into Southern Maryland. However, the scale of the project is significant in terms of construction labor demand.

Direct and indirect effects of construction worker in-migration on housing are difficult to estimate due to population factors discussed above and broader uncertainties about housing and credit markets. There were 27,576 housing units in Calvert County and 34,081 in St. Mary's County in 2000 (Census, 2000). Vacancy rates were 7.7 and 10.1 percent, indicating more than 5,500 vacant units in the two counties. Approximately one-half of the vacant units were for seasonal, recreational, or occasional use. In Calvert County, 13 percent of vacant housing was for rent and 15 percent was for sale. The equivalent percentages were 22 and 13 percent in St. Mary's County (Table 5-14). If vacancy rate trends have continued since 2000, there would be adequate housing for in-migrating households.

It is likely that market forces would come into play in any scenario involving an in-migrating construction workforce. For example, higher demand could increase bid rents for housing in the short term and, in the longer term, stimulate additional supply, although the latter could be moderated in Calvert County by its residential build-out limit or by infrastructure constraints.

Table 5-14 Vacancy Status of Housing in Calvert and St. Mary's Counties, 2000

	Calvert County, Maryland	St. Mary's County, Maryland
Total:	2,129	3,439
For rent	283	748
For sale only	314	441
Rented or sold, not occupied	243	265
For seasonal, recreational, or occasional use	1,057	1,450
For migrant workers	0	0
Other vacant	232	535

Source: U.S. Bureau of the Census, Census 2000 Summary File 3.

5.4.3 *Transportation*

During construction, Calvert County would see an increase in traffic on major roads leading to the construction site, particularly during the peak construction period when nearly 4,000 construction workers are on-site. During shift changes, local traffic congestion is expected at intersections near Calvert Cliffs, and traffic volumes could cause periodic delays until distance from the site distributes traffic throughout Southern Maryland's highway network. Because the projected operational workforce is much smaller, traffic impacts are expected to be minor, although scheduled outages for maintenance could temporarily swell traffic volumes on nearby roads, causing occasional delays.

To quantify traffic impacts, UniStar conducted a Phase 1 traffic impact study (KLD, 2007). The study area consisted of the intersections MD 2/4 with Calvert Beach Road, Calvert Cliffs Parkway, Pardoe Road and Cove Point Road. Currently, intersections at Calvert Beach Road and Calvert Cliffs Parkway are signalized while those at Pardoe Road and Cove Point Road are not. The performance of signalized intersections was measured using Critical Lane Volume (CLV) analysis to determine a level of service. CLV analysis entails summing the highest through movement volumes plus the opposing left hand turns for each signal phase (the critical volume for that phase) and compares this to a theoretical capacity value of 1,600 vehicles per hour (vph). Congested intersections are assigned Level of Service (LOS) ratings of "E" or "F," where LOS "E" indicates a CLV between 1,450 and 1,600. The CLV for an intersection rated LOS "F" exceeds 1,600 vph. Unsignalized intersections were analyzed using the methodology published in the Highway Capacity Manual (HCM, 2000). LOS "E" is considered acceptable for unsignalized intersections.

UniStar's analysis of existing conditions found that the signalized intersections of MD 2/4 with Calvert Beach Road and Calvert Cliffs Parkway are operating acceptably. The unsignalized intersection of MD 2/4 and Pardoe Road operates at an acceptable LOS in the morning peak period but at LOS "F" in the afternoon peak period. The intersection of Cove Point Road and MD 2/4 operates at LOS "F" in both the morning and afternoon peak periods. Volumes at these intersections are low, however.

The Maryland State Highway Administration (SHA) indicated its concern that construction worker traffic would have a major impact on intersection operations in correspondence dated July 30, 2007, and required UniStar develop a detailed Transportation Management Plan to account for the anticipated origins of employee and other construction vehicles (SHA, 2007). In response, a Draft Traffic Impact Study (TIS) was released on May 22, 2008 (KLD, 2008).

On the basis of a change to the construction worker split between day, afternoon and night shifts (60 percent - 35 percent - 5 percent) and refinements to other assumptions, the TIS estimates that the month of highest traffic would be February 2013, when 4,199 vehicles associated with Units 1 and 2 operational staff, Unit 1 outage workers, heavy vehicles and Unit 3 construction staff descend upon the site. During this period, the LOS at intersections of MD 2/4 with Calvert Cliffs Parkway, Pardoe Road and Cove Point Road would remain acceptable, avoiding mitigation. However, the intersections of MD 2/4 and Calvert Beach Road/Ball Road, and MD 2/4 and Nursery Road are projected to operate at LOS "F" during both the morning and evening peak periods (6:30 am – 7:30 am, 4:00 pm – 5:00 pm) even though both intersections are signalized.

UniStar has suggested using the shoulders of MD 2/4 for right-turning and through movements, effectively creating an extra lane to handle through traffic, to mitigate congestion at its intersection with Calvert Beach Road/Ball Road. The use of the shoulders would last for approximately 24 months. Because it has inadequate capacity for handling anticipated traffic volumes in the peak period, UniStar has proposed converting Nursery Road, the site access road, to four lanes (two in each direction), three lanes (with a reversible center lane) or running the existing two lanes in one direction only, reversing the direction as needed. The intersection of Nursery Road with MD 2/4, which is currently stop-controlled, would also require temporary signalization during the construction period.

However, additional mitigation would be required to improve the operation of the intersection to an acceptable level, particularly during the morning peak period when construction workers are attempting to access the site from the north. UniStar has suggested using the left through lane on southbound MD 2/4 at Nursery Road as a shared left-turn lane, and converting the left-turn lane on northbound MD 2/4 to a through lane, effectively adding a third northbound through lane by utilizing the shoulder for through movement beyond the intersection.

UniStar also suggests building a ramp from Nursery Road onto MD 2/4 to service northbound construction worker traffic leaving the site. This would split north- and southbound traffic and restrict the Nursery Road and MD 2/4 intersection to southbound construction worker traffic. Both the approach land and shoulder of Nursery Road would function as left turn lanes in this scenario.

Traffic safety is an ongoing concern of the SHA and Calvert County. Between 2004 and 2006, there were 42 accidents at MD 2/4 intersections with crossroads in the vicinity of the Calvert Cliffs Nuclear Power Plant, only one involving a truck (Table 5-15). Overall, the accident rate was 0.28 per million vehicle miles of travel at intersections throughout the area of concern in UniStar's traffic impact study.

Although these intersections are relatively safe, construction traffic is likely to increase the number of vehicular accidents, which would require additional resources from Calvert County's emergency service responders. While the increase is expected to be marginal if current accident rates prevail, any temporary changes to intersection geometry, such as lane shifting, could create unsafe driving conditions and increase accident rates and number of accidents.

Table 5-15 Accidents at MD 2/4 Intersections near Calvert Cliffs Nuclear Power Plant, 2004 – 2006

MD 2/4 Intersection		Accidents		
2004	**AADT**	**Total**	**# Trucks**	**Rate**
Cove Point Rd	31425	3	0	0.26
Pardoe Rd	24449	1	0	0.11
Nursery Rd	24099	1	0	0.11
Calvert Cliffs Pkwy	24099	2	0	0.23
Calvert Beach Rd	28075	13	1	1.27
2005				
Cove Point Rd	32275	4	0	0.34
Pardoe Rd	28450	1	0	0.10
Nursery Rd	28075	0	0	0.00
Calvert Cliffs Pkwy	28075	0	0	0.00
Calvert Beach Rd	30775	2	0	0.18
2006				
Cove Point Rd	30322	7	0	0.63
Pardoe Rd	26591	1	0	0.10
Nursery Rd	26220	0	0	0.00
Calvert Cliffs Pkwy	26220	2	0	0.21
Calvert Beach Rd	27841	5	0	0.49
Total				
Cove Point Rd	94022	14	0	0.41
Pardoe Rd	79490	3	0	0.10
Nursery Rd	78394	1	0	0.03
Calvert Cliffs Pkwy	78394	4	0	0.14
Calvert Beach Rd	86691	20	0	0.63

Source: Maryland State Highway Administration, Office of Traffic and Safety, Traffic Development and Support Division.

SHA review of the TIS (SHA, 2008) resulted in a number of comments regarding methodologies and assumptions that need to be addressed before UniStar's proposed mitigation strategies can be accepted. Revisions must determine the extent of traffic impacts caused by the anticipated workforce and the roadway improvements necessary to mitigate those impacts. SHA has committed to working with UniStar and other agencies to coordinate the continued reviews of revised traffic study reports, engineering plans, calculations and supporting documentation necessary to obtain SHA approval for an access permit. The roadway improvements necessary to mitigate the power plant generated traffic impacts should be completed in place when the traffic demand occurs. The SHA would accept additional traffic impacts while the engineering details are resolved to issue an access permit through SHA. The applicant should be required to have the roadway improvements permitted by SHA and under construction when the construction reaches 500 workers with all improvements substantially in place and completed to open to unrestricted traffic by the time the activities reach 1,000 construction workers.

5.4.4 *Land Use*

Land use impacts associated with construction and operation of CCNPP Unit 3 are expected to be contained within the Calvert Cliffs site. No off-site impacts are expected. Approximately 281 acres within the south parcel would be disturbed for permanent facilities. Another 139.1 acres would be temporarily disturbed for construction laydown, one or more concrete batch plants and sediment basins. Currently, 134 acres of the 281 that would be permanently disturbed are zoned Farm and Forest District (FFD) with the remainder zoned Light Industrial (I-1). Temporarily disturbed land is zoned FFD (13 acres) and I-1 (126.1 acres).

The intake and discharge structure and part of the heavy haul road from the barge slip would be located in the Chesapeake Bay Critical Area (CBCA). The total construction disturbance in the CBCA would be 30 acres including 0.78 acre within the Critical Area Buffer that extends 100 feet landward from tidal waters, wetlands, or tributaries. Calvert County's zoning map designates the area containing the footprints of Units 1 and 2 and ancillary facilities as an Intensely Developed Area (IDA). The remaining Critical Area at the site is classified as a Resource Conservation Area (RCA). Construction is expected to be confined within the IDA.

The criteria set forth in conjunction with the Critical Area Act require that any development or redevelopment within an IDA be accompanied by practices to reduce water quality impacts associated with storm water runoff. The criteria further specify that these practices must be capable of reducing storm water pollutant loads from a development site to a level at least 10 percent below the load generated by the same site prior to development. This requirement is commonly referred to as the "10 Percent Rule." In order to provide a consistent approach to comply with the 10 Percent Rule, the Critical Area Commission provides guidance that includes a methodology for determining a pollutant removal requirement and for quantifying the pollutants removed by a variety of storm water Best Management Practices. This guidance, entitled "Maryland Chesapeake and Atlantic Coastal Bays Critical Area 10 Percent Rule Guidance," is the result of revisions to prior publications printed in 1987 and in 1993. The current guidance was reviewed and officially adopted by the Critical Area Commission (CAC) on December 3, 2003. Consultations between UniStar and the CAC are ongoing.

5.4.5 *Property Values*

The conceptual association of location to the value of land is embodied in much of urban and regional economics and derives from a theory of land use advanced by Alonso (1964), Muth and Wisand (1972), and others where a bid-rent function is based on locational factors. Since its original formulation, location theory has been reworked considerably to include locational factors such as accessibility to public services (Tiebout, 1956) and environmental amenities like open space (Ridker and Henning, 1967). This has spawned a considerable literature on the relationship between property values and environmental disamenities ranging from highway noise (Hall *et al.,* 1979), oil pipeline ruptures (Simons *et al.,* 2001), high voltage transmission lines (Exeter Associates, 1995) and many other types of locally undesirable land uses (sometimes referred to as LULUs).

Much of the literature has been summarized in other reviews including Exeter Associates (1995), Specter and Manson (1999) and Boyle and Kiel (2001), and while property value effects from proximity to environmental disamenities have been observed in many studies, the relationship is far from unambiguous.

Of studies of property value impacts from power plants, most have concerned nuclear facilities. Nelson (1981) studied the impact of the accident at Three Mile Island on house prices and was unable to find a significant decrease in residential property values as a result of the accident. Explanatory variables included attributes of the housing units themselves, but did not include any neighborhood variables. The author suggests that real estate prices cannot adjust to changes in perception of risk as rapidly as the perceptions themselves change, or alternately, that houses were sold to individuals who did not perceive the reactor as a negative externality. Studying property values in California, Clark *et al.* (1997) found that the negative imagery surrounding nuclear power plants or stored nuclear waste did not have a significant detrimental influence on house prices in the immediate vicinity of the facilities.

Folland and Hough (1991) examined the impacts of a nuclear power plants on agricultural land values. The authors divided the continental U.S. into 494 market areas and found that average land values in the areas that contained a nuclear power plant were significantly lower than in similar areas that did not. Folland and Hough (2000) built upon their previous work by reaching back to cover a longer time period, attempting to compensate for changes in land use over time, and including the age of the reactor as a variable. They found land prices were altered downward by proximity to the oldest and second-oldest group of reactor installations, and that the trend continued after installation. Land prices showed a positive and statistically significant association with proximity to newer (post-1979) reactors, however.

As part of a general investigation of the impact of property value impacts from power plants and industrial facilities in Maryland, several hedonic models were estimated on data sourced from the MD Property View 2003 Edition (DPPDS, 2003) to measure the effect distance from the Calvert Cliffs Nuclear Power Plant has on property values. The models considered structural and environmental attributes of owner-occupied residential properties and disamenity distance, measured as the straight line distance between a property and the reactor building and were estimated using multiple regression.

The general conclusion was that values of properties near the Calvert Cliffs Nuclear Power Plant are influenced by factors other than their distance to it and its influence on residential land values appears to be relatively benign. In other words, the data failed to reveal a clear association between distance to the reactor building and residential property values. This may be partly attributable to the influence of waterfront amenities on property values, but may also be associated with the extent to which the Calvert Cliffs nuclear power plant is buffered by land from residential land uses.

5.4.6 *Visual Quality*

Unit 3 would be located within the Calvert Cliffs site, which consists of nearly 2,100 acres of prime wooded and agricultural land. Because of the size of the site, placement of reactor buildings, absence of cooling towers, and intervening terrain and vegetation, the existing Units 1 and 2 are not visible from land in Calvert County. The only visible exception is the transmission line corridor that exits the north parcel of the property and roughly parallels MD 2/4 through Port Republic. Units 1 and 2, cooling water intake structures, and the barge slip/heavy haul road are clearly visible looking landward from the Chesapeake Bay.

Because of its location within the interior of the south parcel, most construction activities associated with Unit 3 would not be visible from outside the site boundary. The most visible element during construction would be the new construction access road (and the traffic it generates) at the intersection of Nursery Road and MD 2/4, which would require signalization and possibly other improvements during the period of construction. Nursery Road at MD 2/4 is currently not signalized. Parts of the masts or booms of cranes may occasionally be visible at the construction site during construction of taller components. Overall, the profile of the facility will be less than 200 feet above grade although boom heights will exceed 200 feet at least part of the time during construction. Fugitive dust may be occasionally visible from the construction site.

Because the reactor and turbine buildings would be located at least 1,000 feet from the shoreline, most construction activities are not expected to be visible from the Chesapeake Bay. Construction activities associated with construction of intake and discharge structures, extension of the existing barge slip and construction of a new heavy haul road would be visible from the water.

The power block of Calvert Cliffs Unit 3 consists of a reactor building, turbine building, a fuel pool building, four safeguard buildings, two emergency diesel generator buildings, a reactor auxiliary building, a radioactive waste processing building, and an access building. The reactor building is the tallest building at 190 feet above grade. A vent stack (197 feet above grade) would be the tallest new structure on the site. Calvert Cliffs Unit 3 would use a circulating water supply system cooling tower with a plume abatement system, and would have a diameter of 528 feet and height of 164 feet.

Due to its location within the heavily wooded south parcel, relatively low profile and plume abated cooling system, Calvert Cliffs Unit 3 is not expected to be visible from land. Looking landward from the Chesapeake Bay, the new intake and discharge structures would be visible, although the visual intrusion would be offset by continuity with the intake and discharge structures associated with Units 1 and 2. The tops of the containment building and cooling tower would also be visible from some perspectives on the bay, although probably less visible than natural gas storage tanks associated with the Dominion Cove Point LNG terminal to the south. The cooling tower for Calvert Cliffs Unit 3 is not expected to create a visible plume under any meteorological conditions. Loss of foliage is not expected to change the visibility of Unit 3 appreciably given the density of woodlands surrounding the site.

Outdoor lighting along the site access driveway and on temporary buildings near the perimeter of the property would add to the visual setting from public perspectives during construction of Calvert Cliffs Unit 3. In addition, cranes exceeding 200 feet would require obstruction lighting to satisfy FAA lighting requirements. Once operational, light from Calvert Cliffs Unit 3 would probably not trespass onto adjoining properties because the project is buffered by forest. Since the tallest structure is less than 200 feet, FAA obstruction lighting would not be needed.

In Calvert County, outdoor lighting regulations are codified under Article 6-6 of the Calvert County Zoning Ordinance. In general, outdoor lighting is required for safety and public security. For industrial projects, outdoor lighting is required to satisfy OSHA requirements for worker safety. The county's outdoor lighting regulations are designed to satisfy these requirements while reducing glare (light trespass) on adjoining residential properties and reducing the hazard to drivers, pedestrians and boat operators. The county establishes several criteria for the control of glare and uses guidelines from the Illuminating Engineering Society of North America (IESNA) for establishing illumination levels. For non-residential developments in Calvert County where site lighting is required or proposed, lighting plans must be submitted to the Department of Planning and Zoning for review and approval prior to approval of a site plan.

PPRP has recommended a licensing condition requiring UniStar to develop a lighting distribution plan to mitigate intrusive night lighting and avoid undue glare onto adjoining properties. The plan should conform to Article 6-6 of the Calvert County Zoning

Ordinance. In recognition that NRC may impose additional lighting requirements, the plan should be developed in coordination with PPRP, NRC, and the Calvert County Department of Planning and Zoning.

5.4.7 *Fiscal Impacts*

Fiscal impacts from the project would be in the form of tax revenues and government expenditures on public services. During construction, revenues from taxes on construction worker wages, income taxes on indirect employment incomes, and sales taxes on consumption expenditures would accrue to Maryland and local governments. Depending on where construction labor resides and where materials and supplies are procured, nearby states would reap fiscal benefits as well.

Using UniStar's construction employment estimate, and indirect employment and income estimated from state multipliers, state income tax revenues attributable to the project over the construction period could approach $57 million. Expected construction expenditures for Calvert Cliffs Unit 3 are confidential, but are expected to be substantial. Assuming an overnight capital cost estimate of $4,000 per kW suggests a construction cost estimate exclusive of labor of $5.7 billion. If 20 percent of construction expenditures is captured by Maryland firms, the sales tax revenue impact would exceed $120 million if the personal consumption expenditures of construction and indirect employment are included.

During construction, county tax revenues would accrue from personal income taxes on direct (construction) and indirect income, and would be distributed among all counties where employed workers, both direct and indirect, reside. As most of the construction labor force is expected to be drawn from workers living in Calvert, St. Mary's, Charles, Prince George's, Anne Arundel and other nearby counties, including those in northern Virginia, the project would generate most income tax revenues in these jurisdictions.

Once operational, the most significant revenue impact to Calvert County would be from property taxes. Currently, the Calvert Cliffs Nuclear Power Plant (Units 1 and 2) is by far the largest tax payer in the county, contributing $15.5 million in taxes in FY 2006 (CCED, 2006). (Total property tax revenues were $90.8 million and total revenues were $219.3 million in FY 2006.) Following authorization from the Maryland legislature to grant personal and real property tax credits of up to 50 percent to businesses that meet certain criteria (HB 1183), the Board of County Commissioners granted a 15-year, 50-percent tax credit to Constellation Generation Group LLC on personal and real property for the proposed third reactor. Even with the tax credit, Calvert County estimates that Calvert Cliffs Unit 3 would generate approximately $20 million annually in new tax revenue (Calvert County, 2006).

Property taxes are Calvert County's largest revenue source, comprising 48 percent of the total final budgeted revenue for FY 2007. The increase represents nearly 10 percent of total revenues collected by the county in fiscal year 2007. Combined with income tax revenues from an O&M workforce of 363 (more than $800,000), the net fiscal impact of Calvert Cliffs Unit 3 on the county is expected to by extremely favorable.

Construction of Unit 3 could impact public services in Calvert and nearby counties, although impacts would be most pronounced in Calvert County. Population effects from in-migrating construction workers and their families have already been discussed. However, the project could also increase demands upon State and county emergency services such as fire, rescue, and police services, particularly when construction traffic is added to other commuting traffic. In addition, injuries from accidents at the construction site could place additional demands on rescue and medical services.

Calvert County anticipates that UniStar would provide some degree of occupational health on-site, including emergency response, similar to what occurs during major outage overhauls on Units 1 and 2. The County's fire, rescue and EMS service would be available through the 911 dispatch center to provide additional resources as necessary. Emergency services in response to off-site incidents would be dispatched through 911, as well. The Solomons Volunteer Rescue Squad and Fire Department (Company 3) would be the first unit to respond to emergencies at the construction site. Once Unit 3 is operational, with access to the site via Calvert Cliffs Parkway, the St. Leonard Volunteer Fire Department and Rescue Squad (Company 7) would be the first responder (Richardson, 2008).

Facilities providing a complete range of medical, surgical, and emergency care services are nearby, and numerous specialized medical services are available within the Baltimore-Washington metropolitan area. Furthermore, local fire, rescue and EMS companies have operated in an environment that includes Calvert Cliffs Units 1 and 2 and the Dominion Cove Point LNG Facility for many years. As a result, the County believes that resource levels are adequate for the additional incident response activity anticipated during Unit 3 construction (Richardson, 2008).

Still, Calvert County's fire, rescue, and EMS department is an all volunteer system, and construction of Calvert Cliffs Unit 3 could strain local resources. Prior to construction, UniStar should contact the County's Fire-Rescue-EMS Division to establish a relationship with fire departments and emergency response agencies under this Division, to address site safety/EMS coverage during construction, and to establish timely response options and facilitate emergency vehicle access throughout the site in case of an accident or injury. Where existing emergency response capabilities are determined to be inadequate, UniStar should assist these organizations through contributions, training, and general support.

Construction could also require additional police services, particularly for traffic management and incident response. Intersection improvements developed in consultation with SHA are expected to reduce the need for traffic management services by State and County law enforcement agencies. However, added traffic during construction is likely to increase the number of traffic incidents requiring police and/or EMS response.

Both the Calvert County Sheriff's Office (CCSO) and Maryland State Police respond to traffic incidents on State highways in Calvert County. In 2007, the CCSO responded to more than 2,000 motor vehicle accidents, including 1,366 involving property damage, 615 with personal injuries and 100 serious accidents with 17 fatalities. Overall, the number of traffic accidents has declined throughout the County over the last three years, and the CCSO considers MD 2/4 in the vicinity of Calvert Cliffs to be a relatively safe highway. In 2008, there were 117 sworn officers in the Sheriff's Office, including five new officers who began their employment in July, and further increases are proposed in the department's 10 year plan. As a result, the CCSO considers its resource levels will be adequate during construction of Calvert Cliffs Unit 3 (Hejel, 2008).

Construction and operation of Calvert Cliffs Unit 3 would have a minimal impact upon the Calvert County Department of Public Works (DPW). DPW would be responsible for reviewing and issuing the grading permit for the site. Since access to the site is via State roads, the DPW would have no official role in the design or permitting of traffic mitigation facilities, although it would provide input to the SHA. Solid waste from construction would be handled privately by UniStar, and would not use the County's solid waste disposal facilities (Carlson, 2008).

Calvert Cliffs Unit 3 would increase demands upon the Emergency Management and Safety Division of the Calvert County Department of Public Safety. Currently staffed by three full-time employees and a (vacant) planner position funded by the federal Homeland Security Grant Program, staff responsibilities include disaster mitigation, planning, training, and response efforts that are part of the county's Emergency Operations Plan (EOP). Calvert Cliffs Unit 3 introduces another emergency response plan that must be integrated into the county's EOP. Prior to commercial operation, UniStar should address resource constraints within the Emergency Management and Safety Division to ensure the county has sufficient technical expertise to review the emergency response plans for its nuclear facilities. PPRP recommends that UniStar be required to consult with the Calvert County Department of Public Safety to address the adequacy of technical resources in the county for the additional burden associated with emergency planning for the construction and operation of Calvert Cliffs Unit 3. If consultations indicate that resources are inadequate, UniStar should assist the Emergency Management Division through contributions, training, and general support.

5.4.8 Cultural Impacts

Construction of Calvert Cliffs Unit 3 would involve site preparation, including site clearing, excavation, transmission line routing and road building, and construction, including the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of foundations and assembly. Most construction effects on cultural resources would be on-site, although some visual and noise impacts could extend beyond the project boundary even though views of construction equipment and taller structures on-site would be limited by a forested buffer that surrounds the disturbed area. Other nuisance impacts, such as construction worker traffic congestion, could affect cultural resources indirectly by altering the aesthetics of the area.

Once operational, part of the project site used for construction laydown, parking and construction management would be restored. The upper extents of tall project components might be visible from some locations outside the project boundary. Although the public had limited access to the site prior to September 2001, none is expected during the operational life of Calvert Cliffs.

As noted earlier, there are numerous cultural resources throughout Calvert County. However, there are few in close proximity to Calvert Cliffs and even fewer that would be affected by construction and operation of the facility. In its Phase Ib cultural resources investigation (GAI, 2007), an area of potential effect (APE) for the archeological survey was defined to be the 600-acre area within the project boundary (South Parcel). For the architectural survey the APE (subsequently refined by field surveys) was defined as the project viewshed, encompassing the area within the project boundary and areas outside the project area within 1000 feet of the project boundary.

According to the Maryland Historical Trust (MHT), there are five properties listed on the Maryland Inventory of Historic Properties (MIHP) within the APE, including Calvert Cliffs Units 1 and 2. None of the properties is currently listed on the National Register of Historic Places (NRHP), although one – the Baltimore and Drum Railroad (CT-1295) – was determined NRHP-eligible by the MHT, based on segments elsewhere in Calvert County.

During its cultural resources investigation, UniStar's consultant (GAI, 2007) surveyed five architectural resources within the APE for National Register eligibility and recommended NRHP status for three properties – Preston's Cliffs/Charles's Gift/The Wilson Farm (CT-59), Camp Conoy (CT-1312), and the Baltimore & Drum Railroad (CT-1295). Preston's Cliffs, comprising three tobacco barns, ruins of a 17th century house and a modern building that serves as a visitor center, was recommended NRHP-eligible because of its historic association with the tobacco culture of Calvert County (Criterion A) and the architectural value of remaining tobacco barns (Criterion C). Camp Conoy was recommended because of its association with 20th century recreational trends (Criterion A). The Baltimore & Drum Railroad was recommended because of its association with a significant local economic development project (Criterion A) and as an example of 19th century railroad construction methods (Criterion C). The resource was previously determined to be NRHP-eligible by the MHT based on cultural evaluations of other sections of the railroad bed and the NRHP boundary was defined to be the length of the bed and its graded slopes. Non-contiguous sections within the APE were found to contribute to the resource's eligibility and are therefore NRHP-eligible (GAI, 2007).

The Phase Ib survey identified 14 archeological sites within the APE, including 12 historic, one combined historic-prehistoric and one prehistoric site. Of these, five were recommended to be potentially eligible to the NRHP. These sites were primarily 19th and 20th century domestic sites containing historic artifacts. A prehistoric component recovered from one of the eligible sites did not represent a significant archeological resource nor contributed to its eligibility determination (GAI, 2007).

Recommendations from the Phase Ib cultural resources investigation were reviewed by the MHT (MHT, 2007a), which agreed with the recommendations for CT-59, CT-1295 and CT-1312, but also made a determination that Parran's Park (CT-58) is also NRHP-eligible because of its association with agricultural history (Criterion A). MHT's evaluation of eligibility recommendations for surveyed archeological sites agreed with NRHP-eligibility determinations for four sites, but concluded that previous disturbance at lack of associated features at one site (Site 10) did not warrant a recommendation.

Although listing of a resource on the MIHP has no regulatory impact on that resource, a resource's inclusion in the National or Maryland Register or a local landmarks list may trigger certain regulatory protections (MHT, 2007b). If a survey reveals historic properties listed in, or determined eligible for, inclusion in the Maryland Register of Historic Properties or National Register of Historic Places, the governmental agency sponsoring an undertaking must assess how its project will affect them (MHT, 2000) and, if necessary, reduce, avoid or mitigate adverse effects. For historic properties, the goal of mitigation is protection, although documentation is an alternative when historic properties cannot be saved. For archeological resources, mitigation may include avoidance, site protection, data recovery or other treatment measures (MHT, 1994).

Construction and operation of Calvert Cliffs Unit 3 would likely have an adverse effect upon NRHP-eligible historic properties in the APE, although to different degrees. Effects on Prestons's Cliffs would be limited due to its distance from the project boundary and proximity to Units 1 and 2. However, parts of Camp Conoy are within the protected area boundary containing the reactor, turbine and other buildings, and segments of the Baltimore and Drum Railroad bed are located within the footprints of the Unit 3 switchyard, cooling tower and desalinization plant. These areas would be extensively cleared, excavated and graded during construction. Parran's Park could be adversely affected by the construction access road and concrete batch plant.

All archeological sites recommended eligible for the NRHP would be adversely affected by the project. Site 1 is within a planned construction laydown area and Site 9 is in the vicinity of the construction batch plant. Site 7 is adjacent to the construction access road, and Site 8 is near a proposed construction laydown area. Excavation and grading activities could severely compromise these resources.

Because of their potential significance, MHT concurred that a Phase II archeological investigation was necessary to evaluate the four recommended archeological sites (MHT, 2007b).

UniStar's consultant conducted Phase II fieldwork on archeological sites within the South Parcel between March 17 and May 3, 2008, with the goal of evaluating the eligibility of Sites 1, 7, 8 and 9 for listing in the NRHP (GAI, 2008). At the same time, an Assessment of Effects study evaluated project effects on four NRHP-eligible historic resources: Parran's Park (CT-58), Preston's Cliffs (CT-59), the Baltimore and Drum Point Railroad (CT-1295) and Camp Conoy (CT-1312).

Although a complete Phase II report is not expected until July 2008, an executive summary of the Phase II survey indicated, of the archeological sites, only 18CV474 (Site 1) was recommended eligible for listing in the National Register. The site is a domestic African-American habitation site dating to the 19th century. As the site possesses integrity, it has the potential to address research questions relating to domestic agricultural sites of this era in this region of Maryland. GAI has recommended that the site be avoided or, if avoidance is not feasible, mitigation of adverse effects through Phase III data recovery excavations. 18CV480

(Site 7) was determined to be a mid-19th to mid-20th century domestic site that has been heavily disturbed and contains modern artifacts mixed with older ones. GAI concluded that the site does not possess the potential to address questions relating to the history of the region and is not eligible for listing on the National Register. 18CV481 (Site 8) was determined to be a 19th to 20th century field scatter containing no features. As the site lacks integrity, GAI recommended they site is not eligible for listing on the National Register and no further investigation is warranted. 18CV482 (Site 9) was determined to by a mid-19th to 20th century domestic habitation site likely associated with a slave, tenant or sharecropper household. However, the site lacks integrity and does not contain the potential to address the history of the region. As a result, GAI recommended that the site is not NRHP-eligible and no further investigations are warranted.

GAI's Assessment of Effects to historic resources found that of the four on-site resources that were recommended as NRHP-eligible, three would be adversely affected by project construction. Parran's Park (CT-58) would be affected by site access road construction. Parts of the Baltimore and Drum Point Railroad (CT-1295) within the South Parcel would be demolished by road construction and by grading for plant facilities. The resource would also be visually affected by the cooling tower and desalinization facility. In other words, construction of Calvert Cliffs Unit 3 would inalterably compromise the features that qualify it for the National Register. Situated within the footprint of the reactor building and support facilities, Camp Conoy (CT-1312) would be affected by grading, excavation and construction. Buildings associated with the historic significance of the resource would be demolished. Only Preston's Cliffs (CT-59) would not be adversely affected by construction activities, although a wetland mitigation easement area includes the northern edge of the resource's boundary.

Although NRHP-eligible cultural resources have been identified and potential effects have been documented, the Phase II report and Assessment of Effects documentation have not been submitted to the MHT for review. Without the Phase II report and Assessment of Effects documentation, the MHT cannot provide definitive comments or recommendations regarding effects on cultural resources or possible mitigation measures. Once it has received the necessary documentation, MHT will be able to work with all interested parties to evaluate the potential adverse effects and make appropriate recommendations regarding measures to avoid, minimize or mitigate any such effects. The resolution of all adverse effects will require the negotiation and execution of a Memorandum of Agreement (MOA) between the NRC, MHT, UniStar and other involved parties stipulating the agreed-upon mitigation measures that will be implemented by UniStar. This consultation process will include Calvert County and the Southern Maryland Heritage Area.

That adverse effects upon historical and archeological resources would be confined largely within the project boundaries of Calvert Cliffs Unit 3 suggests that construction and operation of the facility would not significantly affect other existing or emerging cultural components in the lower Patuxent peninsula. As noted in Chapter 3, a "cluster" (Cluster 10) of the Southern Maryland Heritage Area (SMHA) overlays parts of Calvert and St. Mary's counties, including the Calvert Cliffs Nuclear Power Plant, and MD 2/4 is a designated "corridor." Clusters and corridors are key elements of the SMHA Tourism Management Plan, where clusters represent a concentration of heritage resources (e.g., museums, historic sites, parks, etc.) and corridors between the clusters represent key linkages that connect various components of the heritage region (SMHA, 2003).

Key heritage resources within Cluster 10 in the vicinity of Calvert Cliffs include the Flag Ponds Nature Park, Calvert Cliffs State Park, Preston's Cliffs, Middleham Chapel, and the T. Rayner Wilson Blacksmith Shop. Flag Ponds Nature Park and Calvert Cliffs State Park bound the Calvert Cliffs Nuclear Power Plant to the north and south, respectively. Flag Ponds Park is cited as a key natural, recreational and cultural resource because of its nature center, boardwalks, trails, woods and wetlands, and exhibits interpreting the culture of Southern Maryland watermen's communities. Calvert Cliffs State Park contains key archeological (prehistoric), natural, and recreational resources, including land and water trails. Its visitor center is an interpretive facility for Southern Maryland's pre-history and early American history. Preston's Cliffs (Charles' Gift), Middleham Chapel and the T. Rayner Wilson Blacksmith Shop are identified in the SMHA management plan as key historic resources. Middleham Chapel and the T. Rayner Wilson Blacksmith Shop are more than a mile south of the project site, while Preston's Cliffs overlooks Calvert Cliffs Units 1 and 2. Although the management plan identifies the Visitors Center at the Calvert Cliffs Nuclear Power Plant as an interpretive facility, it has been closed to the public since the terrorist attacks of September 11, 2001 and can no longer be considered a key component of the heritage cluster.

The management plan also considers existing and proposed trail systems to be significant nature and eco-tourism attractions to the SMHA, and identifies both the Baltimore and Drum Point Rail Trail and Flag Ponds to Solomons Trail in southern Calvert County as SMHA greenways. The Flag Ponds to Solomons Trail is also identified as a potential greenway by the Maryland Greenways and Water Trails Program. Calvert County has associated the trail with a War of 1812 – Star Spangled Banner Hiking/Biking theme and identifies it as a potential acquisition project in its Land Preservation, Parks and Recreation Plan (BCC, 2006). The SMHA's vision for a trail connecting Flag Ponds, Calvert Cliffs Visitor's Center, Calvert Cliffs State Park, Cove Point Park, Annmarie Gardens, and Calvert Marine Museum, however, pre-dates 9/11. If a Flag Ponds to Solomons trail is eventually developed, it will undoubtedly avoid the Calvert Cliffs property and be outside the area of potential effect.

Construction and operation of Calvert Cliffs Unit 3 could have an adverse effect upon the Captain John Smith Chesapeake National Historic Trail by creating additional visual elements that contrast with the trail's potential for public recreational use and historical interpretation. Although the trail is not a historic property under Section 106 of the National Historic Preservation Act, it is nonetheless considered an important resource. On the basis of his diary and map, Smith likely spotted the Calvert Cliffs from the mouth of the Nanticoke River during his voyage of 1608 and made for them on June 11, anchoring at sunset between Fishing Creek and Randle Cliff (Roundtree, Clark and Mountford, 2007). The Calvert Cliffs are a distinctive natural feature of the Chesapeake Bay, noted for its fossil deposits (Williams 2006). The National Park Service (NPS) has expressed its concerns about the project (Bransom, 2008).

UniStar's visual impact analysis concluded that activities associated with the construction of intake and discharge structures, extension of the barge slip and grading for a new heavy haul road would be visible from the water. After construction, the intake and discharge structures would be visible, as would the tops of the containment building and cooling tower. To some extent, the intake and discharge structure will appear to be a continuation of Units 1 and 2, which dominate the shoreline. Further, shoreward views of southern Calvert County are currently not pristine. Nevertheless, the NPS has expressed the need for visualizations of key facility components from offshore locations to assist it in making a determination of effect.

PPRP concurs that additional consultations with NPS are necessary to ensure that the project's effects on the Captain John Smith Chesapeake National Historic Trail are understood and mitigated to the extent possible. However, PPRP is reluctant to condition the licensing of Calvert Cliffs Unit 3 in the absence of a management plan upon which to assess adverse effects. A management plan is not expected until 2009.

5.5 *NOISE IMPACTS*

5.5.1 *Summary of Regulatory Requirements*

Maryland State noise regulations specify maximum allowable noise levels, detailed in COMAR 26.02.03. The maximum allowable noise levels specified in the regulations vary with zoning designation and time of day. Maximum allowable noise levels for residential areas are 55 dBA (A-weighted decibel scale) for nighttime hours (10 p.m. to 7 a.m.) and 65 dBA for daytime hours. Motor vehicles on public roads are exempt from the regulatory limits.

During construction, the State regulations limit noise to a maximum of 90 dBA during daytime hours. Nighttime construction activities must meet the regular limit of 55 dBA at residentially zoned properties.

5.5.2 *Noise Impacts from Construction*

Construction activities are likely to generate higher noise levels compared with operational noise associated with the project. Construction noise is difficult to predict because it results from many different sources moving about the site and operating on different schedules. The applicant has provided PPRP with a listing of potential major construction equipment with sound level data. To arrive at a conservative assessment of potential noise impact, it was assumed that all construction equipment would be operating concurrently at the site of the proposed unit. Most of the construction activities would occur only during daylight hours, so the projections represent maximum daytime levels. Nighttime levels would be expected to be much lower and near baseline levels.

PPRP selected four critical receptor locations, shown on Figure 5-12. These locations correspond to monitoring locations that UniStar utilized in its baseline noise monitoring, selected to represent the direction toward nearby receptors that will be most affected by the new Unit 3.

Table 5-16 summarizes the results of PPRP's analysis. These calculations show that the noise contribution from the construction of the proposed Calvert Cliffs Unit 3 will be well below the State's 90 dBA regulatory limit for daytime construction due mainly to the large buffer distances, more than 1000 meters. Noise impacts are expected to be about 60.6 dBA at the nearest residential area, S2. Construction activities should not significantly increase the maximum noise levels observed off-site.

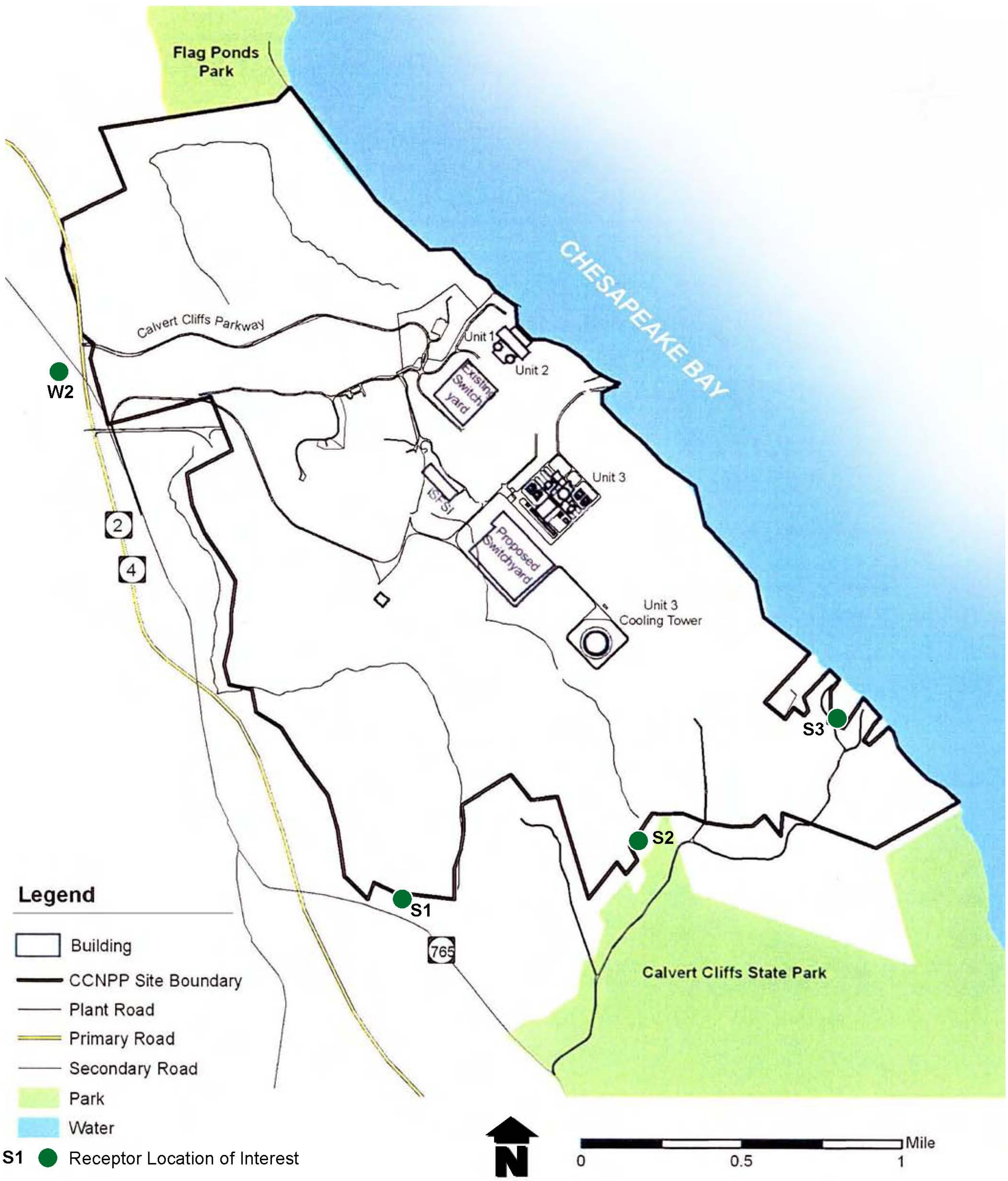
Table 5-16 Calculated Sound Pressure Levels (in dBA) Resulting from Construction of Proposed Generating Facility, Projected to Receptor Locations

Receptor Site	S1	S2	S3	W2
Construction Total[1]	56.4	60.6	59.8	50.9
L90 baseline leaf-off conditions (includes Units 1 and 2)	43	36	44	56
TOTAL	56.6	60.6	59.9	57.2

[1] Consists of equipment anticipated to be operated during construction (UniStar, 2007)

These projections of noise impacts from construction of the proposed Unit 3 are conservatively high. Actual construction noise contains an accumulation of many transient sources of varying noise from sources of varying degrees of usage from day to day to account for differing phase of construction. Additionally, the projection methodology only considers distance spreading; the calculations do not take into account the atmospheric absorption of sound energy, or any effect of natural barriers between the noise sources and the receptors. Vegetative cover and terrain between the plant components and the receptor locations may have some noise reduction benefits, which are not

Figure 5-12
Noise Receptor Locations



reflected in this analysis. Actual sound pressure levels caused by the construction are expected to be lower, and the corresponding impacts (increases over ambient) will be less.

5.5.3 *Noise Impacts from Operation*

The applicant provided PPRP with equipment specifications and/or source noise data (i.e. sound power levels) for the major components of the proposed Unit 3, including the cooling tower for the CWS, four EDGs, two SBOs, and associated 500 kV transmission lines. Sound power levels for the EDGs and SBOs were derived from past PPRP evaluations of similar diesel generators. This information is listed in Table 5-17.

While PPRP evaluations of power plant noise typically does not take into account transmission line noise, in this case there are 500 kV lines being constructed as part of the Unit 3 project, which are higher voltage and can create noise levels greater than those located on most power plant sites. PPRP used UniStar's estimate of transmission line noise to address the cumulative impact of all new noise sources together. The primary type of noise from transmission lines is a corona discharge — the humming or buzzing noise associated with the electrical breakdown of air into charged particles caused by the electrical field at the surface of the conductors, which increases under ambient weather conditions such as humidity, air density, wind, and precipitation.

Table 5-17 *Sound Power Levels for Proposed Generating Facility Components*

	Octave Band Frequency (Hz)									**Overall Sound Power Levels**
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
CWS Cooling Tower	90	102	113	118	117	118	116	112	103	124
EDGs (4)	88.2	89.7	82.4	75.7	72.8	68.8	63.2	70.2	59.8	83.1
SBOs (2)	82.2	83.7	76.4	69.7	66.8	62.8	57.2	64.2	53.8	77.1
Transmission Lines	Each line estimated at 59.3 dBA under worst-case conditions									-

Using the source noise information, PPRP estimated the sound pressure levels that would result at various receptors surrounding the Calvert Cliffs site with all the proposed units operating at full load, simultaneously. The objective of this analysis was to verify the results that the applicant had presented. Sound pressure levels at varying distances for each piece of equipment, except the transmission lines, were calculated using the following formula (Kurze and Beranek 1980):

$$Lp = Lw + DI - 20 \log(r) - Ae - 11$$

where:

- Lw is the source sound power level;
- DI is a source directivity factor (we assumed hemispherical spreading, DI = 3)
- r is the distance from the source to the receptor location;
- Ae is the excess attenuation due to absorption in air (we conservatively assumed no excess attenuation, Ae = 0)

Because sound power level data for the transmission lines are not available, we used the sound pressure level for this component of the overall facility noise, projecting it out to the receptor locations using the standard noise propagation formula:

$$P_2 = P_1 - 20 \log (R_2/R_1)$$

where:

- P_N is the sound pressure level at a distance R_N from the noise source.

PPRP selected four critical receptor locations, shown on Figure 5-12. These locations correspond to monitoring locations that UniStar utilized in its baseline noise monitoring, selected to represent the direction toward nearby receptors that will be most affected by the new Unit 3.

Table 5-18 summarizes the results of PPRP's analysis. These calculations show that the noise contribution from the proposed Calvert Cliffs Unit 3 will be well below the State's 65 dBA regulatory limit for daytime operation. At location W2, the calculations show a potential exceedance of the nighttime noise limit; however, this is a result of existing background conditions and not noise impacts from Unit 3 operations. Proposed Unit 3 will add a negligible amount of noise at this location, where existing noise levels are strongly influenced by traffic noise on Maryland Route 2/4.

The new hybrid plume-abated cooling tower will be the dominant source of noise from proposed Unit 3 at each of the southern monitoring points, S1, S2, and S3. However, while at distances of more than 1000 meters the cooling tower noise would be clearly audible, the overall noise level would be below regulatory limits for daytime and nighttime operation (maximum 53.7 dBA compared to a nighttime limit of 55 dBA).

These projections of future noise from the proposed Unit 3 components are conservatively high. The projection methodology only considers distance spreading; the calculations do not take into account the atmospheric absorption of sound energy, or any effect of natural barriers between the noise sources and the receptors. Vegetative cover and terrain between the plant components and the receptor locations are expected to have some noise reduction benefits, which are not reflected in this analysis. Actual sound pressure levels caused by the facility are expected to be lower, and the corresponding impacts (increases over ambient) will be less.

Table 5-18 Calculated Sound Pressure Levels (in dBA) Resulting from Operation of Proposed Generating Facility, Projected to Receptor Locations

Receptor Site Component Source	S1	S2	S3	W2
CWS Cooling tower	49.5	53.6	52.8	44.0
EGDs (4)	33.4	29.7	29.7	26.6
SBOs (2)	27.3	23.7	23.7	20.6
Transmission Lines	19.4	19.9	18.4	23.2
Unit 3 Total	49.6	53.7	52.9	44.1
L90 baseline leaf-off conditions (includes Units 1 and 2)	43	36	44	56
TOTAL	50.4	53.7	53.4	56.3

5.5.4 *Summary and Recommended Conditions*

PPRP's analysis indicates that nearby residents to the site will not experience noise levels exceeding Maryland regulatory standards as a result of the proposed Unit 3 project. There is a potential for exceedance of the nighttime noise standard at the nearest residentially zoned property to the west (location W2); however, this is attributed to existing conditions, as measured in November 2006.

The hybrid mechanical draft cooling tower is the largest contributor to overall Unit 3 noise as projected. UniStar's estimates of cooling tower noise are based on manufacturer's specifications; however, because this particular tower design, with plume abatement, has not yet been built at any existing facilities, the actual noise levels are uncertain. PPRP recommends that UniStar be required to conduct post-construction noise monitoring to verify that the facility is operating in compliance with applicable noise regulations.

6.0 WATER SUPPLY

6.1 WATER REQUIREMENTS AND SOURCES

6.1.1 Water Needed for Construction

UniStar's Estimated Amount of Water Needed for Construction

During the construction of Unit 3, water will be required for sanitary use for the construction personnel, concrete manufacturing, dust control, testing and flushing lines, and filling tanks and piping for integrity testing. In the November 2007 Technical Report, UniStar estimated that an average of 168,000 gallons per day (gpd) of water will be needed for construction for four of six years to support the construction of the plant. Table 6-1 presents UniStar's estimated annual amounts of fresh water needed for the six-year construction period, and provides the basis for UniStar's 168,000 gpd estimate during years 2 through 5. The 168,000 gpd estimate is derived from dividing the 47,800,000 gallon total by the 285 construction days per year. UniStar stated in Section 5.4.1.2 of its November 2007 Technical Report that the water use estimates are based on an expected maximum number of construction workers and extensive dust control in all construction years, and is considered to be a high estimate of actual water use.

A portion of the water listed under the heading of "People" in Table 6-1 will be supplied for drinking water. In response to DNR Data Request No. 8-4, UniStar indicated that bottled water will be provided for drinking during the initial period of construction, but once the workforce is expanded treated water will be provided for drinking via water jugs typically found at large construction sites. Water for these jugs will be supplied via storage tanks which will be replenished from the on-site well(s) or water obtained from Calvert Cliffs Units 1 and 2. Thus UniStar will need to obtain a Water and Sewerage Construction Permit and Certificate of Potability from MDE WMA in accordance with COMAR 26.03.12. This permit will be necessary because UniStar would be operating a water supply system that treats raw water and distributes potable water to serve 25 or more persons on a day-to-day basis. In addition, UniStar will need to ensure that the water supplied for drinking meets U.S. Environmental Protection Agency drinking water standards, including the 0.010 mg/L limit for arsenic. Ground water extracted from the Aquia aquifer at Calvert Cliffs Units 1 and 2 typically contains arsenic concentrations above this limit and thus the water is treated by Calvert Cliffs Nuclear Power Plant, Inc. before being distributed for potable use.

Table 6-1 Estimated Annual Amounts of Fresh Water Needed for Construction in Gallons (from UniStar Technical Report Table 5.4-1 and UniStar's Response to DNR Data Request No. 7-6)

Construction Year	**People**	**Concrete Mixing and Curing (3)**	**Dust Control/Hydrostatic Testing (4)**	**Annual Totals**
1	8,550,000 (1)	2,220,000	11,400,000	22,120,000
2	34,200,000 (2)	2,220,000	11,400,000	47,800,000
3	34,200,000	2,220,000	11,400,000	47,800,000
4	34,200,000	2,220,000	11,400,000	47,800,000
5	34,200,000	2,220,000	11,400,000	47,800,000
6				31,868,000 (5)

Notes:

(1) Estimated at 1,000 persons using 30 gallons per day (gpd) for 285 days per year.

(2) Estimated at 4,000 persons using 30 gpd for 285 days per year.

(3) Estimated at 6,700 cubic yards per months using 27.61 gallons per cubic yard and 12 months.

(4) Estimated at 40,000 gpd per day for 285 days per year. During year 1, an estimated 40,000 gpd is expected to be used for dust control. Between years 2 and 6, an estimated 40,000 gpd is expected to be used for a combination of dust control and/or hydrostatic testing.

(5) Estimated at two-thirds of the amount used in any year 2 through 5.

In accordance with footnote 4 in Table 6-1, UniStar indicated that 40,000 gpd for the 285-day construction year will be needed for a combination of dust control and hydrostatic testing of lines and tanks. As indicated by UniStar in Table 5.5-1 in the Technical Report and in its response to DNR Data Request No. 1-20c, major excavation and site work will be completed by construction year three, at which time the need to conduct extensive dust control would decrease significantly. As shown in UniStar Table 5.5-1 in the Technical Report, some level of dust control will be necessary throughout the construction period due to vehicle traffic on unpaved roads and stabilizing vegetation is placed in cleared areas. In its response to DNR Data Request No. 8-1, UniStar indicated that the estimate of water needed for dust control was based on early design concepts and engineering, procurement and construction experience for projects of this magnitude.

Water for hydrostatic testing of lines and tanks needs to deionized and therefore will be treated and stored in two 150,000 gallon tanks prior to a testing event requiring a large volume of water. The treatment and storage of the deionized water will equalize the volume of water needed during peak demand periods.

In its response to DNR Data Request No. 7-6, UniStar revised the construction water demand for concrete curing and mixing listed in Table 6-1. UniStar indicated in the response to the data request that two concrete batch plants will be constructed at the Unit 3 construction site, and potentially both plants would operate concurrently if necessary. The average sustained rate of concrete placement will be 500 to 800 cubic yards per day (cy/d) with a maximum peak sustained rate of 1,100 to 1,600 cy/d. UniStar estimates that 40.4 gallons of water will be needed per cubic yard of concrete. Lastly, UniStar indicated that 24 million gallons of water will be required to manufacture the total estimated amount of 470,000 cubic yards of concrete needed for the duration of the construction period. This amount of water includes 19 million gallons for concrete mixing and curing and 5 million gallons of water for equipment wash down. Thus, the annual average amount of water needed for concrete mixing and curing would be 4,800,000 gallons per construction year (i.e., 285 days) or 16,900 gpd. UniStar indicated in its response to DNR Data Request No. 8-2 that the water values described above represent a best estimate of a conservative upper boundary value based on the current level of maturity of the design and construction plan.

Rather than the 47,800,000 gallons per indicated in Table 6-1, UniStar revised its total estimated annual water use to 50,380,000 during years 2 through 5. This translates to an average daily demand of 176,800 gpd for 285 construction days.

In addition, UniStar indicated in its response to DNR Data Request No. 7-6 that the maximum anticipated single placement of concrete will be for the Circulating Water System Cooling Tower foundation. The concrete placement for this structure is estimated to be approximate 47,000 cubic yards, requiring 1.9 million gallons, and taking 10 to 15 days to complete. This information provides a peak water demand for a month of maximum use determination.

MDE's Estimated Amount of Water Needed for Construction

MDE WMA appropriates water on a 365 days per year basis, and therefore adjusted UniStar's water demand downward to reflect the 365 versus the 285-day use. MDE WMA also considers the month of maximum use to account for the maximum amount of water to support short-term needs. Therefore, MDE derived an independent value for the water needed during construction for an average daily use and a month of maximum use.

Additionally, MDE WMA does not agree that the 168,000 gpd estimate for construction water demand (131,000 gpd based on a 365 day year) was a reasonable estimate. MDE WMA determined that the assumption that each construction worker will use 30 gpd of water for sanitary purposes was an overestimate, and that experience shows that 15 gpd per worker is a more reasonable estimate. The 15 gpd estimate reduces the estimate for the average daily demand for construction workers from 120,000 gpd to 60,000 gpd

MDE WMA's estimate of the average annual construction water demand for years 2 through 5 on a 365-day basis is derived as follows:

- People – (60,000 gpd*285 days)/365 days = 46,800 gpd;
- Concrete Mixing and Curing - (16,900 gpd*285 days)/365 days = 13,200 gpd; and
- Dust Control and Hydrostatic Testing - (40,000 gpd*285 days)/365 days = 31,200 gpd.

The total average annual demand for water during construction years 2 through 5 will be 91,200 gpd. MDE WMA is adding contingency to provide a total of 100,000 gpd over a 365 day period.

Maximum peak daily demand is based on the amount of water needed for concrete mixing and curing, and for sanitary and dust control or hydrostatic testing during one month. The assumptions used by MDE WMA to calculate the month of maximum use numbers for the three categories is described below.

- People – MDE WMA assumed that construction would occur all 30 days in the month, and thus 15 gpd per person for 4,000 workers for 30 days would create a water demand of 1,800,000 gallons for 30 days or 60,000 gpd;

- Concrete Mixing and Curing - UniStar indicated in its response to DNR Data Request No. 7-6 that approximately 1,900,000 gallons of water will be needed over 15 days to place the concrete for the CWS cooling tower foundation. Over a 30-day month, water for concrete mixing and curing will be 126,700 gpd for 15 days (1,900,000 gallons/15 days) and 13,200 gpd for 15 days (198,000 gallons), for an average of water demand of 69,900 (rounded to 70,000 gpd); and

- Dust Control and Hydrostatic Testing – MDE WMA assumed that 60 percent more water compared to the 950,000 gallons per month average would be needed. This equates to 1,520,000 gallons, and when divided over a 30-day month, provides 51,000 gpd for dust suppression.

The total demand for water use during the month of maximum use during construction years 2 through 5 will be 181,000 gpd. MDE WMA rounded this number to provide a total of 180,000 gpd over a 30-day month of maximum use period. Note that UniStar indicated that two, 150,000-gallon raw water storage tanks are being considered to equalize the water use during critical concrete pours (UniStar Response to DNR Data Request No. 7-6).

6.1.2 *Potential Sources of Water Needed for Construction*

UniStar's Approach to Supply Water for Construction

UniStar identified four potential sources of water to address water demand during construction in the Technical Report and clarified its position regarding the feasibility of these sources in its response to DNR Data Request No. 1-15. The four potential sources are as follows:

1. Authorization to use available on-site ground water under the ground water appropriations limit for Calvert Cliffs Units 1 and 2;
2. Water collected during dewatering onsite excavations, which will be used for dust control;
3. Desalinated Chesapeake Bay water from the to-be constructed desalination plant (expected to be constructed and on-line during the fifth and sixth year of construction); and
4. Offsite water trucked to the construction site and stored until used.

Each potential source is described further below.

UniStar expects to be able to obtain 60,000 gpd of ground water from Units 1 and 2. Calvert Cliffs Units 1 and 2 are owned by Calvert Cliffs Nuclear Power Plant, Inc., which is a separate company from UniStar. Calvert Cliffs Units 1 and 2 has a ground water appropriation to use ground water from five production wells completed in the Aquia aquifer. Ground water is used in Units 1 and 2 to provide boiler makeup for the steam cycle and for potable and other in-plant uses that require fresh water. Permit CA1969G010 allows Calvert Cliffs Nuclear Power Plant, Inc. to extract ground water under the following limits:

- **Average Daily Use**. The annual average water requirement is 450,000 gpd from the Aquia aquifer; and

- **Month of Maximum Use**. The maximum daily water use is 865,000 gpd from the Aquia aquifer for the month of maximum use.

Table 6-2 shows the amount of ground water used by Units 1 and 2 over the past 10 years. The data in the table shows that the annual average rate of water use has ranged from 340,000 to 420,000 gpd over the period 1997 to 2006, with an average of 390,000 gpd. The highest years of ground water use were in 2003 and 2004, with annual average rates of 410,000 and 420,000 gpd. UniStar indicated in its response to DNR Data Request No. 1-18 that the high use rates were attributed to leakage, which was repaired and no longer occurs. Ground water use decreased to 340,000 and 350,000 in 2005 and 2006, respectively. If the use rates in 2003 and 2004 were an aberration, there would be approximately 60,000 gpd available from the existing Units 1 and 2 appropriation for use at Unit 3. The UniStar Technical Report (Table 5.4-2) indicates that monthly use of ground water for the period 2002 to 2005 ranged from 9,400,000 to 15,700,000 gallons per month.

Table 6-2 Average Daily Ground Water Withdrawal from the Aquia Aquifer for Calvert Cliffs Units 1 and 2 (in million gallons per day)

Year	Withdrawal Amount	Year	Withdrawal Amount
1997	0.41	2002	0.39
1998	0.37	2003	0.41
1999	0.39	2004	0.42
2000	0.41	2005	0.34
2001	0.40	2006	0.35

Source: PPRP CEIR-14, February 2008, Table 4-12.

As discussed in Section 5.3 of this Environmental Review, UniStar estimates that dewatering of excavations for foundations will generate between 75,000 and 100,000 gpd of ground water from the Surfical aquifer. UniStar is proposing to collect the water generated during dewatering, store it in tanks or impoundments, and apply the stored water to exposed soils and road surfaces for dust control. Although MDE WMA believes that the use of water generated from dewatering is beneficial, the estimate of dewatering presented by PPRP in Section 5.3 indicates that the amount of water that will be generated during dewatering will be less than the 75,000 to 100,000 gpd estimated by UniStar beyond the first year of construction. In addition, it is expected that dewatering will only generate water during the initial two years of construction because once foundations are complete; the need to dewater will decrease significantly (UniStar Response to DNR Data Request No. 1-20c). Although dewatering will decrease in the third year of construction, the need for dust control will decrease significantly by this time because the majority of the site grading will be completed (UniStar Response to DNR Data Request No. 1-20c).

Fresh water can be obtained from the desalination plant being constructed to supply water for Unit 3. The purpose and operation of the desalination plant is described in further detail in Section 6.1.2. Once the construction of the desalination plant is complete (estimated to be in-service by construction year five), a source of fresh water will be available for all uses for construction, and thus eliminate the need for the transfer of water from Calvert Cliffs Nuclear Power Plant, Inc. and other sources as described below under the MDE WMA approach for meeting the construction water demand.

UniStar proposes to use water from the desalination plant to provide potable water to the plant workers once the nuclear power plant is operational. As stated previously, UniStar will need to obtain a Water and Sewerage Construction Permit and Certificate of Potability from MDE WMA before water is provided for potable use.

UniStar indicated in its response to DNR Data Request No. 1-15 that trucking of water to address excess water demand during construction will be necessary. UniStar estimated that the amount of water that will be trucked to the site will be between 50,000 and 100,000 gpd, based on its assumption that 168,000 gpd of water will be needed for construction. Further, in its response to DNR Data Request No. 1-16, it was stated that the water will be conveyed to the site in 5,000 gallon tanker trucks and stored. UniStar identified C.L. Pitcher, Inc. as a potential water hauler in its response to DNR Data Request No. 6-6. C.L. Pitcher is located in Prince Frederick and would presumably draw water from the Prince Frederick Water System. There is currently no capacity available from the Prince Frederick Water System to enable C. L. Pritchard to draw 50,000 gpd. Calvert County is withdrawing water from the Prince Frederick Water System at a rate that is greater than its ground water appropriations limits. UniStar indicated in its response to DNR Data Request No. 6-6 that a decision regarding the provider of fresh water to be trucked to the site has not yet been finalized.

UniStar indicated in the Technical Report that authorization for a ground water withdrawal from the temporary installation of wells may be sought as a source of water to meet the water demand during construction. UniStar clarified its position regarding the need for a ground water appropriation for construction in its response to DNR Data Request No. 1-15 and 1-21, where it stated that UniStar does not intend to install any additional wells to provide water for construction activities. However, at the recommendation of MDE WMA, UniStar filed a request in response to DNR Data Request No. 6-9 to appropriate ground water from the Aquia aquifer to support the construction of the plant. The amounts of ground requested, the duration of the appropriation, and the rationale for granting the appropriation is discussed below under the section titled MDE WMA's Approach to Supply Water for Construction.

UniStar indicated in its response to DNR Data Request No. 6-12 that other sources of water were being sought. In the response to the data request, UniStar stated it had preliminary discussions regarding the use of treated effluent from the Solomons Island WWTP located on Sweetwater Lane in Lusby, Maryland. The discussion indicated that up to 15,000 gpd of treated effluent could be available for use in dust suppression.

MDE WMA's Approach to Supply Water for Construction

As described in Section 6.1.1, MDE WMA estimates that the total water demand for the construction of Unit 3 is as follows:

- Average Daily Use - 100,000 gpd; and
- Month of Maximum Use – 180,000 gpd.

MDE WMA recommends that the five sources of water listed below be used to meet water demand during construction:

1. Authorization to use available on-site water ground water under the ground water appropriations limit for Calvert Cliffs Units 1 and 2, with a condition limiting the use to an annual average of 40,000 gpd;
2. Water collected during dewatering onsite excavations to be used for dust control, but will likely only be available during the first two years of construction;
3. Desalinated Chesapeake Bay water from the to-be constructed desalination plant (expected to be constructed and on-line during the fifth and sixth year of construction);
4. Use of treated effluent from local wastewater plants that meets ground water discharge quality standards and site application requirements for use for dust control, or water from a hauler that has access to a source with adequate permitted capacity; and
5. Ground water obtained from a short-term appropriation granted from the Aquia aquifer.

The rationale for each of these sources is described below.

MDE WMA agrees with UniStar's approach to use a portion of the unused appropriation for Units 1 and 2 for a source of construction water for Unit 3. To allow for possible fluctuations of annual ground water use, MDE WMA recommends that this use be capped at 40,000 gpd. This proposed use of ground water needs to be approved by MDE WMA as the regulatory authority that administers the water appropriation permit for Calvert Cliffs Nuclear Power Plant, Inc., as well as by the PSC through the issuance of the CPCN for UniStar's Unit 3.

MDE WMA further recommends UniStar take two steps to document the transfer of ground water from one entity to another.

1. UniStar needs to request a letter from Calvert Cliffs Nuclear Power Plant, Inc. consenting to provide an annual average of 40,000 gpd from State Water Appropriation and Use Permit No. CA1969G-010, and that all the water used by both entities will be reported under Permit No. CA1969G-010. The requested letter needs to provide evidence that Calvert Cliffs Nuclear Power Plant, Inc. has submitted a request to MDE WMA for a conforming modification to State Water Appropriation and Use Permit No. CA1969G-010 to allow the transfer of water to support the construction of UniStar's Unit 3.
2. UniStar needs to prepare a plan describing how UniStar will coordinate with Calvert Cliffs Nuclear Power Plant, Inc. the withdrawal of ground water under State Water Appropriation and Use Permit No. CA1969G-010 to ensure that the Calvert Cliffs appropriation quantities are not exceeded.

MDE WMA supports the use of water collected from dewatering for dust control to its fullest extent practicable. However, as explained in Section 5.3, the estimate of water generated from the excavation of the power block and other excavations after the initial ground water in storage is removed during the first year of construction is uncertain for two reasons:

1. The presence of the power block on a hydrologic divide will limit the amount of ground water that flows into the excavation; and
2. There is a limited amount of ground water within the exposed Chesapeake confining unit.

Some additional water will be generated during the second year of construction from rainfall that falls into the excavations. Once the dewatering of excavations is complete in construction year 2, this source of water will be eliminated. Thus, this source will not be available to provide water for dust control in construction years 3 through 6.

MDE WMA agrees that water generated from the desalination plant is an acceptable source of water to meet construction water demand. Once the desalination plant is brought on-line, UniStar will have a sufficient amount of water to meet all construction water demand.

MDE WMA supports the approach of hauling treated effluent from local wastewater treatment plants. In addition to the Solomons Island WWTP, MDE UniStar should contact Calvert County to seek permission to reuse treated effluent from the Prince Frederick WWTP, which consists of two separate plants with a combined treatment capacity of 750,000 gpd, one on Tobacco Ridge Road and the other in Barstow (Draft Calvert County Comprehensive Water & Sewerage Plan 2007 Update, August 2007). Before applying treated effluent for dust control, UniStar would need to obtain approval from MDE's Wastewater Permits Program in accordance with COMAR 26.08 to discharge the treated effluent onto the ground for dust control.

MDE WMA does not accept UniStar's proposal to truck ground water to the site because UniStar has not shown that the source of the water provided by a hauler is from a water system that has adequate capacity on its water appropriations permit. In addition, MDE WMA recommends that fresh water not be hauled from off-site sources for use until the hauler and water source have been identified to MDE WMA and UniStar provides documentation demonstrating that the water is from a system that has adequate capacity within its water appropriations permit.

After consideration of the alternatives presented by UniStar and the uncertainty associated with hauling water from an off-site supplier, MDE WMA recommends that UniStar be granted a short-term ground water appropriation from the Aquia aquifer to provide water for construction, rather than be permitted to supply water from trucking it from off-site sources. MDE WMA expects that the short-term ground water appropriation will have the following limits:

- **Average Daily Use**. The annual average water requirement is 60,000 gpd from the Aquia aquifer; and

- **Month of Maximum Use**. The maximum daily water use is 140,000 gpd from the Aquia aquifer for the month of maximum use.

These limits, combined with the water obtained from the existing ground water appropriation for Units 1 and 2, will provide UniStar flexibility to meet the total estimated construction water demand of 100,000 gpd on an average day and 180,000 gpd during the month of maximum use. MDE WMA considered other sources including other aquifers, including the Piney Point and Lower Patapsco aquifers. The Aquia aquifer was selected based on the drawdown analysis presented in Section 6.3, which demonstrates that the impacts to the aquifer and surrounding users are acceptable, and the reasonable depth of the aquifer.

MDE WMA conducted the evaluation of impact to the aquifer and other users to support this determination using methods applied by the agency to evaluate requested appropriations of ground water in the confined aquifers of the Coastal Plain. The results of this evaluation are described in Section 6.3. The results indicate that the impacts to the Aquia aquifer and users of the aquifer are acceptable because of the short duration of the ground water withdrawal.

In summary, MDE recommends the five sources and the minimum annual average amounts of water listed below be used to support the construction of Unit 3:

1. Transfer of Water from Calvert Cliffs Units 1 and 2 - 40,000 gpd;
2. Construction dewatering to the extent that it is available;
3. Desalination plant – full treatment capacity of the plant estimated to be 1,750,000 gpd;
4. Use of treated effluent from local wastewater treatment plants that meets ground water discharge quality standards and site application requirements for use as dust control, or water from a hauler that have access to a source with adequate permitted capacity; and
5. Ground water appropriations from the Aquia aquifer - 60,000 gpd.

Even though MDE believes that the estimate that UniStar provided for daily potable use to support is too conservative, the amounts of water described above for the first three sources of water will provide UniStar sufficient contingency to meet fluctuations in daily demand.

The amount of ground water proposed for use in Calvert Cliffs Unit 3 during construction is reasonable for three reasons:

1. The assumptions presented above regarding the daily volumes of water needed to support construction are reasonable;
2. The proposed primary uses of ground water for sanitary supply, dust control, and concrete mixing are typical uses for ground water at construction sites; and
3. The projected duration of construction spanning over six years is reasonable.

6.1.3 Water Needed for Operation

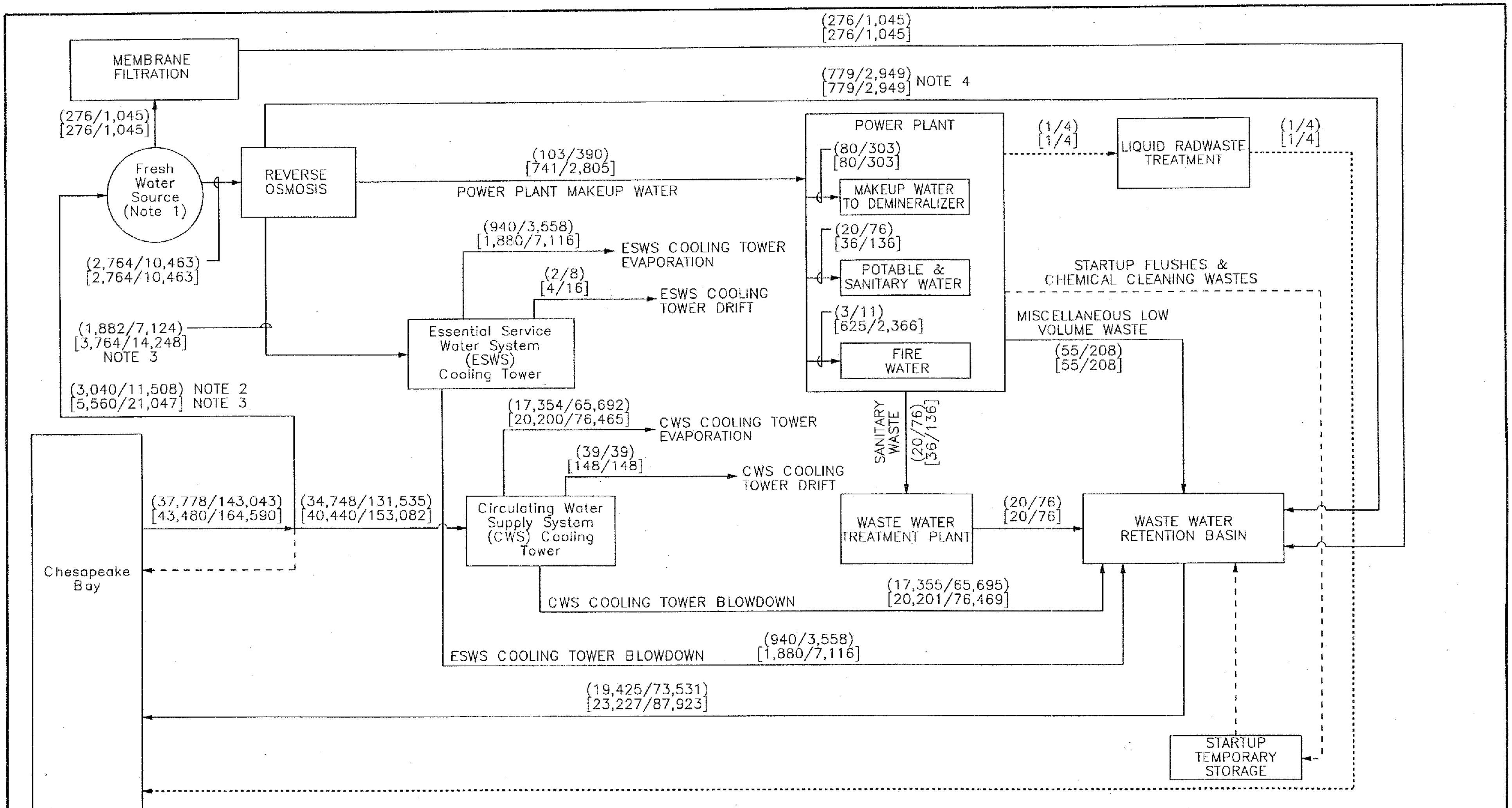
Calvert Cliffs Unit 3 will require water for cooling and operational purposes. UniStar has requested that the Chesapeake Bay be the source of water for the operations. UniStar estimates that the water demand for operations is as follows:

- **Annual Average**. The annual average water requirement is estimated to be 54,400,000 gpd; and
- **Maximum**. The maximum use is estimated to be 62,600,000 gallons in any one day.

UniStar indicated in the Technical Report that normal plant operations will require an estimated demand of 54.5 mgd, from which 4.38 mgd will be processed through the desalination plant to supply fresh water for the ESWS cooling towers and other processes. UniStar further stated that during refueling outages, which will occur approximately every two years and last approximately one month, the maximum water demand will rise to 62.6 mgd for the initial plant cool down and then decrease to meet only the fresh water demand for the onsite workforce.

A preliminary water balance for Unit 3 is included in Figure 6-1; Figure 6-2 illustrates in more depth the cooling water systems that are part of the Unit 3 design. UniStar considers the average and maximum flows shown on the figure to be upper bound estimates that will likely be reduced as detailed design work progresses. The water balance shows that 92 percent of the Chesapeake Bay withdrawal will supply the CWS cooling tower, and that 8 percent will supply the desalination plant to generate fresh water for the ESWS and other sources. The CWS provides cooling water for the turbine condenser and closed cooling heat exchanger. The cooling tower is expected to be operated at two cycles of concentration. In the closed loop CWS cooling tower, approximately half of the water will be lost to the atmosphere as evaporation and the other half will be released as blowdown.

Calvert Cliffs Unit 3 requires a source of fresh water to support operations. UniStar has proposed to meet the fresh water demand by using a reverse –osmosis desalination plant rather than ground water. The desalination plant will remove the high concentrations of salts and minerals from the Chesapeake Bay source water. As indicated in Figure 6-1, the primary demand for fresh water will be makeup water for the ESWS. Fresh water will also be used for the potable water system, makeup to the demineralizer for the steam system, and fire protection. In Section 6.4.1 of the Technical Report, UniStar estimates that the desalination plant will have an output capacity of 1,750,000 gpd, of which approximately 1,250,000 gpd will be needed to meet the fresh water demand of Calvert Cliffs Unit 3. Thus, an additional capacity of 500,000 gpd will be available after the desalination plant comes on-line.



NOTES:

1. THE FRESH WATER SOURCE IS DESALINATED CHESAPEAKE BAY WATER.
2. MAKEUP WATER TO THE CWS CIRCULATING WATER SYSTEM WILL SUPPLY THE DESALINIZATION PLANT.
3. MAXIMUM FLOW WILL BE PROVIDED BY THE DESALINIZATION PLANT PLUS WATER STORED IN THE ESWS COOLING TOWER STORAGE BASINS.
4. SEE TABLE 2.3-1.

LEGEND:

- - - - - - STARTUP FLOWS
———— NORMAL FLOW
.... FLOW VARIES WITH OPERATING CONDITIONS

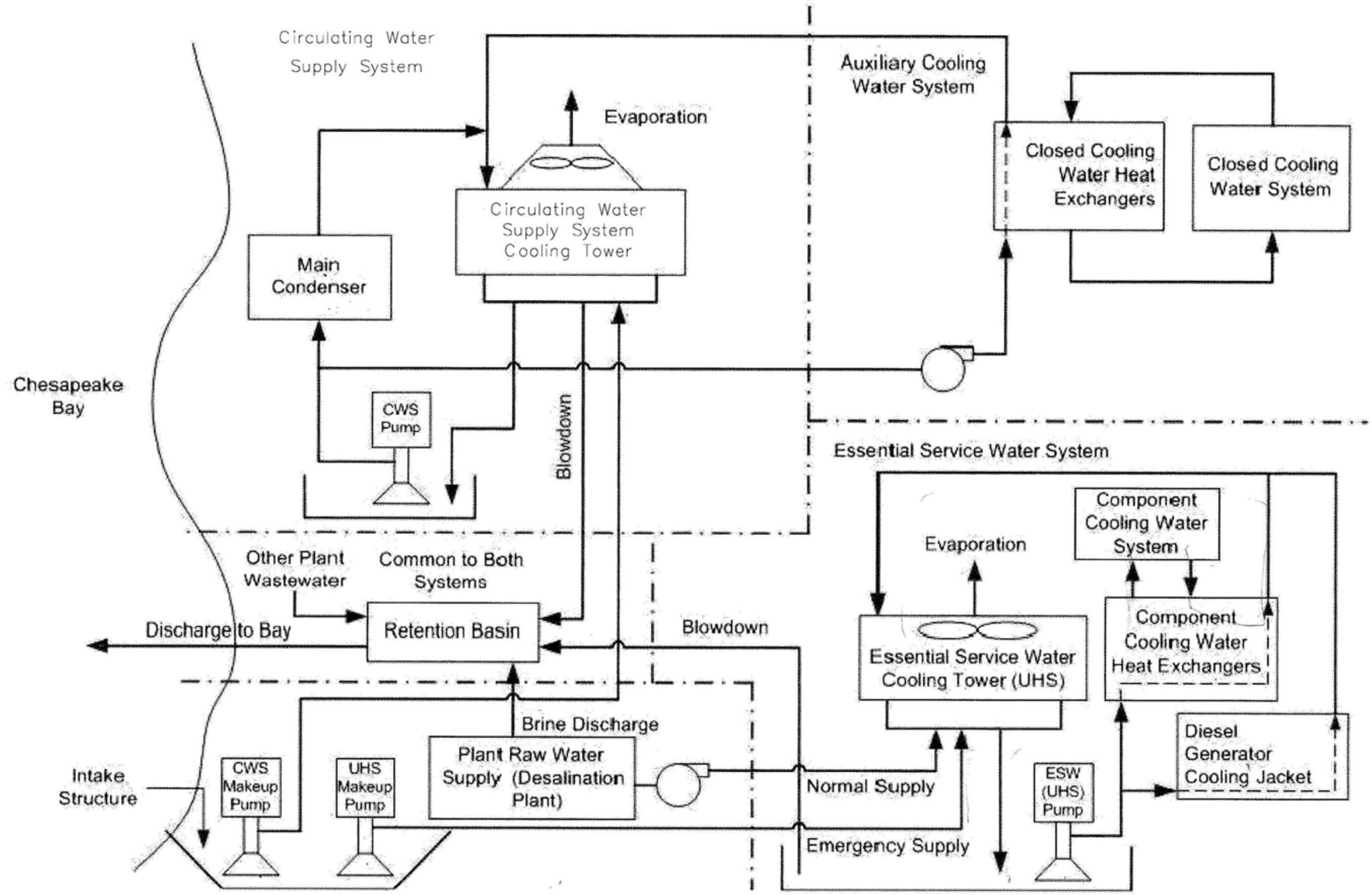
KEY:

(AVERAGE FLOWS: GALLONS PER MINUTE/LITERS PER MINUTE)
[MAXIMUM FLOWS: GALLONS PER MINUTE/LITERS PER MINUTE]

Figure 6-1

Anticipated Water Use for UniStar Unit 3

(from Figure 2.3-1 in UniStar Technical Report)



Source: UniStar Environmental Review submitted to NRC, Figure 3.4-1

Figure 6-2
General Cooling System Flow Diagram for Calvert Cliffs Unit 3

As described in Section 6.4.1 of the UniStar Technical Report, the desalination plant will operated as follows:

- The Chesapeake Bay water is run through a membrane filtration pretreatment, where 10 percent of the influent stream will be lost as reject;
- High pressures makeup water enters the reverse-osmosis trains, where the water passes through membranes, and the dissolved salts are rejected;
- Product water is collected from the end of each membrane element; and
- Reject water consisting of the highly concentrated brine is conveyed to the wastewater retention basin where it will be mixed with the cooling tower blowdown.

The desalination plant is expected to operate at a 40 percent recovery rate, which means that for every 100 gallons of Chesapeake Bay water introduced into the unit, 40 gallons of product water will be generated, and 60 gallons will be discharged as wastewater.

UniStar stated in the Technical Report that during a design basis accident, Chesapeake Bay water will provide safety-related makeup water for the four ESWS cooling towers at a consumption rate of up to 471 gpm for each cooling tower operating during an accident. Since the consumption rate for accidents is not associated with normal modes of plant operation, this rate is not shown on the water use diagram in Figure 6-1.

The amount of surface water proposed for use in Calvert Cliffs Unit 3 is reasonable for two reasons:

- The assumptions presented in the water balance in Figure 6-1 are reasonable for the water treatment and cooling operations associated with the plant; and
- The proposed amount of surface water required for cooling the steam cycle is consistent with closed cycle cooling conducted at similar facilities of similar size.

MDE WMA requests that UniStar and Calvert Cliffs Nuclear Power Plant, Inc., the owner of Units 1 and 2, consider using the fresh water generated in Unit 3 desalination plant to replace the ground water use from the Aquia. UniStar indicated in its response to DNR Data Request No. 6-7 a willingness to make excess water from the Unit 3 desalination plant available to Calvert Cliffs Nuclear Power Plant, Inc. The desalination plant has excess capacity of 500,000 gpd as described above. The benefit from the elimination of the Aquia withdrawal would be to mitigate long-term drawdown impacts to the aquifer.

The remainder of this section is organized as follows:

- Section 6.2 describes the process by which Maryland appropriates surface and ground water;
- Section 6.3 presents the evaluation of the ground water withdrawal impacts associated with using the Aquia aquifer to supplement construction water withdrawals; and
- Section 6.4 discusses impacts to the Chesapeake Bay from a proposed withdrawal of surface water to support the operations of the plant.

6.2 *MARYLAND'S APPROPRIATIONS REGULATIONS*

The withdrawal of ground water and surface water to supply Calvert Cliffs Unit 3 requires a new appropriation issued by the Maryland PSC through this CPCN proceeding. The State of Maryland has a statutory requirement to conserve and protect the water resources of the State and to control the appropriation and use of surface and ground water. Although the PSC is the actual permitting authority for the facility's water appropriations, MDE's statutes and regulations in COMAR 26.17.06, as administered by the WMA, are used to guide the State's decision regarding water appropriations.

Maryland water allocations are guided by the common law doctrine of reasonable use. This doctrine provides landowners the opportunity to make reasonable use of the water associated with their property, limited only by the rights of other landowners and the assurance that the use will not harm the water resources of the State. Additionally, the use of the water needs to be beneficial, which means that the use of water is: 1) necessary; 2) non-wasteful; 3) reasonably non-damaging to the resource and other users; and 4) in the best interest of the public.

COMAR 26.17.06.05A states that MDE WMA will grant an appropriation for a beneficial use if three conditions are met:

1. The requested appropriation is reasonable in relation to the anticipated level of use;
2. The requested appropriation does not have an unreasonable impact on the State's water resources and other users of the resource; and

3. The requested appropriation or use does not have an unreasonable impact on other users of the resource.

COMAR 26.17.06.05B provides criteria for determining reasonableness. Key criteria considered in the review of the use of ground water for construction include:

1. The extent and amount of harm to the aquifer and other users it may cause;
2. The practicality of adjusting the quantity of water used by a user to reduce impacts;
3. Aggregate changes and cumulative impact that this and future appropriations in an area may have on the waters of the State; and
4. The contribution that the proposed appropriation may make to future degradation of the waters of the State.

MDE WMA is tasked under COMAR 26.17.06.02 as the trustee for the State's water resources. The agency is authorized to control the appropriation of surface and ground water to provide for the greatest possible use of the waters of the State, while protecting the water supply resources from mismanagement or overuse.

Construction dewatering is a permitted activity under COMAR 26.17.06.03 if dewatering, including intermittent periods of non-pumping, exceeds 30 calendar days, and the appropriation exceeds an annual average of 10,000 gpd. Calvert Cliffs Unit 3 will exceed both the time and extraction rate limits, and thus will need approval from the PSC to conduct dewatering activities. As discussed in Section 5.3, conditions, which are identical with those issued by MDE WMA for construction, are proffered to direct the dewatering.

6.3 GROUND WATER WITHDRAWAL IMPACTS

This section presents the evaluation of the ground water withdrawal impacts associated with using the Aquia aquifer to supplement construction water withdrawals.

6.3.1 Impacts to the Aquifer

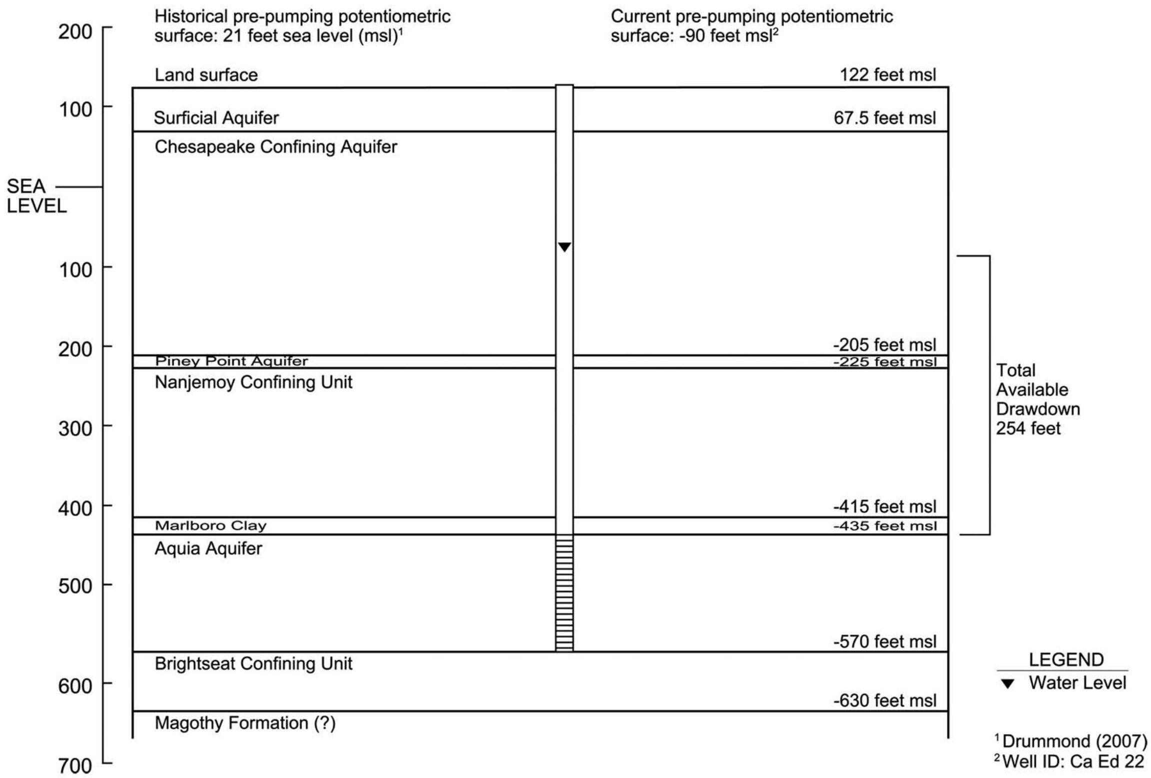
COMAR 26.17.06.05.D(3) indicates that an appropriation of ground water cannot be issued if the proposed withdrawal will exceed the sustained yield of the aquifer. COMAR 26.17.06.05.D(4) provides the tool to determine whether the regional sustained yield potentiometric surface of a confined aquifer is being exceeded, by ensuring that the regional sustained yield potentiometric surface is not be lowered below 80 percent of the drawdown available between the top of the aquifer and the historical pre-pumping level of the potentiometric surface.

The method used to calculate the 80 percent management level for the Aquia aquifer at Calvert Cliffs is described below. Figure 6-3 illustrates the calculation of the 80 percent management level for the Aquia aquifer at Calvert Cliffs.

- The land surface elevation at well CA Ed 42 on the Units 1 and 2 site is approximately 122 feet msl, and the September 2007 water level in well CA Ed 42 at Calvert Cliffs is -90 feet msl.
- Drummond (2007) reported that the modeled historical pre-pumping water level elevation in the Aquia aquifer at Calvert Cliffs is 21 feet msl.
- The top of the Aquia aquifer is estimated to occur at -435 msl at Calvert Cliffs based on the geophysical log from wells CA Ed 22 and 45 (Achmad and Hansen, 1997).
- The difference between the top of the Aquia aquifer and the historic, pre-pumping water level is 456 feet (435 feet plus 21 feet).
- Eighty percent of 456 feet is 365 feet; subtracting 365 feet from 21 feet msl results in an 80 percent management level of -344 feet msl.
- Remaining available drawdown is the difference between the current water level of -90 feet msl and the 80 percent management level of -344 feet msl, which leaves 254 feet of remaining available drawdown.

The value of -344 for the 80 percent management value is consistent with the values shown on Figure 45 in the Maryland Geological Survey Report of Investigations No. 76 (Drummond, 2007).

Figure 6-3 Available Drawdown in the Aquia Aquifer at Well CAEd42 at Calvert Cliffs



The level of the potentiometric surface within the Aquia aquifer was calculated using the Theis modified non-equilibrium equation (Theis, 1935). to evaluate the long-term regional impact of the proposed withdrawal on the aquifer and other users. The Theis equation is for non-steady flow in a homogenous, isotropic, confined aquifer with a single production well, and is based on the assumptions that 1) no recharge is provided during the period of withdrawal, and 2) the aquifer boundaries are infinite. These assumptions provide a conservative estimate of drawdown for two reasons.

1. Drawdown calculations from a single pumping well provide maximum estimated drawdown values; in actuality ground water would be withdrawn from a well field that consists of three or more wells.

2. The Theis equation provides a conservative calculation of drawdown in that it does not assume any recharge to the aquifer, and assumes that the aquifer boundaries are infinite.

Even with the conservatism, the Theis equation is an appropriate method to determine long-term drawdown because the Aquia aquifer is confined and somewhat homogenous in makeup at Calvert Cliffs. In addition, the distance to the aquifer boundary in the up slope outcrop area is over 40 miles west of the site and down slope the aquifer undergoes a facies change to finer grained sediments 10 miles southeast of the site (Drummond, 2007). These distances are too great to impact the analysis in any meaningful way.

The following equation (Theis, 1935) is used to calculate drawdown at selected time intervals:

$$s = \frac{QW(u)}{4\pi T} \quad (1)$$

where:

s = drawdown at time t;

S = storativity;

T = transmissivity; and

Q = well discharge rate.

W(u) = the well function; an exponential integral that can be expanded as an infinite series approximation as:

$$W(u) = -0.5772 - \ln(u) + u - \frac{u}{3*3!} + \frac{u}{4*4!} - \frac{u}{5*5!} + \ldots \quad (2)$$

where u is defined as:

$$u = \frac{r^2 S}{4Tt} \quad (3)$$

and:

r = distance in feet from the center of the pumped well to a point where the drawdown is measured.

The properties of the Aquia aquifer used in this analysis are as follows:

- Transmissivity – 935 feet squared per day (ft^2/d); and

- Storativity – 1.0×10^{-4} (unitless).

These values were obtained from literature values in Achmad and Hansen (1997). The transmissivity value was calculated from a pumping test conducted in a well installed at Calvert Cliffs. The storativity of an aquifer represents the volume of water that an aquifer releases from storage per unit surface area of the aquifer per unit decline in hydraulic head (e.g., for a one-foot water level decline over one square foot of aquifer area, a release of 0.05 cubic feet of water would result in a storativity value of 0.05). The storativity value is consistent with the one used by Achmad and Hansen (1997) to model the Aquia in southern Maryland.

Using the values for transmissivity and storativity listed above, drawdowns in the Aquia aquifer at various distances for year five at the annual average rate of 100,000 gpd were calculated using the Theis method. The 100,000 gpd withdrawal includes the 60,000 gpd being considered for the new wells installed to support the construction of the plant and 40,000 gpd obtained from the existing ground water appropriation at Calvert Cliffs. The total average daily demand of 100,000 gpd reflects a new use that is not reflected in the current water level in the Aquia aquifer at Calvert Cliffs. The new 100,000 gpd demand is assumed to be withdrawn from a hypothetical central well located 1/2 mile from the existing wells at Calvert Cliffs Units 1 and 2. Table 6-3 lists the results of the drawdown analysis.

Table 6-3 Aquia Aquifer Calculated Drawdown for 5 Years at the Proposed Withdrawal Rate of 100,000 gpd

Distance from Pumping Well (feet)	Distance from Pumping Well (miles)	Theis Calculated Drawdown (feet)	Theis Calculated Drawdown Plus 10 foot Regional Rate of Decline (feet)
50		18.8	28.8
100		17.3	27.3
200		15. 7	25.7
500		13.6	23.6
1,320	0.25	11.4	21.4
2,640	0.5	9.8	19.8
5,280	1.0	8.2	18.2
7,920	1.5	7.3	17.3
10,560	2.0	6.7	16.7
15,840	3.0	5.7	15.7
18,480	3.5	5.3	15.3
26,400	5.0	4.6	14.6
52,800	10.0	3.0	13.0

Based on the Theis analysis, drawdowns in the area of the withdrawal are as follows:

- **One-half mile**. The calculated drawdown after five years at an estimated distance of one-half mile is 9.8 feet; this is about 4 percent of the available drawdown of 254 feet at this point. One-half mile would be the approximate distance to the existing Aquia production wells at Calvert Cliffs.
- **One mile**. The calculated drawdown after five years at an estimated distance of one mile is 8.2 feet; this is about 3 percent of the available drawdown of 254 feet at this point. It is approximately one mile to the property boundary.

In addition, an estimate of the regional rate of decline was determined to evaluate cumulative impacts associated with the new 100,000 gpd withdrawal on the Aquia aquifer and other users. Based on the long-term decline in the water level measured in well CA Fd 54 at Calvert Cliffs State Park (see Figure 3-3), the regional rate of decline in the Aquia aquifer water level over the past 5 years is estimated to be about 2 feet/year. Thus after 5 years, there will be 10 additional feet of drawdown due to the regional rate of decline in the aquifer. The last column in Table 6-3 includes the sum of the total cumulative effect of the new withdrawal of 100,000 gpd at Calvert Cliffs plus the 10 feet of additional drawdown that will be realized after 5 years due to the regional rate of decline. The calculated drawdown associated with the 100,000 gpd withdrawal combined with the 10 additional feet of regional drawdown could create a total drawdown of 18.2 feet after five years at one mile from the hypothetical pumping well, with represents 7 percent of the available drawdown of 254 feet.

The calculated drawdown at the property boundary is small, especially when compared to the 254 feet of available drawdown in the Aquia at Calvert Cliffs. Further, the drawdown in the Aquia will not cause an unreasonable impact to the aquifer for the limited five year period of construction for Unit 3.

6.3.2 *Impacts to Other Users*

The Aquia aquifer is widely used for water supply in southern Maryland, and in Calvert County in particular. As described in Section 3.1, pumping wells in the Aquia aquifer are located in the area surrounding the power plant. MDE WMA reports that there are 186 separate ground water appropriations in the Aquia in Calvert County. The four closest users in the Aquia aquifer identified in either MGS publications or from MDE WMA permit records are as follows:

- Southern Middle School located on HG Trueman Road, about 1.5 miles south of the intersection of Calvert Cliffs Parkway, uses a small amount of water from the Aquia. This well is 1.5 miles from the Unit 3 site;
- The Rodney Getz Saw Mill, located on Saw Mill Road about 0.5 miles north of the intersection of Calvert Cliffs Parkway, uses the Aquia aquifer. The well at the saw mill is 2.0 miles from the Unit 3 site;
- Beaches Water Company, Inc. Beaches Water Company operates two production wells located in the community of Long Beach, which is approximately 3.0 miles north of Calvert Cliffs. As of 2002, the Beaches Water Company had a ground water appropriation of 49,000 gpd and withdrew an average of 39,000 gpd in 2002; and
- Dominion Cove Point LNG, located about 3.5 miles south of Calvert Cliffs. As of 2002, Dominion had a ground water appropriation with an annual average of 29,000 gpd and withdrew an average of 23,000 gpd in 2002.

As shown in Table 6-3, calculated drawdown after 5 years at a withdrawal rate of 100,000 gpd at these four locations, including the additional 10 feet of drawdown to account for the regional rate of water level decline, are as follows:

- 17.3 at Southern Middle School;
- 16.7 at the saw mill;
- 15.7 feet at Long Beach; and
- 15.3 feet at Dominion.

These calculated drawdown amounts are small, especially when compared to the 254 feet of available drawdown in the Aquia at Calvert Cliffs. Further, the drawdown in the Aquia will not cause an unreasonable impact to the nearby users for the limited five year period of construction for Unit 3.

The potential for short-term withdrawal impacts to other users associated with the drawdown caused by the month of maximum use withdrawal of 180,000 gpd for a 60-day period was also evaluated using the Theis method (140,000 gpd from the new appropriation and 40,000 gpd from Units 1 and 2). Worst-case impacts from the month of maximum use withdrawal would occur at the end of year 5, and are calculated by running a Theis simulation for 80,000 gpd for 60 days and adding these results to the drawdown values for the 100,000 gpd withdrawal listed in Table 6-3 (including the 10 feet to account for the regional rate of decline). The simulation at 80,000 gpd represents the incremental increase in pumping during the month of maximum use. Table 6-4 lists the results of the drawdown analysis.

Table 6-4 Aquia Aquifer Calculated Drawdown for 60 Days at the Proposed Withdrawal Rate of 80,000 gpd

Distance from Pumping Well (feet)	Distance from Pumping Well (miles)	Theis Calculated Drawdown Plus 10 foot Regional Rate of Decline at Year 5 (feet)	Theis Calculated Drawdown for 80,000 gpd for 60 Days	Total of All Theis Calculated Drawdowns
50		28.8	12.0	40.8
100		27.3	10.7	38.0
200		25.7	9.4	35.1
500		23.6	7.8	31.4
1,320	0.25	21.4	6.0	27.4
2,640	0.5	19.8	4.7	24.5
5,280	1.0	18.2	3.5	21.7
7,920	1.5	17.3	2.8	20.1
10,560	2.0	16.7	2.3	19.0
15,840	3.0	15.7	1.6	17.3
18,480	3.5	15.3	1.3	16.6
26,400	5.0	14.6	0.8	15.4
52,800	10.0	13.0	0.1	13.1

As shown in Table 6-4, calculated drawdown after 60 days at a withdrawal rate of 80,000 gpd, combined with the calculated drawdown after five years with the 10 additional feet at a withdrawal rate of 100,000 gpd associated with the regional rate of decline, at the four off-site Aquia users are as follows:

- 20.1 at Southern Middle School;
- 19.0 at the saw mill;
- 17.3 feet at Long Beach; and
- 16.6 feet at Dominion.

These calculated drawdown amounts at these locations are small, especially when compared to the 254 feet of available drawdown in the Aquia at Calvert Cliffs. Further, the drawdown in the Aquia will not cause an unreasonable impact to the nearby users for the limited five year period of construction for Unit 3.

6.3.3 Recommendations Relative to Ground Water Use for Construction

MDE WMA recommends that UniStar be granted an appropriation to use ground water from the Aquia aquifer for five years to support the construction of Unit 3. The appropriation is recommended to be granted with the following amounts:

- **Average Daily Use**. The annual average water requirement is 60,000 gpd from the Aquia aquifer; and

- **Month of Maximum Use**. The maximum daily water use is 140,000 gpd from the Aquia aquifer for the month of maximum use.

In addition, MDE WMA agrees that Calvert Cliffs Nuclear Power Plant, Inc. can provide up to 40,000 gpd of water from State Water Appropriation and Use Permit No. CA1969G-010 as long as the appropriation steps are taken to document the transfer of water between the two entities and a plan is developed to ensure that the annual average appropriation limit of 450,000 gpd for Units 1 and 2 is not exceeded.

The combination of the new and existing appropriations is expected to provide UniStar with a sufficient amount of water to meet its demand during construction years 2 through 5. However, MDE WMA further recommends that UniStar pursue use of other sources of water, including water generated during construction dewatering and treated effluent hauled from local wastewater treatment plants (with the appropriate MDE approval), to augment the ground water withdrawals during the construction period. If the availability of treated effluent or on-site conditions limit the use of treated effluent, then UniStar should pursue other off-site water sources with available capacity within their permitted limits. After five years, the desalination plant will be brought on-line, and all use of ground water for construction will cease.

MDE MWA has provided a recommended license condition that indicates that the Aquia aquifer withdrawal can be obtained from two new wells. At least two wells likely will be necessary to provide sufficient ground water to meet the construction water demand during the month of maximum use. UniStar should inform MDE WMA of the final number of wells to be installed.

Ground water in Southern Maryland and Calvert County in particular, is significantly more limited in comparison to quantities available from the Chesapeake Bay. Ground water supplies are ideally suited for potable use, being free from pathogens and salts present in brackish waters. Opportunities to convert existing non-potable ground water uses to water reuse or a brackish water source should be sought and taken advantage of. Such a condition is present with respect to the new reverse osmosis water plant and system being developed for Unit 3. UniStar has indicated a willingness to provide excess treated water from its proposed withdrawal from the Chesapeake Bay to Calvert Cliffs Nuclear Power Units 1 and 2. Additionally, UniStar indicated that the desalination plant will have available 0.5 million gallons per day above the 1.25 million gallon per day demand for Unit 3. The ground water use for Units 1 and 2 is the fourth largest permitted use from the Aquia aquifer in Calvert County. Cessation or a significant reduction of water withdrawals from the Aquia aquifer at Units 1 and 2 will allow water levels to rebound in the general area of Calvert Cliffs and thereby benefit other users of ground water. Therefore MDE WMA recommends that UniStar make the excess capacity of the reverse osmosis water plant be sufficient to replace at least all nonpotable Aquia ground water uses associated with Units 1 and 2 and that UniStar enter into an agreement with Calvert Cliffs Nuclear Power Plant, Inc. to transfer water from the reverse osmosis plant to meet these water needs.

6.4 *CHESAPEAKE BAY WITHDRAWAL*

UniStar requested a surface water appropriation of: 1) a daily average of 54.4 mgd on a yearly basis; and 2) a maximum daily withdrawal of 62.6 mgd. MDE concurs with the requested surface water appropriation. The requested amount is reasonable and will not have any impact on the ability of others to utilize the water supply resources of the Chesapeake Bay. Approximately 50 percent of the water withdrawn, or about 27 mgd, will be consumptively lost in the cooling tower and therefore not returned to the Bay.

The average water withdrawal of 54.4.mgd would make Calvert Cliffs Unit 3 the largest power plant user of water in Maryland, among those plants that utilize closed-cycle cooling systems. Around the state, there are seven generating stations with once-through cooling systems, on both tidal and non-tidal surface water bodies, that withdraw much more water than UniStar is requesting. However, the consumptive loss of 27 mgd at Calvert Cliffs Unit 3 would be the largest consumptive use of any Maryland power plant.

UniStar's requested surface water appropriation for Unit 3 is a small percentage of the existing 3,500 mgd daily appropriation issued to Calvert Cliffs Nuclear Power Plant, Inc. to withdraw Chesapeake Bay water for cooling Units 1 and 2. In 2006, Calvert Cliffs Nuclear Power Plant, Inc. withdrew a daily average of 3,235 mgd for once-through cooling water at Units 1 and 2. About 0.6 percent of that cooling water demand, or 18 mgd in 2006, was lost to evaporation in the estuary after discharge, according to estimates by the Interstate Commission on the Potomac River Basin (ICPRB, 1986). These estimated amounts of consumptive use, in the context of a large estuary such as the Chesapeake Bay, represent a negligible impact to water resources.

The requested amount of water withdrawn from the Chesapeake Bay will not adversely impact the recreational use of the river or aquatic life. Therefore, MDE WMA recommends that UniStar be granted an appropriation to use surface water from the Chesapeake Bay. It is recommended that the appropriation be for 12 years consistent with the standard conditions issued by MDE WMA for surface water appropriations.

7.0 SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

In this Environmental Review, the State has summarized its consolidated evaluation of UniStar's proposed Calvert Cliffs Unit 3 project. The scope of the State's review did not encompass any areas in which the NRC has federal authority under 10 CFR Parts 2 and 52, for example, radiological health, spent fuel storage, and emergency planning. These issues are being addressed in detail within the NRC's environmental and safety analysis.

The NRC operating license will not be issued until 2011, according to NRC's current schedule forecast. Under NRC regulations, UniStar cannot begin construction of safety-related components until it receives the NRC license. However, upon issuance of the CPCN, UniStar may begin site preparation, clearing, and grading; installation of access roads, parking lots, shipping facilities, sanitary water supply and sewage system, administration buildings, and construction trailers; and excavation for all permanent structures.

PPRP is recommending that the PSC require UniStar to return the site to an environmentally stable condition, in the event that UniStar begins preconstruction activities and then the NRC does not issue an operating license, or UniStar decides not to go forward with its plans.

7.1 AIR QUALITY IMPACTS

The proposed Calvert Cliffs Unit 3 project will have the potential to emit several types of air pollutants. The emissions sources evaluated as part of the State's environmental review included the cooling towers and the emergency generators. PPRP did not evaluate the impacts of radionuclide emissions from the reactor or any associated fuel or waste handling operations; this Environmental Review Document addresses only the non-NRC regulated emissions sources that are part of the Calvert Cliffs Unit 3 project.

Based on the information provided in the CPCN application and subsequent amendments, supplemented with independent analyses conducted by the State, PPRP and MDE-ARMA conclude that emissions from the proposed project trigger major Prevention of Significant Deterioration (PSD) requirements for particulate matter (PM), primarily due to PM emissions from the circulating water system (CWS) cooling tower. Emissions of all other regulated pollutants are below major New Source Review and Hazardous Air Pollutant (HAP) permitting thresholds. Because emissions of PM will be significant, UniStar is required to apply the Best Available Control Technology (BACT) for PM emissions from all cooling towers and emergency generators and conduct impact assessments to ensure that emissions will not adversely affect ambient air quality.

UniStar has demonstrated that it will achieve BACT levels of pollution control. PM emissions from the cooling towers will be minimized by limiting the total dissolved solids (TDS) concentration in the circulating water and operating high efficiency drift eliminators. Emissions from the emergency generators will be minimized by the use of low-sulfur diesel fuel, annual limits on hours of operation, and operation of New Source Performance Standard-compliant or better engines.

Impact assessment modeling evaluations demonstrate that operating with the restrictions included in the State's recommended licensing conditions (Appendix A), emissions from the proposed project are not predicted to cause any significant adverse impacts to air quality. Specifically, air emissions from the proposed Calvert Cliffs Unit 3 project will not adversely affect ambient air quality or PSD increments; the project's impacts on visibility in the surrounding Class I areas are likely to be minimal; and there will be no projected unacceptable impacts from fogging, icing, or from cooling tower salt deposition.

In conclusion, an evaluation of the project and its potential emissions indicate that, if designed and operated in accordance with the recommended licensing conditions, the Calvert Cliffs Unit 3 project will meet all applicable State and federal air quality requirements.

7.2 *IMPACTS TO ECOLOGICAL RESOURCES*

7.2.1 *Terrestrial Ecology*

Construction of Calvert Cliffs Unit 3 will result in the clearing of 238 acres of forest, of which 21 acres are in the Chesapeake Bay Critical Area (CBCA). UniStar's Forest Conservation Plan (FCP) offers as mitigation the preservation of 160 acres of forest that already exist on the Calvert Cliffs property. To offset forest clearing in the CBCA, forest planting and forest preservation elsewhere in the CBCA are offered. The existing forests currently provide numerous ecological benefits to the region and particularly to wildlife. Although a portion of the site forest will be left intact, impacts to the remaining forest will likely continue following the construction of the project, mainly through exposure to invasive species where the forest has been opened. It is recommended that UniStar have an approved FCP prior to initiating any on-site construction. Furthermore, UniStar must obtain Critical Area Commission approval prior to any action that impacts the CBCA.

The construction of the proposed Calvert Cliffs Unit 3 will permanently impact 11.7 acres of wetlands distributed throughout the project site, as well as 30.85 acres of wetland buffers. To compensate for wetlands losses, UniStar proposes "in-kind" mitigation through enhancement and creation of wetlands elsewhere on the project site. The project will also permanently impact 8,350 linear feet of perennial and intermittent stream beds. Mitigation of stream losses would include restoration and enhancement of more than 10,000 linear streams elsewhere on the Calvert Cliffs property. It is recommended that UniStar have an approved permit from the U.S. Army Corps of Engineers (USACE) and MDE for impacts to wetlands prior to conducting any construction activity that impacts wetlands or streams. USACE has sought cooperating status with the NRC for the preparation of its Environmental Impact Statement (EIS). Actions affecting wetlands may be precluded if UniStar has not received permit approval from USACE.

The principal impact to wildlife from the construction of the proposed Unit 3 facility is the loss of habitat available to resident species. Effectively, all of the animals that currently inhabit the forest will be lost once the forest is cleared. The mature forests on the site also provide habitat to many birds that are Forest Interior-Dwelling Species (FIDS). The clearing of forested area will not only have a direct impact on FIDS from the removal of habitat, but adjoining forest habitats will also be less supportive due to fragmentation effects. Additionally, the mature forest that remains after project construction will likely be more exposed to invasive and exotic vegetation, making it potentially less valuable to wildlife (by lowering diversity, decreasing food resources, and increasing the potential for damage to individual trees in inclement weather).

To compensate for the impacts to wildlife, PPRP recommends that UniStar be required to develop and implement acceptable mitigation plans for impacts to affected habitats. Impacts to forest resources will be addressed in the Forest Conservation Plan (FCP) as prescribed by the Maryland Forest Conservation Act. UniStar's FCP is currently under review by DNR. Although the Calvert Cliffs property is zoned for industrial uses, and the "Conservation Threshold" for such areas is the lowest among land use categories, it should be realized that the forest resources at the site are of the highest quality in Calvert County. Preservation of forests in this area, especially where contiguous with other large forest tracts (such as Flag Ponds Park to the north), would be beneficial to species affected by the proposed project.

Showy goldenrod (*Solidago speciosa*) is a State-listed Threatened plant species that would be adversely affected by project construction. As mitigation, UniStar has indicated that it will transplant the goldenrod to other suitable habitat on the site. UniStar should follow DNR's guidelines for the reintroduction of rare plants in its mitigation efforts for the showy goldenrod. Shumard's oak (*Quercus shumardii*), State-listed as Threatened, and the spurred butterfly pea (*Centrosema virginianum*), a State-listed Rare species, are present or known to occur on the site, but are outside of the project's developmental footprint and so require no mitigation. Bobcat (*Lynx rufus*), a Watch-list species and In Need of Conservation, was reported in one area of the project site.

Bald eagles will also be adversely affected by the project's construction. One currently active nest will be removed during project construction. Two other active nests occur in the project vicinity, but are considered outside of the area of project impact and therefore would be unaffected. Bald eagles are State-listed as Threatened in Maryland, but will likely be de-listed in the near future, an action that will follow the recent de-listing by the USFWS. Until the bald eagle is de-listed, UniStar should follow the State's standard guidelines for nest site protection, which prescribe a one-quarter mile (1,320-foot) radius around a nest tree, within which certain activities are prohibited. If the guidelines cannot be followed, an incidental take permit will be required for disturbance to or removal of any nests. Federally, bald eagles are still protected under the Bald and Golden Eagle Protection Act (BGEPA) and Migratory Bird Treaty Act (MBTA). Neither of these laws has a provision for take of bald eagles. The USFWS has issued a Proposed Rule authorizing such actions under BGEPA.

The northeastern beach tiger beetle (*Cicindela dorsalis*) and puritan tiger beetle (*Cicindela puritana*), both federally Threatened and State Endangered species, are known to occur along the Chesapeake Bay shoreline proximal to the project site. Construction of the Calvert Cliffs Unit 3 project is not likely to impact either tiger beetle species provided their preferred habitats are undisturbed. UniStar indicates that construction along the shoreline necessary for Unit 3 will make use of existing access routes and structures associated with Units 1 and 2. No construction activities should occur within 500 feet of any cliff or beach habitats that are suitable for either tiger beetle species. Administrative controls that restrict personnel access to beaches should be implemented. In the interest of safeguarding this species, UniStar should allow DNR to access the shoreline as requested to conduct surveys to examine the health of tiger beetle populations.

7.2.2 *Aquatic Ecology*

Delivery of materials to the site will include transportation by barge through the Bay to an unloading facility at the site. The existing unloading site will need to be refurbished and the adjacent barge slip dredged to accommodate delivery vessels. In addition, new cooling water intake and discharge facilities will need to be constructed. Since Unit 3 will use closed-cycle cooling rather than once-through cooling as at Units 1 and 2, these facilities will be much smaller at Unit 3. However, there will be construction of these facilities in the Bay and these will require a joint federal/State permit from USACE and MDE. As discussed above in the wetlands section, UniStar has applied for a joint permit.

A new NPDES permit will be required for the cooling water intake structure and for the discharge of cooling tower blowdown, and other wastewater sources. The intake will be designed to meet the Phase 1 standards of USEPA's Clean Water Act Section 316(b) regulations. The discharge structure and effluents will also be designed to meet the State's thermal and chemical discharge standards. The NPDES permit application will be developed and submitted to MDE independent of the CPCN process and the permit obtained prior to the startup of Unit 3.

7.3 *SOCIOECONOMICS*

7.3.1 *Employment and Fiscal Impacts*

Employment and income impacts from the construction of the proposed facility would be sizable. A significant construction workforce is projected to be on-site by August 2009 and would peak at about 4,000 workers in 2013. The project's estimated requirements amount to more than 15,600 person-years of employment and $1.1 billion in direct earnings over the entire construction period. While it is unknown how much of this workforce would come from the local population and how much would migrate into the region, the scale of the project is significant in terms of construction labor demand.

Fiscal impacts from the project would be in the form of tax revenues and government expenditures on public services. During construction, revenues from taxes on construction worker wages, income taxes on indirect employment incomes, and sales taxes on consumption expenditures would accrue to Maryland and local governments. The net fiscal impact of Calvert Cliffs Unit 3 on Calvert County is expected to be extremely favorable, generating an estimated $20 million annually in new property tax revenue.

7.3.2 *Transportation*

During construction, Calvert County would see an increase in traffic on major roads leading to the Calvert Cliffs site, particularly during the peak construction period when nearly 4,000 workers are on-site. Because the projected operational workforce for Unit 3 is much smaller, traffic impacts are expected to be minor. Periodic outages for maintenance at Unit 3 could temporarily swell traffic volumes on nearby roads, causing occasional delays, similar to the current situation during outages at Calvert Cliffs Units 1 and 2.

7.3.3 *Cultural Impacts*

UniStar's evaluation of cultural resources that could potentially be affected by the project identified four architectural resources and four archeological sites at the Calvert Cliffs property. UniStar has completed the fieldwork and is currently preparing a Phase II report that will include a detailed discussion of resource integrity and significance and a definitive statement on resource eligibility for the National Register of Historic Places. If the Maryland Historical Trust (MHT) concurs with the findings of the report, it will consult with UniStar and others to find ways to reduce, avoid, or mitigate the adverse effects. PPRP recommends that UniStar be required to execute a Memorandum of Agreement with MHT prior to beginning any site clearing or preparation activities within the identified boundaries of on-site cultural resources that are eligible for the National Register.

Because the site is large and the proposed structures are relatively low profile, significant visual impacts to historic architectural resources or other receptors off-site are not likely to occur.

7.4 *NOISE IMPACTS*

PPRP conducted an independent analysis of potential noise impacts from both construction and operation of the proposed Calvert Cliffs Unit 3. There is a large buffer distance available between the areas of disturbance during construction and the property boundaries where potential noise receptors are located. As a result, the construction noise is projected to comply with State regulatory limits for allowable noise at the site boundary, and no adverse impacts to the community are anticipated.

Continuous noise at the facility during operation will be significantly less than during peak construction. The primary noise source will be the hybrid mechanical cooling tower, but due to the distance buffer between the noise source and the nearest receptors, the cooling tower is projected to comply with all applicable noise limits. To ensure that noise impacts from the cooling tower are acceptable, PPRP is recommending a licensing condition that requires UniStar to conduct noise monitoring after the plant becomes operational, at the plant boundaries in locations of closest proximity to residentially zoned land.

7.5 WATER SUPPLY

UniStar indicated that the Calvert Cliffs Unit 3 project would need an estimated 131,000 gallons of water per day (gpd) during the construction phase (estimated to be six years). UniStar needs water to produce cement, for dust control, for sanitary and potable use to support the construction staff (which is expected to peak at about 4,000 workers), and for hydrostatic testing of lines and tanks. UniStar proposed to obtain the water from several sources, including a portion from the ground water Aquia aquifer appropriations from existing Units 1 and 2, ground water generated from dewatering, water trucked from an off-site supplier, and wells drilled at the Unit 3 site.

The Maryland Department of the Environment Water Management Administration (MDE WMA) determined that 100,000 gpd is a reasonable amount to meet the construction water demand on an average day. If hauled water is used as a source, then MDE WMA recommends that it be obtained from a permitted supply with adequate capacity. MDE WMA agrees that UniStar can obtain 40,000 gpd of water from the Units 1 and 2 ground water appropriations as a daily average. MDE WMA proposes that the remainder of the 100,000 gpd, or 60,000 gpd, be provided from a temporary appropriation of ground water from the Aquia aquifer, lasting a period of five years. MDE WMA further proposes to provide UniStar with a "month of maximum use" amount of 140,000 gpd to ensure an adequate amount of water will be available to meet the demand during peak periods of concrete mixing. PPRP and MDE WMA have developed recommended licensing conditions to ensure that the water supply impacts associated with the proposed withdrawal for construction are acceptable and that the CPCN includes appropriate licensing conditions relevant to water supply for both construction and operations.

MDE WMA determined that a daily average of 54.4 million gallons per day (mgd) on a yearly basis, and a maximum daily withdrawal of 62.6 mgd of Chesapeake Bay water requested by UniStar for a surface water appropriation are reasonable, and will not adversely impact the recreational use of the Bay or aquatic life. UniStar will utilize Bay water as cooling water for Unit 3. MDE WMA recommends that UniStar be granted an appropriation to use surface water from the Chesapeake Bay subject to the appropriate license conditions for both construction and operations.

UniStar indicated a willingness to provide a portion of its water treated by reverse osmosis (RO) to Units 1 and 2 to replace the ground water withdrawn from the Aquia aquifer to support the operation of those units. This water transfer from Unit 3 to Units 1 and 2 is expected to occur after the desalination facility at Unit 3 comes on-line to mitigate long-term drawdown impacts to the Aquia Aquifer. Cessation or a significant reduction of water withdrawals from the Aquia aquifer at Units 1 and 2 will allow water levels to rebound in the general area of Calvert Cliffs and thereby benefit other users of ground water. Therefore, MDE WMA recommends that UniStar make the excess capacity of the RO water plant be sufficient to replace at least all non-potable Aquia aquifer ground water uses associated with Units 1 and 2 and that UniStar enter into an agreement with Calvert Cliffs Nuclear Power Plant, Inc. to transfer water from the reverse osmosis plant to meet these water needs.

TABLE OF CONTENTS

Achmad, G. and H.J. Hansen 1997. Hydrogeology, Model Simulations, and Water-Supply Potential of the Aquia and Piney Point-Nanjemoy Aquifers in Calvert and St. Marys Counties, Maryland. Report of Investigations No. 64. Maryland Geological Survey.

Alonso 1964. Location and Land Use. W. Alonso. Harvard University Press. Cambridge, Massachusetts.1964.

ANSP 1981. Chalk Point 316 Demonstration of Thermal, Entrainment and Impingement Impacts on the Patuxent River in Accordance with COMAR 08.05.04.13, Volume III, The Academy of Natural Sciences of Philadelphia, Division of Limnology and Ecology, April 1981.

Askins, R.A. 2000. Restoring North America's Birds. Second Edition, Yale University Press, New Haven, Connecticut.

Baltimore Gas and Electric Company (BG&E) and ANSP 1979. Non-radiological
Environmental Monitoring Report. Calvert Cliffs Nuclear Power Plant January-December 1978. Available at: http://esm.versar.com/pprp/bibliography/sec14.htm as item 1 under Calvert Cliffs.

BCC 1984. Code of Calvert County. Chapter 57. Historic Districts. Adopted by the Board of County Commissioner of Calvert County 1-24-1984 by Res. No. 4-84. As amended.

BCC 2004. 2004 Comprehensive Plan. Calvert County, Maryland. Approved and adopted December 2004.

BCC 2006. Calvert County Land Use, Parks and Recreation Plan. Board of County Commissioners. Approved and Adopted December 2006.

Bergmark 2005. Statement of Dr. Christine L. Bergmark, Director, Southern Maryland Agricultural Development Commission, Tri-County Council for Southern Maryland before the Senate Budget and Taxation Committee Capital Budget Subcommittee. February 1, 2005

BLS 2008. Local Area Unemployment Statistics. Labor force data by county, 2006 annual averages. Bureau of Labor Statistics, U.S. Department of Labor. http://www.bls.gov/LAU/

Boyle and Kiel 2001. "A survey of house price hedonic studies of the impact of environmental externalities", Boyle, M.A. and K.A. Kiel, Journal of Real Estate Literature, 2001, 9:2, 117-144.

Brugger 1988. Maryland: A Middle Temperament, 1634 – 1980. Robert J. Brugger. Johns Hopkins University Press.

Bushman, E.S. and G.D. Therres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Wildlife Technical Publication 88-1, Maryland Department of Natural Resources Forest, Park and Wildlife Service. Annapolis, MD.

Calvert County 2007. Calvert County Radiological Emergency Plan for Calvert Cliffs Nuclear Power Plant. June 2007.

Calvert County. 2008. Information gathered from Calvert County web site regarding the status of County forests: http://www.co.cal.md.us/business/planning/

Carlson 2008. Email correspondence from Terry P. Carlson, P.E., Director, Calvert County Department of Public Works. July 3, 2008.

CCDED 2008. Calvert County, Maryland Visitor Counts – Fiscal Year Comparisons. Calvert County Department of Economic Development.

CCPS 2007. Calvert County Public Schools Master Plan. 2007 Annual Update.

Census 2000a. Census 2000 Summary File 1 (SF 1) 100-Percent Data, Geographic Area: District 3, Sunderland, Calvert County, Maryland. U.S. Census Bureau.

Chapelle, F.H., and D.D. Drummond 1983. Hydrogeology, Digital Simulation, and Geochemistry of the Aquia and Piney Point-Nanjemoy Aquifer System in Southern Maryland. Report of Investigation No. 38. Dept. of Natural Resources, Maryland Geological Survey.

Clark et al 1997. "Nuclear Power Plants and Residential Housing Prices", Clark D. E., L. Michelbrink, T. Allison and W. C. Metz, Growth and Change, 1997, 28, 496-519.

DBED 2008. Calvert County, Maryland. Brief Economic Facts. Division of Business Development. Maryland Department of Business & Economic Development. Baltimore, Maryland. 2007-2008.

DNR 2006. Maryland Department of Natural Resources. Environmental Review for Constellation Energy's Calvert Cliffs Nuclear Power Plant Site, Lusby, Calvert County, Maryland. Letter: Lori A. Byrne (MDNR) to R.M. Krich (UniStar Nuclear), July 31, 2006. NTIS No. PB2002-105441.

DNR 2008. Maryland Department of Natural Resources. Information gathered from MDNR web site regarding the status of forest conservation in Maryland: http://www.dnr.state.md.us/forests/conservationgoal.asp

DPZ 2006. Planning, Growth Management and Quality of Life: Making the Connection. Prepared by the Calvert County Department of Planning and Zoning. October 2006.

DPZ 2007a. Preserving Farm and Forestland in Calvert County, Maryland. Agricultural Workshop Presentation. March 19, 2007.

DPZ 2007b. Cultural Resources Review in Calvert County, Maryland. Calvert County Planning and Zoning. Prince Frederick, Maryland. August 3, 2007.

DPZ 2007c. Draft Calvert County Comprehensive Water and Sewage Plan 2007 Update. Prepared by the Calvert County Department of Planning and Zoning. August 2007.

DPZ 2008. Calvert County Zoning Ordinance. Calvert County Department of Planning and Zoning. Revised March 25, 2008.

Drummond, D.D. 2007. Water-Supply Potential of the Coastal Plain Aquifers in Calvert, Charles, and St. Marys Counties, Maryland, with Emphasis on the Upper Patapsco and Lower Patapsco Aquifers. Report of Investigation No. 76. Dept. of Natural Resources, Maryland Geological Survey.

EA 1981. Ecological Analysts, Inc. Entrainment Abundance and Viability Studies, Calvert Cliffs Nuclear Power Plant, Final Report 1978-1980, Baltimore Gas and Electric Company. Report No. BGE04K1.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Shuster, New York, New York.

Exeter Associates, Inc. 1995. An Assessment of Changing Perceptions of High Voltage Transmission Lines on Residential Property Values. Prepared for Power Plant Research Program, Maryland Department of Natural Resources, Annapolis, Maryland, June 1995.

Fenwick 2008. Personal communication from John R. Fenwick, Emergency Management and Safety Division, Public Safety, Calvert County Government.

Fergus, C. 2003. Wildlife of Virginia and Maryland and Washington, D.C. Stackpole Books, Mechanicsburg, Pennsylvania.

Folland and Hough 1991. "Nuclear Power Plants and the Value of Agricultural Land", Folland S. H. and Hough R. R., Land Economics, 1991, 67:1, 30-36.

Folland and Hough 2000. "Externalities of nuclear power plants: Further evidence", Folland S. H. and Hough R. R., Journal of Regional Science, 2000, 40:4, 735-753.

Hall et al 1979. The effect of highway noise on residential property values, Hall, F.L., B.E. Breston and S.M. Taylor, Transportation Research Record 686, 1979, 38-43.

Hejel 2008. Personal telephone communication with Lt. Colonel Thoma Hejel, Calvert County Sheriff's Office. July 8, 2008.

HDR / Lawler, Matusky & Skelly Engineers 2005. Proposal for Information Collection in Compliance with Section 316 (b) Phase II-Requirements of the Clean Water Act For Calvert Cliffs Nuclear Power Plant. Prepared for Constellation Generation Group, December 19, 2005.

Hixson III, J. Howard and Denise L. Breitburg 1994. Impingement studies at Calvert Cliffs Nuclear Power Plant for Baltimore Gas and Electric Company. Estuarine Research Center. Report No. 94 – 28

Hixson III, J. Howard and Denise L. Breitburg 1996. 1995 Impingement studies at Calvert Cliffs Nuclear Power Plant for Baltimore Gas and Electric Company. Estuarine Research Center. Report No. 96 – 12.

Humphreys 2007. Adequate Public Facilities Report – November 2007. Memorandum to Board of County Commissioners and Planning Commission from David Humphreys, Planning Commission Administrator. November 1, 2007.

ICPRB 1986. Interstate Commission on the Potomac River Basin, Roland C. Steiner, PhD and PE and Kathleen B. Hogan, PhD. Evaporative Loss from Receiving Waters Due to Heated Effluent Discharges. Report 86-10, July 1986.

Jones, C, J. McCann, and S. McConnville 2000. A guide to the conservation of forest interior dwelling birds in the Chesapeake Bay Critical Area. Critical Area Commission publication. Annapolis, MD.

Jones, T. and R. I. McLean 2005. Environmental Radionuclide Concentrations in the Vicinity of the Calvert Cliffs Nuclear Power Plant and Peach Bottom Atomic Power Station: 2002-2003, Power Plant Research Program, and Versar, Inc., PPRP-R-29, December 2005.

Jones, T., B. Hood and R. I. McLean 2008. Environmental Radionuclide Concentrations in the Vicinity of the Calvert Cliffs Nuclear Power Plant and Peach Bottom Atomic Power Station: 2004-2005, Power Plant Research Program and Versar, Inc., PPRP-R-30, April 2008.

KLD 2007. Traffic Impact Study at the Calvert Cliffs Nuclear Power Plant – Phase 1. Prepared by KLD Associates Inc. for Constellation Energy. May 30, 2007.

KLD 2008. Traffic Impact Study at the Calvert Cliffs Nuclear Power Plant. Draft Final Report. Prepared for Unistar Nuclear Inc. Prepared by KLD Engineering, P.C. May 22, 2008.

Knisley, C. B. 2006. Current Status of Two Federally Threatened Tiger Beetles at Calvert Cliffs Nuclear Power Plant, 2006. Report of survey conducted by C. Barry Knisley, Ph.D. for Constellation Generation Group.

Kurze, Ulrich J., and Leo L. Beranek, 1988. Sound Propagation Outdoors, Chapter 7, Noise and Vibration Control, edited by L.L. Beranek. Institute of Noise Control Engineering, 1988.

Makhijani 2008. "Nuclear Power Costs: High and Higher." Science for Democratic Action, Volume 15, Number 2. January 2008.

Maryland Department of the Environmental (MDE) 2004. Maryland's 2004 Section 303(d) List. Available at: (accessed on 15Apr08) http://www.mde.state.md.us/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/final_2004_303dlist.asp

Maryland Office of Tourism 2007. The Economic Impact of Travel on Maryland Counties 2006. Prepared by the Travel Industry Association. Washington, DC. November 2007.

McLean, R., W. Richkus, S. Schreiner and D. Fluke 2002. Maryland Power Plant Cooling Water Intake Regulations and Their Applications in Evaluation of Adverse Environmental Impact (1.1 MB), Maryland Department of the Environment and Versar, Inc., PPRP-127, March 2002
Nelson 1981. "Residential Choice, Hedonic Prices, and the Demand for Urban Air Quality", Nelson, J. P., Journal of Urban Economics, 1981, 5:3, 357-69.

MDOT 2008. Maryland's 2008-2013 Consolidated Transportation Program. Maryland Department of Transportation. Office of Planning and Capital Programming.

MDP 2003. Calvert County. 2000 Journey-to-Work Commutation. Prepared by the Maryland Department of Planning, Planning Data Services. March 2003.

MDP 2004. Acres of Land in Farms for Maryland and its Jurisdictions. Prepared by the Maryland Department of Planning from the 1997 and 2002 Census of Agriculture. July 2004.

MDP 2007a. Historical and Projected Total Population for Maryland's Jurisdictions. Prepared by the Maryland Department of Planning, Planning Data Services. October 2007.

MDP 2007b. Full and Part-time Jobs by Place of Work. Prepared by the Maryland Department of Planning, Planning Data Services, from BEA (Tables SA25 and SA25N). April 2007.

MDP 2007c. Personal Income by Major Source and Earnings by Industry. Prepared by the Maryland Department of Planning from US BEA Table CA05N. April 2007.

MdTA 2006. Task Force on Traffic Capacity Across the Chesapeake Bay. Task Force Report. Maryland Transportation Authority. July 2006.

NEI 2008. Costs: Fuel, Operation and Waste Disposal. Nuclear Energy Institute. www.nei.org/resourcesandstats/nuclearstatistics/costs/. Accessed April 16, 2008.

Nichols, M., R.J. Diaz, and L.C. Schaffner. 1990. Effects of Hopper Dredging and Sediment Dispersion, Chesapeake Bay. Environ. Geol. Water Sci. 15(1), 31-43.

PWRC 2003. The Diamondback Terrapin in the Chesapeake Bay. Available at
http://www.pwrc.usgs.gov/products/sciencebriefs/sb01sm.pdf. Patuxent Wildlife Research Center, Laurel, Maryland.

Reisman, Joel and Gordon Frisbie 2002. Calculating Realistic PM10 Emissions From Cooling Towers, July 2002.

Richardson 2008. Email correspondence from James W. Richardson, Coordinator, Calvert County Department of Public Safety, Fire-Rescue-EMS Division. July 8, 2008.

Ridker and Henning 1967. "The Determinants of Residential Property Values with Special Reference to Air Pollution", Ridker, R.G. and J.A. Henning, Review of Economics and Statistics, 1967, 49:2, 246-57.

Ringger, T.G. 2000. Investigations of impingement of aquatic organisms at the Calvert Cliffs Nuclear Power Plant, 1975-1995. Environmental Science & Policy 3 (2000) S261±S273.

Rohde, F.C., R.G. Arndt, D.G. Lindquist, and J.F. Parnell 1994. Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware. The University of North Carolina Press. Chapel Hill & London. 222 pp.

Roundtree, Clark and Mountford 2007. John Smith's Chesapeake Voyages 1607-1609. Charlottesville: University of Virginia Press.

Schreiner, S.P., W.A. Richkus, and R.I. McLean 2004. Overview of CWA Section 316(a) evaluations of power plants with thermal discharges in Maryland. Chapter 5 In: Proceedings from the EPRI Workshop on 316(a) Issues: Technical and Regulatory Considerations: October 16-17, 2003, EPRI, Palo Alto, CA, and American Electric Power Company, Columbus, OH: 2004. 1008476

SHA 2007. Letter to Ms. Bobbi Hutchinson, Calvert County Government, Department of Planning and Zoning from Steven D. Foster, Chief

Engineering Access and Permits Division, State Highway Administration, Maryland Department of Transportation. July 30, 2007.

Simons et al 2001. "The Effects of an Oil Pipeline Rupture on Single-Family House Prices", Simons, R. A., K. Winson-Geideman and B. A. Miklebank, The Appraisal Journal, 2001, October, 410-18.

SMHA 2003. The Southern Maryland Heritage Area. Heritage Tourism Management Plan. Prepared by Redman/Johnson Associates. April 2003.

Soeder, D.J., J.P. Raffensperger and M.R. Nardi 2007. Effects of Withdrawls on Ground-Water Levels in Southern Maryland and the Adjacent Eastern Shore,
1980-2005. Scientific Investigation Report 2007-5249. Prepared by the U.S. Geological Survey in cooperation with the Maryland Geological Survey and the Maryland Power Plant Research Program.

Specter and Manson 1999. Review of Current Property Valuation Literature. Spector, K. and C. Manson, Industrial Economics, Inc. Memorandum to Jean Schumann, US EPA OSWER, August 22, 1999.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater
storage: American Geophysical Union Transcript no. 16, p. 519-524.

Thomas 2008. Personal communication from Michael A. Thomas, Solid Waste Division Chief, Calvert County Division of Solid Waste.

Tiebout 1956. "A Pure Theory of Local Public Expenditures", C.M. Tiebout, Journal of Political Economy, 1956, 64: 416-24.

UniStar 2007. Technical Report in Support of Application of Unistar Nuclear Energy, LLC and Unistar Nuclear Operating Services, LLC for Certificate of Public Convenience and Necessity Before the Maryland Public Service Commission for Authorization to Construct Unit 3 at Calvert Cliffs Nuclear Power Plant and Associated Transmission Lines. Dated as of November, 2007. PublicVersion.

United States Atomic Energy Commission (USAEC) 1973. Final Environmental Statement Related to Operation of Calvert Cliffs Nuclear Power Plant Units 1 and 2. Baltimore Gas and Electric Company. Dockets Nos. 50-317 and 50-318.

USFWS 2008. U.S. Fish and Wildlife Service. Information gathered from USFWS web site regarding the current status of American eel in North America. Web site address: http://www.fws.gov/northeast/ameel/

USDA 2007. Calvert County 2006 Agricultural Profile. USDA, NASS, Maryland Field Office. http://www.nass.usda.gov/Statistics_by_State/Maryland/

USDA 2008. U.S. Department of Agriculture Natural Resource Conservation Service Soil Data Mart. http://soildatamart.nrcs.usda.gov/Survey.aspx?County=MD009. Accessed April 2008.

USEPA 1990. United States Environmental Protection Agency (USEPA), Office of Air Quality Planning and Standards. New Source Review Workshop Manual. Draft. October 1990.

USEPA 1996. USEPA, OAQPS Control Cost Manual (Fifth Edition), EPA 453/B-96-001, February 1996.

USEPA 1998. SLAMS/NAMS/PAMS Network Review Guidance. USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, EPA-454/R-98-003, March 1998.

USEPA 2007. United States Environmental Protection Agency (USEPA), Office of Transportation and Air Quality. Diesel Retrofit Technology - An Analysis of the Cost-Effectiveness of Reducing Particulate Matter and Nitrogen Oxides Emissions from Heavy-Duty Nonroad Diesel Engines Through Retrofits, May 2007.

Versar, Inc. 2007. Chesapeake Bay Water Quality Monitoring Program: Long-term Benthic Monitoring and Assessment Component Level 1 Comprehensive Report, July 1984 – December 2006 (Volume 1). Prepared for Maryland Department of Natural Resources, Resource Assessment Service, Tidewater Ecosystem Assessments, Annapolis, Maryland.

Williams 2006. Chesapeake: Exploring the Water Trail of Captain John Smith. By John Page Williams. National Geographic Society.

Wilson 2004. State of Tobacco Barns in Southern Maryland. Teresa Wilson, Historic Preservation Planner, St. Mary's County. November 15, 2004.

WSJ 2008. "Utilities fret as reactor-part suppliers shrink." The Wall Street Journal. April 11, 2008.

Initial Recommended Licensing Conditions
PSC Case No. 9127
UniStar Nuclear Energy, LLC

General

1. Except as otherwise provided for in the following provisions, the application for the Certificate of Public Convenience and Necessity (CPCN) is considered to be part of this CPCN for the UniStar Nuclear Energy, LLC (UniStar) Calvert Cliffs Unit 3 Project (Calvert Cliffs Unit 3). The application consists of the original application received by the Maryland Public Service Commission (PSC) in November 2007 and subsequent amendments in March and July 2008. Construction of the facility shall be undertaken in accordance with the CPCN application and subsequent amendments. If there are any inconsistencies between the conditions specified below and the application, the conditions in this CPCN shall take precedence. If CPCN conditions incorporate federal or state laws through paraphrased language, where there is any inconsistency between the paraphrased language and the actual state or federal laws being paraphrased, the applicable federal or state laws shall take precedence.

2. If any provision of this CPCN shall be held invalid for any reason, the remaining provisions shall remain in full force and effect and such invalid provision shall be considered severed and deleted from this CPCN.

3. Representatives of the Maryland PSC shall be afforded access to the Calvert Cliffs Unit 3 Project location at any reasonable time to conduct inspections and evaluations necessary to assure compliance with the CPCN. UniStar shall provide such assistance as may be necessary to conduct such inspections and evaluations by representatives of the PSC effectively and safely.

4. Representatives of the Maryland Department of the Environment (MDE) and the Calvert County Health Department shall be afforded access to the Calvert Cliffs Unit 3 Project location at any reasonable time to conduct inspections and evaluations necessary to assure compliance with the CPCN requirements. UniStar shall provide such assistance as reasonably may be necessary to conduct such inspections and evaluations effectively and safely, which may include but need not be limited to the following:

    a. Inspecting construction authorized under this CPCN;

    b. Sampling any materials stored or processed on site, or any waste or discharge into the environment;

    c. Inspecting any monitoring or recording equipment required by this CPCN or applicable regulations;

    d. Having access to or copying any records required to be kept by UniStar pursuant to this CPCN or applicable regulations;

    e. Obtaining any photographic documentation and evidence; and

f. Determining compliance with the conditions and regulations specified in the CPCN.

5. In the event that UniStar commences site preparation/preconstruction activities and subsequently either (a) the U.S. Nuclear Regulatory Commission (NRC) does not issue an operating license, or (b) UniStar decides not to proceed with construction and operation of Calvert Cliffs Unit 3, UniStar shall be responsible for returning the site to a long-term environmentally stable condition. If either (a) or (b) occurs, UniStar shall inform the PSC within sixty (60) days and at the same time will describe specific measures that will be taken to stabilize the site. Such measures will depend upon the status of site preparation or preconstruction that has already occurred; however, at a minimum, UniStar must consider appropriate actions to address the following areas:

- Stormwater management measures and erosion/sediment control as required by Conditions 41 and 55;
- Wetlands mitigation and buffering as required by Conditions 45 and 47, and as specified in the joint federal/State wetlands permit;
- Revegetation and reforestation as required by Conditions 48 and 49, and as specified in the approved Forest Conservation Plan;
- Protection for species and habitats as required by Conditions 46, 50, 51, 52, and 53, and as specified by the Chesapeake Bay Critical Area Commission and the joint federal/State wetlands permit; and
- Mitigation for cultural resource impacts as required by Condition 58, and as specified in the Memorandum of Agreement (MOA) with Maryland Historical Trust (MHT).

UniStar shall obtain PSC and Maryland Power Plant Research Program (PPRP) approval of its site stabilization plan and shall complete implementation of the approved plan on the schedule outlined in the plan.

Water Supply

I. Surface Water Supply for Operations

6. This CPCN authorizes UniStar to appropriate and use surface waters of the State. Appropriation means a withdrawal, movement, or diversion of water from its source of natural occurrence. The appropriation shall be tracked under MDE Water Management Administration (WMA) permit number CAXXXXXXX. The surface water appropriation shall be subject to the following conditions:

   a. Allocation—The surface water withdrawal granted by this appropriation is limited to a daily average of 54,400,000 gallons on a yearly basis and a maximum daily withdrawal of 62,600,000 gallons;

   b. Use—The water shall be used for cooling water and operational uses for the new unit designated Calvert Cliffs Nuclear Power Plant Unit 3, and for operational uses at the Calvert Cliffs Units 1 and 2 in accordance with Condition 38;

c. Source—The water shall be withdrawn from the Chesapeake Bay; and

d. Location—The point of withdrawal shall be a new intake on the Chesapeake Bay adjacent to the south side of the Units 1 and 2 intake structure.

7. Initiation of Withdrawal—UniStar shall notify MDE WMA by certified mail when withdrawals for the uses specified in this appropriation have been initiated. This appropriation shall expire if water withdrawal is not commenced within two years after the effective date of issuance of the CPCN. The time limit may be extended for good cause, at the discretion of MDE WMA, upon written request to MDE WMA prior to the expiration of the two-year period. Withdrawal associated with operating the desalination plant for generation of fresh water for construction qualifies as initiation.

8. Change of Operations—UniStar shall report any anticipated change in appropriation, which may result in a new or different withdrawal, quantity, source, or place of use of water, to MDE WMA by submission of a new application.

9. Permit Review—UniStar shall be queried every three years (triennial review) regarding water withdrawal under the terms and conditions of this appropriation. Failure to return the triennial review query will result in suspension or revocation of this appropriation.

10. Appropriation Renewal—This appropriation will expire 12 years from the date that the CPCN was issued. In order to renew the appropriation, UniStar shall file a renewal application with MDE WMA no later than 45 days prior to the expiration.

11. Right of Entry—UniStar shall allow authorized representatives of MDE WMA and the PSC staff access to the facility to conduct inspections and evaluations necessary to assure compliance with the conditions of this appropriation. UniStar shall provide such assistance as may be necessary to conduct such inspections and evaluations effectively and safely.

12. Appropriation Suspension or Revocation—MDE WMA may suspend or revoke this appropriation upon violation of the conditions of this appropriation, or upon violation of any regulation promulgated pursuant to Title 5 of the Environment Article, Annotated Code of Maryland (1996 replacement volume) as amended.

13. Non-Transferable—This appropriation is only transferable to a new owner if the new owner acquires prior authorization to continue this appropriation by filing a new application with MDE WMA. Authorization will be accomplished by issuance of a new appropriation permit by MDE WMA.

14. Additional Permit Conditions—MDE WMA may at any time (including at triennial review or when a change application is submitted) revise any condition of this appropriation or add additional conditions concerning the character, amount, means and manner of the appropriation or use, which may be necessary to properly protect, control and manage the water resources of the State. Condition revisions and

additions will be accompanied by issuance of a revised appropriation.

15. UniStar shall conduct the following monitoring activities in support of the appropriation:

    a. Flow Measurement—Measure all water withdrawn under this appropriation using a flow meter;

    b. Withdrawal Reports—Submit water withdrawal records to MDE WMA semi-annually (for July-December, no later than January 31 and for January-June, no later than July 31). These records shall show the total quantity of water withdrawn each month under this appropriation, and the total quantity of water consumed.

II. Ground Water Supply for Construction

16. This CPCN authorizes UniStar to appropriate and use ground waters of the State from the Aquia aquifer. The appropriation will be tracked under MDE WMA permit number CAXXXXXXX. The ground water appropriation will be subject to the following conditions:

    a. Allocation—The ground water withdrawal granted by this appropriation is limited to a daily average of 60,000 gallons on a yearly basis and a daily average of 140,000 gallons for the month of maximum use;

    b. Use—The water is to be used to support the construction of Calvert Cliffs Nuclear Power Plant Unit 3. Uses for the water will be for sanitary and potable use by the construction workforce, dust suppression, hydrostatic testing of pipes and tanks, concrete mixing and curing, and wash waters;

    c. Source—The water shall be withdrawn from up to two production wells completed in the Aquia Aquifer. UniStar shall identify to MDE WMA the final number of wells to be installed prior to use;

    d. Location—The point of withdrawal shall be located at the site of the Calvert Cliffs Nuclear Power Plant Unit 3. UniStar shall identify to MDE WMA the final locations of the wells prior to use.

17. Initiation of Withdrawal—UniStar shall notify MDE WMA by certified mail when withdrawals for the uses specified in this appropriation have been initiated. This appropriation shall expire if water withdrawal is not commenced within two years after the effective date of issuance of the CPCN. The time limit may be extended for good cause, at the discretion of MDE WMA, upon written request to MDE WMA prior to the expiration of the two-year period.

18. Change of Operations—UniStar shall report any anticipated change in appropriation, which may result in a new or different use, quantity, source, or place of use of water, to MDE WMA by submission of a new application.

19. Permit Review—UniStar shall be queried every three years (triennial review)

regarding water withdrawal under the terms and conditions of this appropriation. Failure to return the triennial review query will result in suspension or revocation of this appropriation.

20. Appropriation Duration and Renewal—The appropriation will expire in five (5) years from the effective date of the issuance of the CPCN. In the event that the construction schedule for Unit 3 is extended, and ground water will continue to be needed to support construction, a one-year renewal of the appropriation shall be granted only if UniStar provides written documentation to MDE WMA within six months of the expiration date demonstrating that the construction schedule will be extended and ground water will continue to be needed.

21. Additional Permit Conditions—MDE WMA may at any time (including triennial review or when a change application is submitted) revise any condition of this appropriation or add additional conditions concerning the character, amount, means and manner of the appropriation or use, which may be necessary to properly protect, control and manage the water resources of the State. Condition revisions and additions will be accompanied by issuance of a revised appropriation.

22. Right of Entry—UniStar shall allow authorized representatives of MDE WMA and the PSC staff access to the Unit 3 facility to conduct inspections and evaluations necessary to assure compliance with the conditions of this appropriation. UniStar shall provide such assistance as may be necessary to effectively and safely conduct such inspections and evaluations.

23. Appropriation Suspension or Revocation—MDE WMA may suspend or revoke this appropriation upon violation of the conditions of this appropriation, or upon violation of any regulation promulgated pursuant to Title 5 of the Environmental Article, Annotated Code of Maryland (1996 replacement volume) as amended.

24. Drought Period Emergency Restrictions—If MDE WMA determines that a drought period or emergency exists, UniStar may be required under MDE WMA's direction to stop or reduce ground water withdrawal. Any cessation or reduction of water withdrawal must continue for the duration of the drought period or emergency, or until MDE WMA directs UniStar that water withdrawal under standard appropriation conditions may be resumed.

25. Non-Transferable—This appropriation is non-transferable to a new owner. A new owner may acquire authorization to continue this appropriation by filing a new application with MDE WMA. Authorization will be accomplished by issuance of a new appropriation.

26. UniStar shall conduct the following monitoring activities in support of the ground water appropriation:

    a. Flow Measurement—Measure all ground water withdrawn using a flow meter.

    b. Water Level Measurements—Pumping equipment shall be installed in the production well so that water levels can be measured during withdrawal and non-withdrawal periods without dismantling any equipment. Any opening for tape measurements of water levels shall have a minimum inside diameter of 0.5 inch and be sealed by a removable cap or plug. UniStar shall provide a tap for taking raw ground water samples before water enters a treatment facility, pressure tank, or storage tank.

c. Withdrawal Reports—Submit withdrawal records to MDE WMA semi-annually (for July-December, no later than January 31; for January-June, no later than July 31). These records shall show the total quantity of ground water withdrawn each month under this appropriation.

27. UniStar shall request a letter from Calvert Cliffs Nuclear Power Plant, Inc. consenting to provide no more than 40,000 gpd of water to support the construction of Unit 3. A copy of the letter shall be provided to MDE WMA and PSC within three (3) months of the issuance of the CPCN. The requested letter shall contain the following information:

    a. A statement that the water to be obtained from Calvert Cliffs Nuclear Power Plant, Inc. will be from State Water Appropriation and Use Permit No. CA1969G010, and that all water withdrawn by either user will be reported under permit CA1969G010; and

    b. Evidence that Calvert Cliffs Nuclear Power Plant, Inc. has submitted a request to MDE WMA for a conforming modification to State Water Appropriation and Use Permit No. CA1969G010 to allow the transfer of water to support the construction of UniStar's Unit 3.

28. UniStar shall prepare a plan describing how UniStar will coordinate with Calvert Cliffs Nuclear Power Plant, Inc. to withdraw ground water under State Water Appropriation and Use Permit No. CA1969G010 to ensure that the CCNPP annual average appropriation limit is not exceeded. The plan shall be provided to MDE WMA and the PSC for review and approval within three (3) months of the issuance of the CPCN.

III. Construction Dewatering

29. This CPCN authorizes UniStar to appropriate and use ground waters of the State from the Surficial Aquifer. The appropriation will be tracked under MDE WMA permit number CAXXXXXXX. The ground water appropriation will be subject to the following conditions:

    a. Allocation—The ground water withdrawal granted by this appropriation is limited to a daily average of 75,000 gallons on a yearly basis and a daily average of 100,000 gallons for the month of maximum use;

    b. Use—The water is to be used for construction dewatering to facilitate excavation for foundations, and water generated from the construction dewatering will be used to the extent practicable for dust control;

c. Source—The water shall be withdrawn from the excavations completed in the Surficial Aquifer; and

d. Location—The points of withdrawal shall be located at the site of the Calvert Cliffs Nuclear Power Plant Unit 3.

30. Change of Operations—UniStar shall report any anticipated change in appropriation, which may result in a new or different use, quantity, source, or place of use of water, to MDE WMA by submission of a new application.

31. Appropriation Duration and Renewal—The appropriation will expire in three (3) years from the effective date of the issuance of the CPCN. In order to renew the permit for a period of one year, UniStar shall file a renewal application with MDE WMA no later than 45 days prior to expiration.

32. Additional Permit Conditions—MDE WMA may at any time (including review or when a change application is submitted) revise any condition of this appropriation or add additional conditions concerning the character, amount, means and manner of the appropriation or use, which may be necessary to properly protect, control and manage the water resources of the State. Condition revisions and additions will be accompanied by issuance of a revised appropriation.

33. Right of Entry—UniStar shall allow authorized representatives of MDE WMA and the PSC staff access to the facility to conduct inspections and evaluations necessary to assure compliance with the conditions of this appropriation. UniStar shall provide such assistance as may be necessary to effectively and safely conduct such inspections and evaluations.

34. Appropriation Suspension or Revocation—MDE WMA may suspend or revoke this appropriation upon violation of the conditions of this appropriation, or upon violation of any regulation promulgated pursuant to Title 5 of the Environmental Article, Annotated Code of Maryland (1996 replacement volume) as amended.

35. Non-Transferable—This appropriation is non-transferable to a new owner. A new owner may acquire authorization to continue this appropriation by filing a new application with MDE WMA. Authorization will be accomplished by issuance of a new appropriation.

36. UniStar shall conduct the following monitoring activities in support of the ground water appropriation:

a. Flow Measurement—Measure all ground water withdrawn under this appropriation by a method approved by MDE WMA.

b. Withdrawal Reports—Submit withdrawal records to MDE WMA semi-annually (for July-December, no later than January 31; for January-June, no later than July 31). These records shall show the total quantity of ground water withdrawn each month under this appropriation.

IV. Other Water Supply Conditions

37. UniStar shall ensure that the desalination treatment system installed at Unit 3 has sufficient capacity to replace all ground water use from the Aquia aquifer by Calvert Cliffs Nuclear Power Plant, Inc. at Units 1 and 2.

38. UniStar shall provide a letter of commitment to Calvert Cliffs Nuclear Power Plant, Inc., with copies provided to MDE WMA and PPRP, indicating their intent to provide water treated in the desalination plant to replace all ground water from the Aquia aquifer used by Calvert Cliffs Nuclear Power Plant, Inc. The letter of commitment shall be provided within six (6) months of the issuance of the CPCN. UniStar shall provide written updates to MDE WMA beginning one year after issuance of the CPCN and annually thereafter describing the status of completing the transfer of water treated in the desalination plant to Calvert Cliffs Nuclear Power Plant, Inc. Units 1 and 2 until UniStar initiates the transfer of water.

39. UniStar shall not haul fresh ground water to Calvert Cliffs Unit 3 until the following conditions are met: 1) the hauler, water source, an estimate of the amount of water to be hauled, and the period of time that the water will be hauled have been identified to MDE WMA; and 2) MDE WMA provides UniStar with approval that the water is from a system or source that has adequate permitted capacity to meet UniStar's estimated need.

Water Discharge

40. The CPCN is not an authorization to discharge wastewater to waters of the State. UniStar shall obtain a new discharge permit from MDE under the National Pollutant Discharge Elimination System (NPDES) for the Calvert Cliffs Unit 3 facility. This permit shall incorporate the USEPA Phase I regulations implementing Section 316(b) of the Federal Clean Water Act for Cooling Water Intake Structures.

41. UniStar shall prepare and submit a Stormwater Pollution Prevention Plan, for approval by MDE Water Management Administration, incorporating best management practices to prevent runoff of contaminated stormwater from the proposed facility. UniStar shall obtain authorization under MDE's Storm Water Permit for construction activity.

42. If treated effluent is used for dust control, UniStar needs to submit an application for a Ground Water Discharge Permit to the MDE WMA Wastewater Permits Program in accordance with the requirements set forth in COMAR 26.08, and obtain MDE WMA approval for the use of treated effluent for dust control. Treated effluent sources to be used for dust control shall be identified to MDE WMA in writing within six (6) months of issuance of the CPCN.

43. If dewatering occurs from an excavation and the water requires discharge to a surface water body, UniStar shall file a Notice of Intent form to MDE WMA for a General Permit for Construction Activities in accordance with COMAR 26.08 to discharge dewatering water in excess of 10,000 gallons per day to a surface water body that is not used for dust control.

Terrestrial and Aquatic Ecology

44. Construction and operation of the Calvert Cliffs Unit 3 power facility and all its appurtenant features shall be undertaken in accordance with this CPCN and shall comply with all applicable local, State, and Federal regulations, including but not limited to the following:

    a. Nontidal Wetlands—COMAR 26.23 applies to activities conducted in nontidal wetlands.

    b. Waterway Construction—COMAR 26.17.04 applies to activities in State waterways.

    c. Water Quality and Water Pollution Control—COMAR 26.08.01 through COMAR 26.08.04 apply to discharges to surface water and maintenance of surface water quality.

    d. Erosion and Sediment Control—COMAR 26.17.01 applies to the preparation, submittal, review, approval, and enforcement of erosion and sediment control plans.

45. UniStar shall obtain applicable State and federal dredge-and-fill and waterway construction permits for the Chesapeake Bay intake and discharge facilities and for the barge facility modifications. UniStar shall not commence construction on any aspect of the project under the jurisdiction of Section 404 of the Clean Water Act covered by the *Joint Federal/State Application for the Alteration of Any Floodplain Waterway, Tidal or Nontidal Wetland in Maryland*, until such application has been approved by the U.S. Army Corps of Engineers and MDE.

46. UniStar shall not commence construction on any aspect of the project under the jurisdiction of the Chesapeake Bay Critical Area Commission (CAC) until it has received approval of the proposed Unit 3 project from the CAC. All site preparation, preconstruction, and construction activities at the site shall be implemented in accordance with the CAC-approved plans.

47. Portions of the Calvert Cliffs Unit 3 construction footprint adjacent to existing forested nontidal wetlands shall comply with Best Management Practices for Nontidal Wetlands of Special State Concern and Expanded Buffers, COMAR 26.23.06.03, which provides for stringent best management practices in the vicinity of very sensitive nontidal wetlands sites. These practices and techniques will include use of adequately sized temporary sediment traps, as needed, as well as super silt fencing and other specialized techniques specifically needed for limiting the quantity of sediment entering existing forested wetlands and streams during the power facility construction process.

48. All portions of the power plant and rights-of-way disturbed during construction shall be stabilized immediately after the cessation of construction activities within that portion of the footprint and right-of-way, followed by seed application, except in actively cultivated lands, in accordance with the best management practices presented in the MDE document 1994 Maryland Standards and Specifications for Soil Erosion

and Sediment Control, and as approved by Calvert County. In wetlands and wetland buffers, seed application shall consist of the following species: annual ryegrass (*Lolium multiflorum*), millet (*Setaria italica*), barley (*Horedum* spp.), oats (*Uniola* spp.), and/or rye (*Secale cereale*). Other non-persistent vegetation may be acceptable, but must be approved by the MDE Water Management Administration. Kentucky 31 fescue shall never be used in wetlands or buffers.

49. UniStar shall construct the facilities for Calvert Cliffs Unit 3 in accordance with a Forest Conservation Plan (FCP) that has been approved by the Maryland Department of Natural Resources Forest Service. The FCP shall define forested areas to be cleared during project construction, as well as forested areas that will remain under permanent protection as mitigation. The FCP must describe site management techniques used during construction (e.g., protective measures, equipment used, stress reduction measures, etc.), or make reference to a sediment control plan prepared for the project that also incorporates protective measures for trees. In addition, so as to minimize forest losses, cleared areas that are no longer in use following project construction (e.g., laydown areas) shall be replanted with tree species appropriate for the area. Tree planting and maintenance should be conducted in accordance with the State Forest Conservation Technical Manual 3rd edition, 1997, and COMAR 08.19.04.05B(4)(a). Areas not replanted with trees shall be vegetated with grasses. Grasses will be planted along streams and other open areas where acceptable. If the areas along streams are wetlands or wetland buffers, only grasses listed in Condition 48, or others approved by MDE WMA, shall be used. If areas along streams are uplands, the following grass species may be used: blue joint grass (*Calamagrostis canadensis*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), or Indian grass (*Sorghastrum nutans*). Other non-persistent vegetation may be acceptable, but must be approved by DNR or MDE WMA. Kentucky 31 fescue shall never be used.

50. For the protection of bald eagles (*Haliaeetus leucocephalus*) at the project site, UniStar shall follow the State's standard guidelines for nest site protection (see DNR Heritage Letter dated 23 June 2008). If these guidelines cannot be followed, an incidental take permit will be required for disturbance to or removal of any bald eagle nests. If take of the Camp Conoy nesting territory cannot be avoided, consideration should also be given to protecting the Rocky Point area of the property for nesting eagles. It should be understood that acquiring a State permit for take of a bald eagle does not carry any authority for take under the federal Bald and Golden Eagle Protection Act as administered by the USFWS.

51. For the protection of showy goldenrod (*Solidago speciosa*), UniStar shall take steps to avoid habitat alteration during the proposed construction activities. Mitigation for impacts to this population through transplanting individuals is discouraged. Transplanting of threatened or endangered plants is not considered a substitute for the protection of existing populations and may result in limited or no conservation value. However, since threatened and endangered plants are the property of the landowner, transplanting such species is not illegal provided the plants are not transported off the property. If such an action is pursued, adherence to DNR's guidelines for the reintroduction of rare plants is recommended. Prior to construction, the site should be accessible to DNR Heritage botanists to confirm the identity of the showy goldenrod.

52. For the protection of the two species of State endangered, federally threatened tiger beetles (northeastern beach tiger beetle and Puritan tiger beetle) that are known to occur along the Chesapeake Bay shoreline and proximal to the project site, no construction activities shall occur within 500 feet of any cliff or beach habitats that are suitable for either species. Administrative controls that restrict personnel access to beaches shall be implemented. UniStar shall allow DNR to access the shoreline as requested to conduct surveys to examine the health of tiger beetle populations.

53. To compensate for impacts to American eel (*Anguilla rostrata*) caused by loss and degradation of stream habitat due to construction of the Unit 3 facilities, prior to disturbing any eel habitat onsite, UniStar shall prepare and submit a mitigation plan to DNR Fisheries Division for approval.

54. To minimize impacts to American oyster (*Crassostrea virginica*) in the Flag Pond Oyster Bar area, UniStar shall either (a) not conduct dredging associated with this project in the Chesapeake Bay during the periods of December 16 to March 14 and June 1 to September 30 in any year and prepare and submit a mitigation plan, prior to conducting any dredging, for approval by DNR Fisheries Division; or (b) prepare and submit an application for a waiver or reclassification of the oyster bar within 500 yards of the area of disturbance, prior to conducting any dredging, for approval by DNR Fisheries Division.

Stormwater Management/Erosion and Sediment Control

55. At a minimum, sediment control during construction of all aspects of this project shall include the following Best Management Practices: construction of earth dikes and retaining walls in appropriate locations, sediment traps, use of super silt fences, stabilizing disturbed areas as quickly as possible, and converting silt traps to permanent features as soon as practicable.

Noise

56. UniStar shall monitor noise levels at the boundaries of the facility, after the plant is operational, to demonstrate that Calvert Cliffs Unit 3 will operate in compliance with the noise limits specified in COMAR 26.02.03. The scope of work for the noise monitoring shall be provided to PPRP for review within one year after the issuance of the CPCN. The noise study shall include monitoring at facility site boundaries in closest proximity to residentially zoned land. Measurements will be taken while the plant is operating at full load, to represent maximum noise emissions. Results shall be provided to PPRP within six months after Unit 3 begins commercial operation. If the results of the noise monitoring indicate that Unit 3 operation is creating an exceedance of the Maryland noise standards, UniStar shall take corrective action in consultation with the PSC and PPRP.

Socioeconomics

57. Prior to construction, UniStar shall submit to the Maryland Historical Trust (MHT) a copy of training programs, or guidelines provided to applicant inspectors or contractors, to identify and/or protect unforeseen archeological sites that may be revealed during construction of the project. If such relics are identified in the project

area, UniStar, in consultation with and as approved by MHT, shall develop and implement a plan for avoidance and protection, data recovery, or destruction without recovery of the properties adversely affected by the project.

58. Prior to construction, UniStar shall execute an MOA with MHT to mitigate the adverse effects of site preparation and construction upon on-site cultural resources that are eligible for the National Register of Historic Places. No site preparation activities (such as clearing or grading) or construction activities having the potential to affect historic properties will take place within the limits of National Register-eligible archeological or structural resources, and no removal or demolition of eligible structures will take place until an MOA has been executed.

59. Prior to construction, UniStar shall revise its Phase II Traffic Study to address Maryland State Highway Administration (SHA) comments contained in its letter dated 26 June 2008 from Steven D. Foster, Chief, Engineering Access Permits Division to Susan Gray, PPRP. The revised study must determine the extent of traffic impacts caused by the anticipated workforce and the roadway improvements necessary to mitigate those impacts. UniStar shall submit eight copies to SHA for review, comments, and acceptance of the report to SHA satisfaction.

60. UniStar shall execute an MOA with SHA for the planning, engineering, and construction of roadway improvements necessary to mitigate the power plant generated traffic impacts. The required roadway improvements shall be permitted by SHA and under construction when the construction workforce reaches 500 workers. All improvements must be substantially in place and completed before 1,000 construction workers are on site.

61. Prior to construction, UniStar shall consult with the Emergency Management Division of the Calvert County Department of Public Safety to address the adequacy of technical resources in the County for the additional burden associated with emergency planning for the construction and operation of Calvert Cliffs Unit 3. UniStar shall assist the Emergency Management Division through contributions, training, and general support.

62. Prior to construction, UniStar shall contact the Fire-Rescue-EMS Division of the Calvert County Department of Public Works to establish a relationship with fire departments and emergency response agencies under this Division to address site safety/EMS coverage during construction, and to establish timely response options and facilitate emergency vehicle access throughout the site in case of an accident or injury. Where existing emergency response capabilities are determined to be inadequate, UniStar shall assist these organizations through contributions, training, and general support.

63. UniStar shall develop a lighting distribution plan that will mitigate intrusive night lighting and avoid undue glare onto adjoining properties. The plan shall conform with Article 6-6 of the Calvert County Zoning Ordinance. UniStar shall coordinate development of the plan with PPRP and the Calvert County Department of Planning and Zoning. UniStar shall submit the plan to PPRP and the PSC for review and approval prior to operation of the facility.

Air Quality

I. General Air Quality Requirements

64. MDE Air and Radiation Management Administration (MDE-ARMA) shall have concurrent jurisdiction with the PSC to enforce the air quality conditions of this CPCN.

65. The CPCN serves as the Prevention of Significant Deterioration (PSD) approval and air quality construction permit for the CCNPP Unit 3 Project.

66. For air permitting purposes, the facility shall be comprised of the following equipment:

    a. One circulating water system (CWS) cooling tower;

    b. Four essential service water system (ESWS) cooling towers;

    c. Four 10,130-kilowatt (kWe) emergency diesel generators (EDGs);

    d. Two 5,000-kWe station black out generators (SBOs); and

    e. Six fuel oil storage tanks.

67. Definition: "Commence" as applied to the construction of the Project means that the owner or operator either has begun, or caused to begin, a continuous program of actual on-site construction of the source, to be completed within a reasonable time.

68. In accordance with COMAR 26.11.02.04B, the air quality provisions expire if, as determined by MDE-ARMA:

    a. Construction is not commenced within 18 months after the date of issuance of a final CPCN;

    b. Construction is substantially discontinued for a period of 18 months or more after it has commenced; or

    c. Construction is not completed within a reasonable period of time after the issuance of a final CPCN.

69. At least 60 days prior to the anticipated date of start-up of the facility, UniStar shall submit to MDE-ARMA an application for a temporary permit to operate.

70. All requirements pertaining to air quality that apply to UniStar shall apply to all subsequent owners and/or operators of the facility. In the event of any change in control or ownership, UniStar shall notify the succeeding owner/operator of the existence of the requirements of this CPCN pertaining to air quality by letter and shall send a copy of that letter to the PSC and MDE-ARMA.

II. Applicable Air Quality Regulations

Facility-wide Requirements

71. The Calvert Cliffs Unit 3 Project is subject to all applicable federally enforceable State air quality requirements including, but not limited to, the following regulations:

    a. COMAR 26.11.01.04A-C Testing and Monitoring—Requires UniStar to follow test methods described in §C of this regulation to determine compliance. MDE-ARMA may require UniStar to install, use, and maintain monitoring equipment or employ other methods as specified by MDE-ARMA to determine the quantity or quality, or both, of emissions discharged into the atmosphere and to maintain records and make reports on these emissions to MDE-ARMA in a manner and on a schedule approved by MDE-ARMA or the control officer.

    b. COMAR 26.11.01.07C Malfunctions and Other Temporary Increase of Emissions—Requires UniStar to report the onset and the termination of the occurrence of excess emissions, expected to last or actually lasting for one hour or more to MDE-ARMA by telephone;

    c. COMAR 26.11.06.12—Prohibits UniStar from constructing, modifying, or operating, or causing to be constructed, modified, or operated, a New Source Performance Standard source as defined in COMAR 26.11.01.01C, which results or will result in violation of the provisions of 40 CFR Part 60; and

    d. COMAR 26.11.06.14 – Prohibits UniStar from construction, modifying or operating a PSD source which will result in violation of 40 CFR 52.21.

72. The Calvert Cliffs Unit 3 Project is subject to all applicable State-only enforceable air quality requirements including, but not limited to, the following regulations:

    a. COMAR 26.11.02.13A(50) – UniStar shall not operate or cause to operate Calvert Cliffs Unit 3 without first obtaining, and having in current effect, a State Permit to Operate. A complete application for an initial State permit to operate shall be submitted to MDE ARMA not later than 60 days before the source is to commence operation;

    b. COMAR 26.11.02.19A Fee Schedule—Requires UniStar to pay annual Title V operating permit fees;

    c. COMAR 26.11.02.19D Emission Certification—Requires UniStar to certify, as provided at Regulation .02F of this chapter, the actual emissions of regulated air pollutants from all installations at the plant or facility. Certification shall be on a form obtained from MDE-ARMA and shall be submitted to MDE-ARMA not later than April 1 of the year following the year for which certification is required. An emission certification submitted pursuant to this section and which contains all information required by COMAR 26.11.01.05-1, for NO_x and VOC, satisfies the requirements of COMAR 26.11.01.05-1;

d. COMAR 26.11.03.17— Requires UniStar to update the Calvert Cliffs Part 70 Operating Permit to include applicable Calvert Cliffs Unit 3 project requirements;

e. COMAR 26.11.06.08—Prohibits UniStar from operating or maintaining any source in such a manner that a nuisance is created; and

f. COMAR 26.11.06.09—Prohibits UniStar from causing or permitting the discharge into the atmosphere of gases, vapors, or odors beyond the property line in such a manner that a nuisance or air pollution is created.

Emergency Diesel Generators (EDGs) and Station Blackout Generators (SBOs)

73. The EDGs and SBOs for the Unit 3 Project are each subject to all applicable federally enforceable State air quality requirements including, but not limited to, the following regulations:

a. COMAR 26.11.09.05A(1) — Prohibits UniStar from discharging emissions greater than 20 percent opacity from fuel burning equipment associated with Unit 3, other than water in an uncombined form. This limitation does not apply to emissions during load changing, soot blowing, startup, or adjustments or occasional cleaning of control equipment if:

i. The visible emissions are not greater than 40 percent opacity; and

ii. The visible emissions do not occur for more than 6 consecutive minutes in any 60-minute period.

b. COMAR 26.11.09.07A(1)(c) —Prohibits UniStar from burning, selling or making available for sale any fuel with a sulfur content by weight in excess of or which otherwise exceeds 0.3 percent for distillate fuel oils;

c. COMAR 26.11.09.05B(2)-(4) Visible Emissions Stationary Internal Combustion Engine Powered Equipment—Prohibits UniStar from causing or permitting the discharge of emissions from any engine:

i. Operating at idle at an opacity greater than 10 percent; or

ii. At conditions other than idle at an opacity greater than 40 percent.

d. COMAR 26.11.09.08E(1-5)—Requires UniStar to do the following for each piece of fuel burning equipment with a rated heat input capacity of 100 MMBTU per hour or less:

i. Submit to MDE-ARMA (for each installation) an identification, information on the rated heat input capacity of the unit, and the type of fuel burned;

ii. Perform a combustion analysis at least once each year;

iii. Maintain the results of the combustion analysis for at least 2 years;

iv. Once every 3 years, require an operator to attend operator training programs on combustion optimization; and

v. Prepare and maintain a record of training program attendance.

74. The EDGs and SBOs are each subject to New Source Performance Standards (NSPS) 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines and the associated fuel, monitoring, compliance, testing, notification, reporting, and recordkeeping requirements (40 CFR §60.4200 *et seq.*), and related applicable provisions of 40 CFR §60.7 and §60.8.

a. The EDGs shall each meet the following standards:

i. Reduce PM emissions by 60 percent or more, or limit emissions of PM to 0.15 grams per kilowatt-hour (g/kW-hr) (0.11 grams per horsepower-hr); and

ii. Reduce NO_x emissions by 90 percent or more, or limit emissions of NO_x to 1.6 g/kW-hr (1.2 grams per horsepower-hour).

b) Emissions from each SBO shall not exceed the following:

i. 0.5 g/kW-hr of PM;

ii. 11.0 g/kW-hr of total hydrocarbons plus nitrogen oxides (THC+NO_x); and

iii. 5.0 g/kW-hr of CO.

Cooling Towers

75. The cooling towers associated with the Calvert Cliffs Unit 3 Project are subject to all applicable federally enforceable State air quality requirements including, but not limited to, COMAR 26.11.06.02(C)1—Prohibits UniStar from discharging emissions from any installation or building, other than water in an uncombined form, which is greater than 20 percent opacity.

<u>III. Best Available Control Technology (BACT)</u>

76. Particulate matter (PM, PM10, and PM2.5) emissions from the emergency diesel generators (EDGs) associated with Unit 3 shall not exceed 0.15 g/kW-hr on a 3-hour average basis. These limits will be achieved by exclusively burning low sulfur diesel fuel with a maximum sulfur content of 0.05 percent by weight, and limiting hours of operation to no more than 600 hours per year total for all EDGs combined, except that the EDGs shall be allowed to operate unrestricted during non-normal conditions associated with a Loss of Offsite Power (LOOP) event in order to provide power to the Calvert Cliffs power plant for safe operations and shutdown.

77. The station blackout generators (SBOs) associated with Unit 3 shall be designed so that particulate matter (PM, PM10, PM2.5) emissions shall not exceed 0.5 g/kW-hr. These limits will be achieved by exclusively burning ultra-low sulfur diesel fuel with a maximum sulfur content of 0.0015 percent by weight, and limiting hours of operation to no more than 200 hours per year total for all SBOs combined, except that the SBOs

shall be allowed to operate unrestricted during non-normal conditions associated with a Loss of Offiste Power (LOOP) event in order to provide power to Calvert Cliffs Unit 3 for safe operation and shutdown.

78. Emissions from the CWS cooling tower shall not exceed 26.0 tons per month of PM, 19.7 tons per month of PM10, and 3.3 tons per month of PM2.5. These emissions shall be achieved through the use of high efficiency drift eliminators designed to achieve a drift loss rate not to exceed 0.0005 percent of recirculating water flow.

79. Each of the ESWS cooling towers shall be designed so that emissions from all four units combined shall not exceed 3 tons of PM, PM10 and PM2.5 in any consecutive 12-month rolling period. These emissions shall be achieved through the use of high efficiency drift eliminators designed to achieve a drift loss not to exceed 0.005 percent of recirculating water flow.

IV. Testing

80. Within 60 days of the initial start-up date, UniStar shall provide MDE-ARMA with a Performance Test Plan. The Plan shall describe the proposed methods for conducting initial performance tests to demonstrate compliance with the NSPS Subpart IIII standard, as applicable.

81. Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup, UniStar shall conduct performance tests outlined in UniStar's Performance Test Plan.

82. In accordance with COMAR 26.11.01.04A, UniStar may be required by MDE-ARMA to conduct additional stack tests to determine compliance with COMAR Title 26, Subtitle 11. This testing will be done at a reasonable time.

V. Monitoring, Recordkeeping, and Reporting

83. UniStar shall submit a monitoring plan to MDE-ARMA at least 90 days prior to anticipated startup of any of emergency engines or cooling towers describing the monitoring, emission factors, or other methods that will be used to determine compliance with the BACT limits in Conditions 76 through 79. MDE-ARMA shall approve the plan prior to startup of any of these emissions units.

84. In accordance with 40 CFR §60.4209, UniStar shall install non-resettable hour meters prior to the start up the EDGs and the SBOs.

85. UniStar shall submit to MDE-ARMA and U.S. EPA written reports of the results of all performance tests conducted to demonstrate compliance with the standards set forth in applicable NSPS within 60 days of completion of the tests.

86. UniStar shall prepare and submit reports to MDE-ARMA that summarize emissions and other parameters necessary to calculate particulate matter emissions determined according to Condition 83.

87. UniStar shall furnish written notification to MDE-ARMA and U.S. EPA of the

following events related to the EDGs and SBOs:

a. Date construction commenced within 30 days after such date;

b. Anticipated startup date, not more than 60 or less than 30 days prior to such date;

c. Actual startup date within 15 days after such date; and

d. Anticipated date of compliance stack testing at least 30 days prior to such date.

88. UniStar shall furnish written notification to MDE-ARMA of the following events related to the cooling towers:

a. Date construction commenced within 30 days after such date;

b. Anticipated startup date, not more than 60 or less than 30 days prior to such date;

c. Actual startup date within 15 days after such date.

89. UniStar shall submit a certified facility-wide emissions statement to MDE-ARMA.

a. Certification shall be on a form obtained from MDE-ARMA and shall be submitted to MDE-ARMA no later than April 1 of the year following the year for which certification is required.

b. The individual making the certification shall certify that the information is accurate to the individual's best knowledge. The certifying individual shall be:

i. Familiar with each source for which the certification form is submitted; and

ii. Responsible for the accuracy of the emission information.

90. All records and logs required by this CPCN shall be maintained at the facility for at least 5 years after the completion of the calendar year in which they were collected. These data shall be readily available for inspection by representatives of MDE-ARMA.

91. All air quality notifications and reports required by this CPCN shall be submitted to:

Administrator, Compliance Program
Air and Radiation Management Administration
1800 Washington Boulevard
Baltimore, Maryland 21230

92. All notifications and reports required by 40 CFR 60 Subpart IIII provisions, unless specified otherwise, shall be submitted to:

Regional Administrator, U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

VI. General and Miscellaneous Provisions

93. Except as otherwise provided herein, UniStar shall not transfer ownership or control of the facility so as to divest UniStar of its ability to control the construction or operation of the facility without the written consent of the PSC. In the event of any such proposed transfer, UniStar shall notify the proposed successor of the existence of the requirements of this CPCN by letter and shall send a copy of that letter to the Secretary of the PSC, the Director, Air and Radiation Management Division of the Maryland Department of the Environment, and the Director of the Power Plant Research Program of the Maryland Department of Natural Resources. Any such successor shall be subject to the CPCN and all applicable requirements and obligations therein. Prior to the commencement of its operation of the facility, any such successor shall provide any assurances required by the PSC that the facility will be operated in compliance with this CPCN and its conditions. The approval of the PSC shall not be required if (i) UniStar transfers a collateral security interest in the facility, or (ii) UniStar sells its interest in the facility to a person or entity that becomes a passive owner of the facility solely for financing purposes, nor shall such transferee or purchaser be subject to the CPCN and the requirements and obligation therein solely by virtue of acquiring and holding such interests. In the event that an entity holding a collateral security interest in the facility or passive ownership for financing purposes acquires ownership or control of the facility so as to divest UniStar of its ability to control the construction or operation of the facility, such entity shall be subject to this CPCN and its conditions.

94. Informational copies of the reports required regarding change of ownership, air quality requirements, cultural resources, and traffic, as described in Conditions 58, 59, 69, 70, 72a, 80, 83, 85, 87, and 88 shall be sent to the Power Plant Research Program at the following address:

Director
Power Plant Assessment Division
Department of Natural Resources
Tawes State Office Bldg., B-3
580 Taylor Avenue
Annapolis, Maryland 21401

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-3

> Under Nuclear Regulatory Commission rules, is it permissible to have enforceable operating restrictions that limit the annual hours of operation for emergency equipment such as the proposed emergency diesel generator and station blackout generators?

RESPONSE

UniStar does not intend to have enforceable operating restrictions that limit the annual hours of operation for emergency equipment. U.S. Nuclear Regulatory Commission (NRC) requirements and guidance regarding emergency diesel generators (EDGs) are in the plant's Technical Specifications and NRC Regulatory Guide documents. These requirements and guidance cover areas such as the size of the EDGs, elements of the periodic testing of EDGs, and the frequency of these tests. These requirements and guidance are intended to result in the EDGs having both a high level of reliability as well as a high availability. In this way, the EDGs can be counted upon to perform their intended safety function of providing the AC power necessary to safely shut the plant down in the highly unlikely event that offsite AC power to the plant is lost. Such an event is considered an upset condition and has only occurred once in the over 30 years of operation at Calvert Cliffs Nuclear Power Plant Units 1 and 2. In 1986 the affected EDGs performed their safety function for a loss of offsite power and were required to run for a period of 6 to 8 hours.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-14

> In reference to Section 4.4.2.3 (p. 4-13) of the Technical Report, provide the results of the geotechnical and hydrogeologic investigations conducted at the site, including, but not limited to, the data collected from the 40 ground water observation wells to evaluate subsurface flow directions, determine vertical flow gradients, and measure field hydraulic conductivity.

RESPONSE

Data collected from groundwater observation wells installed for the CCNPP site subsurface investigation were used to determine groundwater elevation trends. A total of 40 new observation wells with depths extending to 122 ft (37 m) below ground surface were installed from May to July 2006. Observation wells were installed in three distinct groundwater bearing intervals: the Surficial aquifer (17 wells), a deeper sand unit at the top of the Chesapeake Formation informally referred to as the Upper Chesapeake unit (20 wells), and an even deeper sand unit in the Chesapeake Formation informally called the Lower Chesapeake (3 wells). No wells were installed in the deeper Piney Point - Nanjemoy aquifer.

Three well series designations are assigned to the CCNPP Unit 3 observation wells.

- OW-300 Series wells are located in the proposed CCNPP Unit 3 power block area.
- OW-400 Series wells are located adjacent to the Unit 3 power block, generally to the southeast.
- The OW-700 Series wells include all of the wells located outside of the power block areas. The OW-700 Series wells are located in the proposed cooling tower, switchyard, and support facility areas.

To evaluate vertical hydraulic gradients, several observation wells were installed as well clusters. Well clusters are a series of wells placed at the same location, with each well monitoring a distinct water bearing interval. Four well clusters were installed to evaluate the hydraulic gradient between the Surficial aquifer and the Upper Chesapeake unit, and three well clusters were installed to evaluate the gradient between the Upper Chesapeake and Lower Chesapeake units. Table 1 provides well construction details for the observation wells installed onsite. Table 2 provides the groundwater elevation from these wells over time, listed in numerical order, while Table 3 presents a summary of the observation wells data, segregated by aquifer, and used in the evaluations.

The 40 groundwater observation wells installed in connection with CCNPP Unit 3 site subsurface evaluation were slug tested to determine in-situ hydraulic conductivity values for the Surficial aquifer and Upper and Lower Chesapeake units. Table 4 summarizes the test results.

Soil samples collected from the Surficial aquifer, Upper Chesapeake and Lower Chesapeake units during the geotechnical investigation were submitted for laboratory tests to determine moisture unit weight, moisture content, and specific gravity. Testing results are included in Table 5.

Table 1 CCNPP Unit 3 Observation Wells Construction Details
(Page 1 of 3)

Well ID	Northing[1] (ft)	Easting[1] (ft)	Ground Surface Elevation (ft)	Well Pad Elevation (ft)	Top of Casing[2] Elevation (ft)	Boring Depth (ft)	Well Depth (ft)	Screen Diameter & Slot Size (in)	Screen Interval Depth		Screen Interval Elevation		Filterpack Interval Depth		CCNPP Hydrostratigraphic Unit
									Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	
OW-301	217048.02	960814.47	94.51	94.78	96.27	80.0	77.0	2 / 0.010	65.0	75.0	29.5	19.5	61.0	80.0	Upper Chesapeake Unit
OW-313A	217367.31	960705.30	51.03	51.31	53.20	57.5	52.5	2 / 0.010	40.0	50.0	11.0	1.0	35.0	57.5	Upper Chesapeake Unit
OW-313B	217372.35	960713.67	50.73	51.16	53.54	110.0	107.5	2 / 0.010	95.0	105.0	-44.3	-54.3	91.0	110.0	Lower Chesapeake Unit
OW-319A	216962.56	961116.12	103.13	103.31	104.91	35.0	32.0	2 / 0.010	20.0	30.0	83.1	73.1	15.0	35.0	Surficial Aquifer
OW-319B	216957.32	961125.02	103.53	103.85	105.35	85.0	82.0	2 / 0.010	70.0	80.0	33.5	23.5	65.0	85.0	Upper Chesapeake Unit
OW-323	217034.46	960057.07	106.96	107.55	109.69	43.5	42.0	2 / 0.010	30.0	40.0	77.0	67.0	26.0	43.5	Surficial Aquifer
OW-328	216828.86	960493.21	76.29	76.55	77.85	72.0	72.0	2 / 0.010	60.0	70.0	16.3	6.3	56.5	72.0	Upper Chesapeake Unit
OW-336	216643.18	960746.61	97.11	97.50	99.07	74.0	72.0	2 / 0.010	60.0	70.0	37.1	27.1	53.0	74.0	Upper Chesapeake Unit
OW-401	216348.86	961530.99	71.38	71.91	73.49	77.5	75.3	2 / 0.010	63.0	73.0	8.4	-1.6	57.0	77.5	Upper Chesapeake Unit
OW-413A	216703.14	961418.81	123.15	123.51	125.04	50.0	47.0	2 / 0.010	35.0	45.0	88.2	78.2	30.0	50.0	Surficial Aquifer
OW-413B	216694.88	961413.25	122.90	123.25	124.85	125.0	122.0	2 / 0.010	110.0	120.0	12.9	2.9	105.0	125.0	Upper Chesapeake Unit
OW-418A	216340.41	961966.46	43.66	44.31	45.83	40.0	37.0	2 / 0.010	25.0	35.0	18.7	8.7	21.0	40.0	Upper Chesapeake Unit
OW-418B	216340.25	961976.71	43.67	44.13	45.77	92.0	87.0	2 / 0.010	75.0	85.0	-31.3	-41.3	72.0	92.0	Lower Chesapeake Unit
OW-423	216339.99	960882.24	111.12	111.67	113.16	43.0	40.3	2 / 0.010	28.0	38.0	83.1	73.1	23.0	43.0	Surficial Aquifer
OW-428	216105.21	961212.38	113.92	114.32	115.92	50.0	47.0	2 / 0.010	35.0	45.0	78.9	68.9	30.0	50.0	Surficial Aquifer
OW-436	215922.47	961446.87	108.13	108.53	110.39	50.0	41.0	2 / 0.010	29.0	39.0	79.1	69.1	24.0	50.0	Surficial Aquifer
OW-703A	218171.23	960967.72	44.02	44.44	45.65	49.0	47.0	2 / 0.010	35.0	45.0	9.0	-1.0	32.5	49.0	Upper Chesapeake Unit
OW-703B	218171.67	960958.91	45.57	45.97	47.53	80.0	80.0	2 / 0.010	68.0	78.0	-22.4	-32.4	65.0	80.0	Lower Chesapeake Unit

Table 1 CCNPP Unit 3 Observation Wells Construction Details

Well ID	Northing[1] (ft)	Easting[1] (ft)	Ground Surface Elevation (ft)	Well Pad Elevation (ft)	Top of Casing[2] Elevation (ft)	Boring Depth (ft)	Well Depth (ft)	Screen Diameter & Slot Size (in)	Screen Interval Depth		Screen Interval Elevation		Filterpack Interval Depth		CCNPP Hydrostratigraphic Unit
									Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	
OW-705	217566.62	960917.18	47.71	47.77	50.22	52.0	52.0	2 / 0.010	40.0	50.0	7.7	-2.3	35.0	52.0	Upper Chesapeake Unit
OW-708A	217586.23	961803.52	37.44	37.82	39.61	34.0	34.0	2 / 0.010	22.0	32.0	15.4	5.4	19.0	34.0	Upper Chesapeake Unit
OW-711	216748.48	961741.61	52.92	53.26	55.31	50.0	47.0	2 / 0.010	35.0	45.0	17.9	7.9	30.0	50.0	Upper Chesapeake Unit
OW-714	215705.73	962034.37	116.02	116.32	117.98	50.0	50.0	2 / 0.010	38.0	48.0	78.0	68.0	36.0	50.0	Surficial Aquifer
OW-718	214133.58	961924.87	118.53	118.96	120.41	43.0	42.0	2 / 0.010	30.0	40.0	88.5	78.5	28.0	43.0	Surficial Aquifer
OW-725	214649.30	963212.73	58.04	58.38	59.94	60.0	60.0	2 / 0.010	48.0	58.0	10.0	0.0	46.0	60.0	Upper Chesapeake Unit
OW-729	214872.58	962445.93	118.88	119.44	121.11	42.0	42.0	2 / 0.010	30.0	40.0	88.9	78.9	28.0	42.0	Surficial Aquifer
OW-735	214805.48	961021.83	91.20	91.81	93.44	72.0	72.0	2 / 0.010	60.0	70.0	31.2	21.2	58.0	72.0	Upper Chesapeake Unit
OW-743	213320.62	961234.01	103.65	104.05	105.89	55.0	52.0	2 / 0.010	40.0	50.0	63.7	53.7	36.0	55.0	Surficial Aquifer
OW-744	216405.37	960089.41	97.50	97.96	99.81	50.0	50.0	2 / 0.010	38.0	48.0	59.5	49.5	36.0	50.0	Chesapeake Unit
OW-752A	215482.18	960250.12	95.30	95.73	97.00	37.0	37.0	2 / 0.010	25.0	35.0	70.3	60.3	19.0	37.0	Surficial Aquifer
OW-752B	215489.21	960257.57	95.79	96.09	97.41	97.0	97.0	2 / 0.010	85.0	95.0	10.8	0.8	83.0	97.0	Upper Chesapeake Unit
OW-754	217369.78	960290.37	67.00	67.21	68.85	44.0	44.0	2 / 0.010	32.0	42.0	35.0	25.0	30.0	44.0	Upper Chesapeake Unit
OW-756	215497.07	961212.39	106.56	107.07	108.77	42.0	42.0	2 / 0.010	30.0	40.0	76.6	66.6	28.0	42.0	Surficial Aquifer
OW-759A	214536.47	960055.02	97.78	98.05	99.69	35.0	32.0	2 / 0.010	20.0	30.0	77.8	67.8	17.0	35.0	Surficial Aquifer
OW-759B	214526.25	960056.32	98.35	98.72	100.14	90.0	87.0	2 / 0.010	75.0	85.0	23.4	13.4	70.0	90.0	Upper Chesapeake Unit
OW-765A	216424.51	959701.22	97.37	97.92	99.60	29.0	29.0	2 / 0.010	17.0	27.0	80.4	70.4	15.0	29.0	Surficial Aquifer
OW-765B	216420.42	959693.64	96.82	97.19	98.47	102.0	94.0	2 / 0.010	82.0	92.0	14.8	4.8	80.0	102.0	Upper Chesapeake Unit
OW-766	216932.89	959791.50	108.89	109.32	110.72	50.0	32.0	2 / 0.010	20.0	30.0	88.9	78.9	15.0	37.0	Surficial Aquifer
OW-768A	217106.06	962238.98	48.48	48.96	49.84	42.0	42.0	2 / 0.010	30.0	40.0	18.5	8.5	28.0	42.0	Upper Chesapeake Unit

Table 1 CCNPP Unit 3 Observation Wells Construction Details

Well ID	Northing[1] (ft)	Easting[1] (ft)	Ground Surface Elevation (ft)	Well Pad Elevation (ft)	Top of Casing[2] Elevation (ft)	Boring Depth (ft)	Well Depth (ft)	Screen Diameter & Slot Size (in)	Screen Interval Depth		Screen Interval Elevation		Filterpack Interval Depth		CCNPP Hydrostratigraphic Unit
									Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	Top (ft)	Bottom (ft)	
OW-769	216589.75	962559.47	54.23	54.39	56.43	42.0	42.0	2 / 0.010	31.8	41.8	22.4	12.4	18.0	42.0	Upper Chesapeake Unit
OW-770	215466.60	962826.95	121.59	121.79	123.08	42.0	42.0	2 / 0.010	30.0	40.0	91.6	81.6	28.0	42.0	Surficial Aquifer

Notes:

(1) Maryland State Plane (NAD 1927). The Maryland State Plane 1927 coordinate system is based on North American Datum of 1927 (NAD27). NAD27 is a surface (or plane) to which horizontal positions in the U.S., Canada and Mexico is surveyed and referenced.

(2) Elevation is top of PVC Well Casing. Reference Point for Groundwater Level Monitoring

Table 2 CCNPP Unit 3 Observation Well Water Level Elevations
(Page 1 of 3)

Well ID	Ground Surface Elevation	Water Level Monitoring Reference Point Elevation	Depth to Water									Water Level Elevation								
			July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
OW-301	94.51	96.27	58.85	59.45	59.37	58.34	58.00	58.04	57.33	57.00	56.78	37.42	36.82	36.90	37.93	38.27	38.23	38.94	39.27	39.49
OW-313A	51.03	53.20	19.80	20.40	20.08	19.57	18.80	18.90	17.93	18.25	17.12	33.40	32.80	33.12	33.63	34.40	34.30	35.27	34.95	36.08
OW-313B	50.73	53.54	23.05	23.65	23.47	23.17	22.76	22.52	21.89	21.80	21.44	30.49	29.89	30.07	30.37	30.78	31.02	31.65	31.74	32.10
OW-319A	103.13	104.91	26.48	26.58	26.25	26.08	26.28	26.22	26.25	26.44	26.25	78.43	78.33	78.66	78.83	78.63	78.69	78.66	78.47	78.66
OW-319B	103.53	105.35	67.49	67.97	67.95	67.53	66.57	66.49	65.74	65.52	65.27	37.86	37.38	37.40	37.82	38.78	38.86	39.61	39.83	40.08
OW-323	106.96	109.69	27.80	28.22	28.37	28.13	27.96	27.26	26.88	26.45	26.52	81.89	81.47	81.32	81.56	81.73	82.43	82.81	83.24	83.17
OW-328	76.29	77.85	40.77	41.40	41.35	40.68	40.33	40.13	39.63	39.42	39.32	37.08	36.45	36.50	37.17	37.52	37.72	38.22	38.43	38.53
OW-336	97.11	99.07	60.99	61.36	61.52	60.45	60.42	60.19	59.65	59.20	59.25	38.08	37.71	37.55	38.62	38.65	38.88	39.42	39.87	39.82
OW-401	71.38	73.49	34.13	34.95	34.73	33.72	32.95	33.37	32.33	32.45	31.76	39.36	38.54	38.76	39.77	40.54	40.12	41.16	41.04	41.73
OW-413A	123.15	125.04	45.87	45.85	45.87	45.87	45.87	45.86	45.83	45.77	45.76	79.17	79.19	79.17	79.17	79.17	79.18	79.21	79.27	79.28
OW-413B	122.90	124.85	86.60	87.30	87.13	86.46	85.14	85.56	84.40	84.75	83.57	38.25	37.55	37.72	38.39	39.71	39.29	40.45	40.10	41.28
OW-418A	43.66	45.83	8.22	9.44	8.60	7.97	6.45	7.60	6.40	6.91	5.68	37.61	36.39	37.23	37.86	39.38	38.23	39.43	38.92	40.15
OW-418B	43.67	45.77	12.52	13.36	12.90	12.47	11.67	12.85	11.03	11.27	10.74	33.25	32.41	32.87	33.30	34.10	32.92	34.74	34.50	35.03
OW-423	111.12	113.16	29.77	30.04	30.03	29.93	29.78	29.54	29.02	28.76	28.38	83.39	83.12	83.13	83.23	83.38	83.62	84.14	84.40	84.78
OW-428	113.92	115.92	37.82	37.92	37.98	38.07	38.01	37.89	37.69	37.25	37.17	78.10	78.00	77.94	77.85	77.91	78.03	78.23	78.67	78.75
OW-436	108.13	110.39	31.68	32.06	31.85	31.55	31.08	31.40	30.60	31.05	30.28	78.71	78.33	78.54	78.84	79.31	78.99	79.79	79.34	80.11

Table 2 CCNPP Unit 3 Observation Well Water Level Elevations

Well ID	Ground Surface Elevation	Water Level Monitoring Reference Point Elevation	Depth to Water									Water Level Elevation								
			July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
OW-703A	44.02	45.65	27.33	27.84	28.05	27.93	27.60	27.12	25.16	25.60	22.15	18.32	17.81	17.60	17.72	18.05	18.53	20.49	20.05	23.50
OW-703B	45.57	47.53	29.34	29.85	29.95	29.73	29.40	29.10	27.45	27.72	24.74	18.19	17.68	17.58	17.80	18.13	18.43	20.08	19.81	22.79
OW-705	47.71	50.22	20.28	21.10	20.67	20.10	19.02	19.40	17.82	18.60	16.57	29.94	29.12	29.55	30.12	31.20	30.82	32.40	31.62	33.65
OW-708A	37.44	39.61	13.39	15.01	13.85	12.78	10.46	12.58	8.96	12.20	6.71	26.22	24.60	25.76	26.83	29.15	27.03	30.65	27.41	32.90
OW-711	52.92	55.31	19.26	20.64	19.50	18.43	16.14	18.33	15.94	17.70	14.33	36.05	34.67	35.81	36.88	39.17	36.98	39.37	37.61	40.98
OW-714	116.02	117.98	45.93	46.28	46.33	46.36	46.19	45.87	45.60	45.42	45.21	72.05	71.70	71.65	71.62	71.79	72.11	72.38	72.56	72.77
OW-718	118.53	120.41	40.47	40.56	40.80	41.07	41.29	41.37	41.18	40.40	40.22	79.94	79.85	79.61	79.34	79.12	79.04	79.23	80.01	80.19
OW-725	58.04	59.94	32.80	33.87	33.92	33.56	32.54	32.30	30.77	30.77	29.77	27.14	26.07	26.02	26.38	27.40	27.64	29.17	29.17	30.17
OW-729	118.88	121.11	44.08	41.99	41.96	41.96	41.92	41.99	41.98	41.98	41.98	77.03	79.12	79.15	79.15	79.19	79.12	79.13	79.13	79.13
OW-735	91.20	93.44	54.18	55.17	55.14	54.57	53.31	53.24	52.36	52.13	52.16	39.26	38.27	38.30	38.87	40.13	40.20	41.08	41.31	41.28
OW-743	103.65	105.89	37.22	37.77	37.52	37.35	37.22	36.99	36.61	36.03	35.80	68.67	68.12	68.37	68.54	68.67	68.90	69.28	69.86	70.09
OW-744	97.50	99.81	32.97	33.52	33.15	32.96	32.47	32.52	32.06	31.97	31.73	66.84	66.29	66.66	66.85	67.34	67.29	67.75	67.84	68.08
OW-752A	95.30	97.00	24.76	25.18	25.35	25.36	25.23	24.08	23.34	22.77	22.68	72.24	71.82	71.65	71.64	71.77	72.92	73.66	74.23	74.32
OW-752B	95.79	97.41	59.55	60.25	60.05	59.75	59.38	59.16	58.77	58.60	58.58	37.86	37.16	37.36	37.66	38.03	38.25	38.64	38.81	38.83
OW-754	67.00	68.85	31.32	32.05	31.80	31.05	30.73	30.93	30.24	30.12	29.67	37.53	36.80	37.05	37.80	38.12	37.92	38.61	38.73	39.18
OW-756	106.56	108.77	29.98	30.17	30.42	30.55	30.59	30.46	30.04	29.42	29.18	78.79	78.60	78.35	78.22	78.18	78.31	78.73	79.35	79.59
OW-759A	97.78	99.69	26.88	27.53	28.00	28.12	28.32	27.41	26.77	25.50	24.41	72.81	72.16	71.69	71.57	71.37	72.28	72.92	74.19	75.28
OW-759B	98.35	100.14	63.09	63.80	63.56	63.31	63.11	62.87	62.54	62.32	62.30	37.05	36.34	36.58	36.83	37.03	37.27	37.60	37.82	37.84
OW-765A	97.37	99.60	21.72	22.02	21.87	21.70	21.20	20.10	18.95	19.25	18.38	77.88	77.58	77.73	77.90	78.40	79.50	80.65	80.35	81.22

Table 2 CCNPP Unit 3 Observation Well Water Level Elevations

Well ID	Ground Surface Elevation	Water Level Monitoring Reference Point Elevation	Depth to Water									Water Level Elevation								
			July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
OW-765B	96.82	98.47	60.22	60.72	60.55	60.40	59.92	59.77	59.73	59.45	59.37	38.25	37.75	37.92	38.07	38.55	38.70	38.74	39.02	39.10
OW-766	108.89	110.72	28.88	29.36	29.42	29.20	29.20	28.76	28.11	27.60	27.30	81.84	81.36	81.30	81.52	81.52	81.96	82.61	83.12	83.42
OW-768A	48.48	49.84	24.05	24.88	24.04	23.67	23.12	23.65	23.10	23.26	22.53	25.79	24.96	25.80	26.17	26.72	26.19	26.74	26.58	27.31
OW-769	54.23	56.43	26.50	27.96	27.37	26.74	24.13	25.74	23.48	24.43	20.55	29.93	28.47	29.06	29.69	32.30	30.69	32.95	32.00	35.88
OW-770	121.59	123.08	dry	42.10	42.09	42.08	42.09	42.11	42.10	42.10	42.10	dry	80.98	80.99	81.00	80.99	80.97	80.98	80.98	80.98

Notes:

Highlighted wells: Questionable water level readings due to proximity of depth of water to bottom of well screen and/or minimal water level fluctuations with time

Reading from water level round was 41.90. Review suggested questionable reading. Retaken 5 days later and reading was 30.04 ft

Table 3 CCNPP Unit 3 Observation Wells used in the Hydrogeologic Evaluation (Page 1 of 2)

Well ID	Aquifer Unit	Ground Surface Elevation	Water Level Monitoring Reference Point Elevation	Depth to Water											Water Level Elevation						
				July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Surficial Aquifer (SA)																					
OW-319A	SA	103.13	104.91	26.48	26.58	26.25	26.08	26.28	26.22	26.25	26.44	26.25	78.43	78.33	78.66	78.83	78.63	78.69	78.66	78.47	78.66
OW-323	SA	106.96	109.69	27.80	28.22	28.37	28.13	27.96	27.26	26.88	26.45	26.52	81.89	81.47	81.32	81.56	81.73	82.43	82.81	83.24	83.17
OW-423	SA	111.12	113.16	29.77	30.04	30.03	29.93	29.78	29.54	29.02	28.76	28.38	83.39	83.12	83.13	83.23	83.38	83.62	84.14	84.40	84.78
OW-428	SA	113.92	115.92	37.82	37.92	37.98	38.07	38.01	37.89	37.69	37.25	37.17	78.10	78.00	77.94	77.85	77.91	78.03	78.23	78.67	78.75
OW-436	SA	108.13	110.39	31.68	32.06	31.85	31.55	31.08	31.40	30.60	31.05	30.28	78.71	78.33	78.54	78.84	79.31	78.99	79.79	79.34	80.11
OW-714	SA	116.02	117.98	45.93	46.28	46.33	46.36	46.19	45.87	45.60	45.42	45.21	72.05	71.70	71.65	71.62	71.79	72.11	72.38	72.56	72.77
OW-718	SA	118.53	120.41	40.47	40.56	40.80	41.07	41.29	41.37	41.18	40.40	40.22	79.94	79.85	79.61	79.34	79.12	79.04	79.23	80.01	80.19
OW-743	SA	103.65	105.89	37.22	37.77	37.52	37.35	37.22	36.99	36.61	36.03	35.80	68.67	68.12	68.37	68.54	68.67	68.90	69.28	69.86	70.09
OW-752A	SA	95.30	97.00	24.76	25.18	25.35	25.36	25.23	24.08	23.34	22.77	22.68	72.24	71.82	71.65	71.64	71.77	72.92	73.66	74.23	74.32
OW-756	SA	106.56	108.77	29.98	30.17	30.42	30.55	30.59	30.46	30.04	29.42	29.18	78.79	78.60	78.35	78.22	78.18	78.31	78.73	79.35	79.59
OW-759A	SA	97.78	99.69	26.88	27.53	28.00	28.12	28.32	27.41	26.77	25.50	24.41	72.81	72.16	71.69	71.57	71.37	72.28	72.92	74.19	75.28
OW-765A	SA	97.37	99.60	21.72	22.02	21.87	21.70	21.20	20.10	18.95	19.25	18.38	77.88	77.58	77.73	77.90	78.40	79.50	80.65	80.35	81.22
OW-766	SA	108.89	110.72	28.88	29.36	29.42	29.20	29.20	28.76	28.11	27.60	27.30	81.84	81.36	81.30	81.52	81.52	81.96	82.61	83.12	83.42
Upper Chesapeake Unit (CU)																					
OW-301	CU	94.51	96.27	58.85	59.45	59.37	58.34	58.00	58.04	57.33	57.00	56.78	37.42	36.82	36.90	37.93	38.27	38.23	38.94	39.27	39.49
OW-313A	CU	51.03	53.20	19.80	20.40	20.08	19.57	18.80	18.90	17.93	18.25	17.12	33.40	32.80	33.12	33.63	34.40	34.30	35.27	34.95	36.08
OW-319B	CU	103.53	105.35	67.49	67.97	67.95	67.53	66.57	66.49	65.74	65.52	65.27	37.86	37.38	37.40	37.82	38.78	38.86	39.61	39.83	40.08
OW-328	CU	76.29	77.85	40.77	41.40	41.35	40.68	40.33	40.13	39.63	39.42	39.32	37.08	36.45	36.50	37.17	37.52	37.72	38.22	38.43	38.53
OW-336	CU	97.11	99.07	60.99	61.36	61.52	60.45	60.42	60.19	59.65	59.20	59.25	38.08	37.71	37.55	38.62	38.65	38.88	39.42	39.87	39.82

Table 3 CCNPP Unit 3 Observation Wells used in the Hydrogeologic Evaluation

Well ID	Aquifer Unit	Ground Surface Elevation	Water Level Monitoring Reference Point Elevation	Depth to Water									Water Level Elevation								
				July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007	February 2007	March 2007
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
Surficial Aquifer (SA)																					
OW-401	CU	71.38	73.49	34.13	34.95	34.73	33.72	32.95	33.37	32.33	32.45	31.76	39.36	38.54	38.76	39.77	40.54	40.12	41.16	41.04	41.73
OW-413B	CU	122.90	124.85	86.60	87.30	87.13	86.46	85.14	85.56	84.40	84.75	83.57	38.25	37.55	37.72	38.39	39.71	39.29	40.45	40.10	41.28
OW-418A	CU	43.66	45.83	8.22	9.44	8.60	7.97	6.45	7.60	6.40	6.91	5.68	37.61	36.39	37.23	37.86	39.38	38.23	39.43	38.92	40.15
OW-703A	CU	44.02	45.65	27.33	27.84	28.05	27.93	27.60	27.12	25.16	25.60	22.15	18.32	17.81	17.60	17.72	18.05	18.53	20.49	20.05	23.50
OW-705	CU	47.71	50.22	20.28	21.10	20.67	20.10	19.02	19.40	17.82	18.60	16.57	29.94	29.12	29.55	30.12	31.20	30.82	32.40	31.62	33.65
OW-708A	CU	37.44	39.61	13.39	15.01	13.85	12.78	10.46	12.58	8.96	12.20	6.71	26.22	24.60	25.76	26.83	29.15	27.03	30.65	27.41	32.90
OW-711	CU	52.92	55.31	19.26	20.64	19.50	18.43	16.14	18.33	15.94	17.70	14.33	36.05	34.67	35.81	36.88	39.17	36.98	39.37	37.61	40.98
OW-725	CU	58.04	59.94	32.80	33.87	33.92	33.56	32.54	32.30	30.77	30.77	29.77	27.14	26.07	26.02	26.38	27.40	27.64	29.17	29.17	30.17
OW-735	CU	91.20	93.44	54.18	55.17	55.14	54.57	53.31	53.24	52.36	52.13	52.16	39.26	38.27	38.30	38.87	40.13	40.20	41.08	41.31	41.28
OW-752B	CU	95.79	97.41	59.55	60.25	60.05	59.75	59.38	59.16	58.77	58.60	58.58	37.86	37.16	37.36	37.66	38.03	38.25	38.64	38.81	38.83
OW-754	CU	67.00	68.85	31.32	32.05	31.80	31.05	30.73	30.93	30.24	30.12	29.67	37.53	36.80	37.05	37.80	38.12	37.92	38.61	38.73	39.18
OW-759B	CU	98.35	100.14	63.09	63.80	63.56	63.31	63.11	62.87	62.54	62.32	62.30	37.05	36.34	36.58	36.83	37.03	37.27	37.60	37.82	37.84
OW-765B	CU	96.82	98.47	60.22	60.72	60.55	60.40	59.92	59.77	59.73	59.45	59.37	38.25	37.75	37.92	38.07	38.55	38.70	38.74	39.02	39.10
OW-768A	CU	48.48	49.84	24.05	24.88	24.04	23.67	23.12	23.65	23.10	23.26	22.53	25.79	24.96	25.80	26.17	26.72	26.19	26.74	26.58	27.31
OW-769	CU	54.23	56.43	26.50	27.96	27.37	26.74	24.13	25.74	23.48	24.43	20.55	29.93	28.47	29.06	29.69	32.30	30.69	32.95	32.00	35.88
Lower Chesapeake Unit (CL)																					
OW-313B	CL	50.73	53.54	23.05	23.65	23.47	23.17	22.76	22.52	21.89	21.80	21.44	30.49	29.89	30.07	30.37	30.78	31.02	31.65	31.74	32.10
OW-418B	CL	43.67	45.77	12.52	13.36	12.90	12.47	11.67	12.85	11.03	11.27	10.74	33.25	32.41	32.87	33.30	34.10	32.92	34.74	34.50	35.03
OW-703B	CL	45.57	47.53	29.34	29.85	29.95	29.73	29.40	29.10	27.45	27.72	24.74	18.19	17.68	17.58	17.80	18.13	18.43	20.08	19.81	22.79

Table 4 CCNPP Unit 3 Observation Wells Hydraulic Conductivities from Slug Tests

Well ID	Surficial Aquifer	Kh	Kh	Kh
		(ft/sec)	(cm/sec)	(ft/day)
OW-319A	SA	2.89E-06	8.81E-05	2.50E-01
OW-323	SA	6.24E-05	1.90E-03	5.39E+00
OW-423	SA	6.86E-05	2.09E-03	5.93E+00
OW-428	SA	1.19E-05	3.63E-04	1.03E+00
OW-436	SA	2.80E-06	8.53E-05	2.42E-01
OW-743	SA	6.23E-07	1.90E-05	5.38E-02
OW-752A	SA	7.03E-05	2.14E-03	6.07E+00
OW-756	SA	2.01E-04	6.13E-03	1.74E+01
OW-759A	SA	4.64E-07	1.41E-05	4.01E-02
OW-765A	SA	1.00E-05	3.05E-04	8.64E-01
	max	**2.01E-04**	**6.13E-03**	**1.74E+01**
	min	**4.64E-07**	**1.41E-05**	**4.01E-02**
	mean	**4.31E-05**	**1.31E-03**	**3.72E+00**
	geo mean	**1.05E-05**	**3.21E-04**	**9.10E-01**

Well ID	Upper Chesapeake Unit	Kh	Kh	Kh
		(ft/sec)	(cm/sec)	(ft/day)
OW-301	CU	1.58E-04	4.82E-03	1.37E+01
OW-313A	CU	7.50E-06	2.29E-04	6.48E-01
OW-319B	CU	3.42E-05	1.04E-03	2.95E+00
OW-328	CU	3.79E-06	1.16E-04	3.27E-01
OW-336	CU	2.10E-05	6.40E-04	1.81E+00
OW-401	CU	6.77E-06	2.06E-04	5.85E-01
OW-413B	CU	2.78E-06	8.47E-05	2.40E-01
OW-418A	CU	4.41E-06	1.34E-04	3.81E-01
OW-703A	CU	1.34E-05	4.08E-04	1.16E+00
OW-705	CU	4.99E-06	1.52E-04	4.31E-01
OW-708A	CU	2.56E-05	7.80E-04	2.21E+00
OW-711	CU	6.04E-06	1.84E-04	5.22E-01
OW-725	CU	7.54E-06	2.30E-04	6.51E-01
OW-735	CU	5.48E-05	1.67E-03	4.73E+00
OW-752B	CU	3.35E-06	1.02E-04	2.89E-01
OW-754	CU	5.29E-06	1.61E-04	4.57E-01
OW-759B	CU	1.77E-06	5.39E-05	1.53E-01
OW-765B	CU	1.36E-06	4.15E-05	1.18E-01
OW-768A	CU	5.29E-06	1.61E-04	4.57E-01
OW-769	CU	1.74E-05	5.30E-04	1.50E+00
	max	**1.58E-04**	**4.82E-03**	**1.37E+01**
	min	**1.36E-06**	**4.15E-05**	**1.18E-01**
	mean	**1.93E-05**	**5.87E-04**	**1.66E+00**
	geo mean	**8.56E-06**	**2.61E-04**	**7.40E-01**

Well ID	Lower Chesapeake Unit	Kh	Kh	Kh
		(ft/sec)	(cm/sec)	(ft/day)
OW-313B	CL	2.74E-07	8.35E-06	2.37E-02
OW-418B	CL	2.16E-07	6.58E-06	1.87E-02
OW-703B	CL	1.08E-06	3.29E-05	9.33E-02
	max	**1.08E-06**	**3.29E-05**	**9.33E-02**
	min	**2.16E-07**	**6.58E-06**	**1.87E-02**
	mean	**5.23E-07**	**1.60E-05**	**4.52E-02**
	geo mean	**4.00E-07**	**1.22E-05**	**3.45E-02**

Note: Slug test results for 7 Surficial Aquifer wells (OW-413A, OW-714, OW-718, OW-729, OW-766, and OW-770) are not included because of invalid test conditions, questionable data, or the well was screened in a discontinuous sand unit.

Table 5 CCNPP Unit 3 Aquifer Unit Geotechnical Parameters
(Page 1 of 1)

Exploratory Boring	Sample Top Elevation ft (m)	Geotechnical Laboratory Test Results			Calculated Values		
		Natural Moisture (%)	Moisture Unit Weight (PCF)	Specific Gravity	Void Ratio	Porosity (%)	Effective Porosity (%)
Surficial Aquifer							
B-320	67.9 (20.7)	29.4%	124	2.63	0.713	41.6%	33.3%
B-722	66.3 (20.2)	26.8%	120	2.76	0.820	45.0%	36.0%
B-732	75.3 (23.0)	23.1%	124	2.75	0.704	41.3%	33.0%
				Mean =	0.745	42.7%	34.1%
Upper Chesapeake							
B-328	12.8 (3.9)	44.2%	121	2.66	0.978	49.4%	39.6%
B-321	-2.8 (-0.85)	28.5%	120.5	2.67	0.777	43.7%	35.0%
B-423	6.6 (2.0)	23.1%	120	2.74	0.754	43.0%	34.4%
B-420	-0.9 (-0.27)	28.3%	117	2.75	0.882	46.9%	37.5%
B-440	5.3 (1.6)	30.0%	116	2.75	0.923	48.0%	38.4%
				Mean =	0.863	46.2%	37.0%
Lower Chesapeake							
B-304	-30.5 (-9.3)	42.1%	113.2	2.65	1.076	51.82%	41.5%
B-401	-26.4 (-8.0)	50.5%	117	2.70	1.167	53.86%	43.1%
B-701	-38.8 (-11.8)	37.3%	116	2.64	0.950	48.71%	39.0%
				Mean =	1.064	51.5%	41.2%

Calculations:

Void Ratio = {Specific Gravity (x) Unit Weight of Water (x) [1+ Natural Moisture]/[Moisture Unit Weight]-1}

Unit Weight Water = 62.4

Porosity = {(Void Ratio)/(1+Void Ratio)}

Effective Porosity = 80% of Total Porosity)

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-15

> In reference to Section 5.4 (p. 5-10) of the Technical Report, the Technical Report states "Any additional freshwater needed during construction will be trucked to the site and stored in temporary water storage tanks." On p. 5-12, the Technical Report states that "Water may also be trucked to the site..." [emphasis added]. Explain the inconsistent wording of these two sentences. Is trucking of water the definitive plan to address water demand during construction?

RESPONSE

The inconsistency between the two statements should be clarified to reflect that trucking of water to address water demand during construction will be necessary. Trucked water is one of four potential sources of water for construction, including (1) authorization to use available onsite groundwater allowed under the CCNPP Units 1 and 2 current appropriation limits, (2) water collected during dewatering of onsite excavations, largely for dust control, (3) desalinated Chesapeake Bay water from the to-be-constructed Desalination Plant (expected to be in operation during the 5^{th} and 6^{th} year of construction), and (4) offsite water trucked to the construction site and stored until used. UniStar does not intend to construct any new wells to address water demand during construction.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-16

> In reference to Section 5.4 (p. 5-10) and Section 5.4.1.2 (p. 5-12) of the Technical Report, the Technical Report indicates that additional freshwater needed for construction will be/may be trucked to the site. The application states that an additional source of 50,000 to 100,000 gpd of water may be required to meet construction water demand. With respect to this proposed approach:
>
> a. How many trucks per day will be required to deliver the water?
> b. Please identify the provider(s) of the water and evidence that the provider(s) has/have the appropriate approvals from the Maryland Department of the Environment Water Management Administration (MDE WMA) for a 14 to 28 million gallon average annual withdrawal of water.

RESPONSE

Not all of the additional 50,000 gpd to 100,000 gpd is going to be provided by trucked water (see the response to Question 1-15). However, for the quantity that will be trucked to the site and stored, a typical water truck has the capacity of approximately 5,000 gallons. Therefore, the number of trucks needed per day would be a function of the total amount of water from this source.

The source of the additional freshwater needed for construction has not yet been identified; however, UniStar will only contract with water truck companies that have the appropriate approvals for water withdrawal or who can demonstrate that the water was obtained from an appropriate permitted entity. As previously stated in other question responses, no new wells will be used to provide this additional water.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-18

> In reference to Section 5.4.1.2 (p. 5-12) of the Technical Report, the Technical Report states "The current CCNPP Units 1 and 2 groundwater usage varied markedly but averaged 387,000 gpd from July 2001 through June 2006 as shown in Table 5.4-2." In 2003 and 2004, the average usage was 407,000 and 416,000 gpd, respectively. Explain how Unistar and CCNPP will coordinate the withdrawal to ensure that the CCNPP appropriation limit is not exceeded, especially if CCNPP has a high demand year similar to 2004.

RESPONSE

Water usage during 2003 and 2004 is not reflective of normal usage patterns for CCNPP Unit 1 and 2 because of significant water leakage at the site which has been repaired and no longer occurs. We are currently coordinating with Calvert Cliffs Nuclear Power Plant, Inc. regarding use of current water appropriations in the future. This is an on-going effort and additional information will be provided as plans are finalized.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-20

In reference to Section 5.4.1.2 (p. 5-12) of the Technical Report, the Technical Report estimates that dewatering excavation sites will generate on average 75,000 gpd, up to a maximum of 100,000 gpd. With respect to this statement, please provide the assumptions used to generate this estimated dewatering rate, including but not limited to the following:

a. The locations and depth of excavations requiring dewatering (indicate on a map the locations of auxiliary building foundations referenced on p. 5-22 of the Technical Report);
b. The technical basis for the estimate of the daily dewatering generation rate, including but not limited to calculations or assumptions used to determine the amount of dewatering on a daily, monthly and annual basis;
c. The estimated duration of dewatering of excavations to support construction; and
d. Any analysis conducted to determine whether the amount of dewatering conducted within construction years 2, 3 and 4 would be sufficient to meet the estimated demand of 40,000 gpd for dust control.

RESPONSE

Section 5.4.2.2 summarized the hydrological alterations that could impact groundwater including dewatering. The anticipated volume of water generated from dewatering is identified in Section 5.4.1.2.

a. The current design for CCNPP Unit 3 requires the following major excavations
   i. Power Block Area – 750,000 square feet of surface area to a depth of 45 feet
   ii. CWS Cooling Tower – 250,000 square feet of surface area to a depth of 10 feet
   iii. Retention Pond – 50,000 square feet to a depth of 30 feet.
   iv. Circulating Water Pipe laydown – 25,000 square feet to a depth of 45 feet
   v. The Site Utilization Plot Plan (Figure 5.4-1) shows the facility layout including the location of these facilities.

b. The flow rates were estimated based on:
   i. Annual average flow rate of 44 gallons per minute (gpm) which equates to 63,360 gpd and adjusted up to 75,000 gallons per day (gpd)
   ii. Maximum monthly rate of 64 gpm which equates to 92,160 gpd and adjusted up to 100,000 gpd

c. The construction activity is outlined in Table 5.5-1 of the Technical Report. Excavation is expected to be completed during the project's first year, during which the need to dewater and to implement dust control will begin. Backfilling of excavated sites would follow extensive concrete work during the second year, at which time the need to dewater and dust control would decrease significantly. At this time, we have no estimate of the expected duration of dewatering of excavations.

d. Dewatering will decrease in the third year, but so should the amount of dust control required as earth moving activities decrease.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-21

In reference to Section 5.4.1.2 (p. 5-12) of the Technical Report, the Technical Report states "...to meet potential construction water shortages, possibly during construction years 2, 3 and 4, authorization may be sought for the temporary installation of additional wells." Issuance of the CPCN includes approval to appropriate and use waters of the State. Therefore, UniStar needs to definitively identify whether this approach will be used, and if it is used then the CPCN application, or a supplemental filing, needs to include the following information required by COMAR 26.17.06.04 to request approval to appropriate and use waters of the State:

a. The completed MDE Water Management Administration application forms indicating the average daily use and month of maximum use amounts;
b. Identification of the target aquifer;
c. Results of the empirical data collected from the installation and testing of a test well completed in the target aquifer;
d. Information and analyses of the empirical data to address the requirements set forth in COMAR for appropriation - reasonableness of use, impacts to the aquifer and impacts to other users.

Please provide a schedule for when UniStar expects to make a decision about this additional appropriation request, and when the required information and impact analysis will be provided.

RESPONSE

As indicated in responses to prior questions UniStar does not intend to install any additional wells to provide water required for construction activities.

Response to DNR Data Request No. 1
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC

Question 1-26

> In reference to Section 5.4.2.3 of the Technical Report (p. 5-23), the Technical Report states "The locally lowered surficial aquifer water level would be expected to eventually recover after the dewatering and other subsurface construction activities are complete." With respect to this statement, has UniStar determined whether there will be a need for long-term dewatering after foundations are completed to prevent inflow of ground water into subsurface structures? If so, please provide the results of this analysis. If not, please provide an explanation as to why long-term dewatering will or will not be warranted.

RESPONSE

No long-term dewatering of structures will be required. Impermeable membranes on below-grade surfaces will be used to eliminate any groundwater flow into subsurface structures. No permanent dewatering system was needed for Units 1 and 2.

Response to DNR Data Request No. 4
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
April 15, 2008

Question 4-4

> In reference to Section 5.4.2.4 (p. 5-23) of the Technical Report, clarify the intent to abandon the four wells associated with the Camp Conoy facilities that draw from the Piney Point aquifer. The Technical Report states that the wells "may require abandonment." Are these wells within the footprint of Unit 3? If the wells will not be abandoned, explain the intent to use the wells in the future and how does this relate to the current appropriation permit for the wells?

RESPONSE

The Camp Conoy facilities include four wells authorized under MDE water appropriation permit CA63AG003. Three of the four wells are in the footprint of Unit 3 and will be abandoned (one of these wells is out of service). The fourth well is outside the footprint and will remain in service under an appropriation permit.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-1

Page 2-16 of the Technical Report accompanying UniStar's CPCN application refers to the diesel generators and their related fuel storage tanks. Please provide the number and size of these tanks and provide their location.

RESPONSE

The design for the Calvert 3 project includes four safety-related emergency diesel generators (EDGs) and two standby diesel generators (SBOs). Two EDGs will be located in each of two separate buildings (two EDGs per building), located north and south of the power block. The associated fuel supply tanks will be incorporated into the design of the building. The capacity of the tanks will be sufficient to facilitate seven days of operation for each EDG (~106,000 gal). The final design and exact location of the fuel tanks has not been finalized. Fuel consumption for the engines will be determined when the size of the EDGs is finalized.

The two stand-by diesel generators will be located in a separate building (both generators in one building). The associated fuel tanks will be located outside of the building. The final design and location has not been finalized. In addition, fuel consumption for the stand-by diesel generators will be determined when the size of the engines is finalized.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-4

The "PSD Report for the Proposed Unit 3 at Calvert Cliffs Nuclear Power Plant" seems to only address BACT for the circulating water system and not the ESWS cooling towers. Please provide a BACT determination for ESWS cooling towers.

RESPONSE

The BACT determination analysis is in progress and will be provided as soon as it is available.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-5

The "PSD Report for the Proposed Unit 3 at Calvert Cliffs Nuclear Power Plant" seems to only address BACT for the emergency diesel generators and not the station blackout generators (SBOs). Please provide a BACT determination for SBOs.

RESPONSE

The BACT determination analysis is in progress and will be provided as soon as it is available.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-6

In reference to UniStar's Response to DNR Data Request No. 1-16, UniStar representatives indicated at a May 8, 2008 meeting with the Maryland Department of the Environment Water Management Administration (MDE WMA) that the provider for the fresh water to be trucked to the site has been identified. Please provide an update to the data request to reflect the provider. In particular, provide the following information: the identity of the provider of the water and evidence that the provider has the appropriate approvals from the Maryland Department of the Environment Water Management Administration (MDE WMA) for a 14 to 28 million gallon average annual withdrawal of water. Please indicate the name of the respondent to this question.

RESPONSE

The Co-Applicants have held preliminary discussions with C. L. Pitcher, Inc., but a decision regarding the provider of fresh water to be trucked to the site has not yet been finalized. The Co-Applicants do not have information regarding the appropriate approvals from MDE WMA for the annual water withdrawals for potential water providers.

The respondent to this request is Dimitri Lutchenkov.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-7

In reference to UniStar's Response to DNR Data Request No. 1-19d, UniStar representatives indicated at a May 8, 2008 meeting with the MDE WMA that UniStar intends to provide water to Calvert Cliffs Nuclear Power Plant, Inc. to reduce the ground water used under State Water Appropriations Permit No. CA69G-010(05) for Units 1 and 2. Please confirm this commitment as an update to UniStar's Response to DNR Data Request No. 1-19d that stated "No plans have been made to replace the ground water withdrawal provided under the existing appropriations permit." Please indicate the name of the respondent to this question.

RESPONSE

The response to DNR Data Request No. 1-19 was in reference to the replacement of ground water withdrawal used during construction that had been available to Units 1 and 2 under State Water Appropriations Permit No. CA69G-010(05). The response was not intended to address availability of water subsequent to the completion of the desalination plant. As noted by UniStar representatives at the referenced May 8, 2008 meeting with the MDE WMA, the Co-Applicants are willing to make excess water from the desalination plant available to Calvert Cliffs Nuclear Power Plant, Inc. (i.e., Units 1 and 2). However, the terms and conditions associated with the availability of such water have not yet been finalized.

The respondent to this request is Dimitri Lutchenkov.

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-9

In reference to the a May 8, 2008 meeting between UniStar and the MDE WMA, provide the form for a request to appropriate ground water from the Aquia Aquifer to support the construction of the plant. The form should reflect the following limits:

- Average Daily Use. The annual average water requirement is 70,000 gpd from the Aquia Aquifer; and
- Month of Maximum Use. The maximum daily water use is 120,000 gpd from the Aquia Aquifer for the month of maximum use.

RESPONSE

The requested form is attached.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Water Management Administration - Water Rights Division
1800 Washington Blvd. • Baltimore, Maryland 21230
(410) 537-3591 • 1-800-633-6101 • http://www.mde.state.md

APPLICATION TO APPROPRIATE AND USE WATERS OF THE STATE

☒ New Application ☐ Change in Existing Permit Application Number__________

APPLICATION

UniStar Nuclear Energy, LLC (410) 470-4454
(Owners Name) (Daytime Phone Number)
750 E. Pratt Street Baltimore Maryland 21202
(Mailing Address) (Street) (City) (State) (Zip Code)

WITHDRAWAL of GROUNDWATER

Appropriate and use an annual average of
70,000 Gallons per day, and
(Total Annual Use / 365)
120,000 gallons per day during
(Highest Monthly Use / 30)
month of maximum use, from 1 wells, having a diameter of TBD inches, and a depth of TBD feet
(Estimate) (Estimate)

WITHDRAWAL of SURFACE WATER

Appropriate and use an annual average of
________ gallons per day, and a maximum use
(Total Annual Use / 365)
of ________ gallons in any one day, from
____
(Name of Stream or Waterway)
____
(Exact Location of Intake)

PROJECT LOCATION

1650 Calvert Cliffs Parkway Lusby, Maryland
(STREET ADDRESS – MAP DIRECTIONS – ADC PAGE/GRID – TAX MAP PAGE/GRID/PARCEL)
County Calvert Subdivision or Town Lusby Phone Number (410) 495-4600
Name and Type of Business Nuclear Power Generating Plant

SUBDIVISIONS MUST INCLUDE PLAT - ALL PROJECTS MUST INCLUDE LOCATION MAP

PURPOSE

The water will be used for:

- ☐ Community Water Supply
- ☐ Non-Potable Supply (sanitary non Drinking Water)
- ☐ Potable Supply
- ☐ Cooling Water
- ☐ Irrigation
- ☐ Process Water
- ☒ Other, explain See Technical Report Sec 5.4

WASTEWATER TREATMENT AND DISPOSAL

- ☐ Public Sewer
- ☐ Groundwater
  - ☐ Subsurface (Tilefield, Seepage Pit etc.)
  - ☐ Spray Irrigation
  - ☐ Other, Explain________
- ☐ Surface Water________
  (Name of stream)

DISCHARGE PERMIT # TBD

SIGNATURE________

Thomas Roberts
PRINT (NAME) (TITLE) (DATE)

THIS APPLICATION WILL NOT BE PROCESSED WITHOUT A SIGNATURE AND LOCATION MAP

REVIEW BY COUNTY ENVIRONMENTAL HEALTH OR DESIGNATED AGENCY

THIS SECTION NOT TO BE COMPLETED BY APPLICANT

IS PROJECT CONSISTANT WITH THE COUNTY WATER AND SEWER PLAN AND LOCAL PLANNING AND ZONING?

☐ YES ☐ NO, Explain________

Signature of County Representative________
(Signature) (Title) (Date)

Form Number MDE/WMA/PER.001
Revision Date 11/02/2000
TTY Users 1-800-735-2258

Recycled Paper

Response to DNR Data Request No. 6
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 2, 2008

Question 6-12

In reference to a May 8, 2008 meeting with the MDE WMA, UniStar needs to provide an update when available of any discussions with any providers of treated effluent for use for dust control. Specifically, identify the potential providers and indicate the amount of treated effluent that could be obtained from each provider.

RESPONSE

The Co-Applicants have had only preliminary discussions regarding the utilization of effluent from the Sweetwater facility located in Lusby, Maryland. From that discussion, the Co-Applicants understand that up to 15,000 gpd may be available from the facility. The Co-Applicants will provide an update of any future discussions that occur regarding this matter.

Response to DNR Data Request No. 7
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 6, 2008

Question 7-5

Does UniStar plan to conduct any site preparation and preconstruction activities for Unit 3 that do not require NRC authorization? Please describe.

RESPONSE

Site preparation and preconstruction activities not requiring NRC authorization are anticipated to occur; however, the scope and extent of those activities have not yet been finalized. The Co-Applicants currently plan to clear the relevant land, perform preliminary grading, and possibly begin construction of non-safety related support structures (e.g., including but not limited to a warehouse and a concrete batch plant) that may support construction and possibly operation of the unit. Such activities do not require prior NRC authorization. However, such activities are contingent upon the receipt of other required permits and authorizations from other state and federal agencies.

Response to DNR Data Request No. 7
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 6, 2008

Question 7-6

In reference to discussions between the Maryland Department of the Environment Water Management Administration (MDE WMA) and UniStar representatives during the May 14, 2008 site visit, it was determined that concrete structures related to the construction of Unit 3 will require a continuous pour from start to finish (i.e., once the structure is started concrete is poured 24/7 until the entire structure is complete). MDE WMA understands that construction of these structures from one batch concrete plant operating at a rate of 200 cubic yards per hour would require about 92 gallons per minute (gpm) of water. Please address the following questions related to determining the peak water demand needed to support the production of concrete. In addition, please identify the individual who prepared the responses to these questions.

a. How many batch concrete plants will be located at the site and will they have the potential to operate simultaneously? If so, how much water will be needed hourly to generate concrete?

b. What would be the duration of a continuous pour event in consecutive days, and how many continuous pour events would be expected within a month?

c. Given the potential need for 100 gpm of water for operating one batch concrete plant, what would be the peak daily, weekly and monthly demand for water for concrete manufacturing?

d. Will UniStar use storage tanks to store water on-site and equalize the peak daily demand created during a continuous concrete pour event?

RESPONSE

The current construction plan has identified the installation of two batch plants. The primary function of the second batch plant will be to serve as a contingency backup for major placements and to serve as an alternate concrete production unit during periods of scheduled maintenance. However, the option to utilize both batch plants concurrently during periods where Safety-Related and Non-Safety-Related concrete are scheduled to be placed is being considered. Current scoping studies identify a required minimum production rate of 200 cubic yards (cy)/hour per batch plant. However, depending on the finalized construction schedule, it is estimated that an average sustained rate of concrete placement will be 500-800 cy/day with a maximum peak sustained rate of 1,100-1,600 cy/day. This equates to a requirement for 20,213-32,340 gpd (8.3-13.3 gpm) and 44,468-64,681 gpd (18.3-26.7 gpm) of water, respectively. It is currently estimated that a total of approximately 470,000 cy of concrete will be placed over the duration of the CCNPP3 construction period. It is estimated that a total water volume of 19 million gallons will be required to manufacture those 470,000 cy of concrete. (It is also estimated that an additional 5 million gallons of water will be required for equipment wash down for a total estimated water requirement of 24 million gallons.)

It should be noted that the construction schedule has not been finalized. The maximum anticipated single placement will be for the Circulating Water System Cooling Tower foundation. This concrete placement is estimated to be approximately 47,000 cy, requiring 1.9 million gallons and taking 10 to 15 days to accomplish. Depending on construction sequencing, one other major placement would be the Nuclear Island (NI) basemat, if the common basemat is constructed, constituting approximately 35,000 cy and requiring approximately 1.4 million gallons of water. However, if the final construction schedule concludes that separate basemats will be placed, then the NI maximum would be approximately 10,500 cy, which would be comparable to the other large placements ranging in size from approximately 3,000 cy to 10,000 cy.

Two 150,000 gallon raw water storage tanks are currently being contemplated for the project. Additional capacity may be staged on an as-needed basis for critical pours.

The respondent to this request is Dimitri Lutchenkov.

Response to DNR Data Request No. 8
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 27, 2008

Question 8-1

In reference to Revised Table 5.4-1 provided in response to DNR Data Request No. 6-8, provide the basis for the estimated amount of water needed for dust suppression during year 1. Provide the estimated daily application rate for water. In addition, provide the estimated daily and monthly amounts of water needed during a summer month when rainfall amounts are low and the site is dry. Please indicate the name of the respondent for the data request.

RESPONSE

The quantity of water required for dust suppression identified in Table 5.4-1 is based directly on information provided in licensing application documents, such as the Environmental Report submitted to the U.S. Nuclear Regulatory Commission. These values are estimates based on very early design concepts and engineering, procurement and construction experience for projects of this magnitude and represent the best information available at this time. As the design matures, these values will be further refined.

Dimitri Lutchenkov is the respondent for this data request.

Response to DNR Data Request No. 8
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 27, 2008

Question 8-2

In reference to UniStar's response to DNR Data Request No. 7-6, UniStar indicated that concrete production will require an estimated 24 million gallons of water over the duration of the CCNPP3 construction period. This value is inconsistent with the 11.1 million gallons presented in Revised Table 5.4-1 provided in response to DNR Data Request No. 6-8. The inconsistency appears to be due to an increase in the amount of concrete that will be placed and an increase in the amount of water required per cubic yard of concrete. Please provide an update to Table 5.4-1 indicating these changes. Include footnotes to reflect any changed assumptions regarding the estimate for the amount of concrete produced and the amount of water to produce a cubic yard of concrete. Please indicate the name of the respondent for the data request.

RESPONSE

The quantities of water required for concrete identified in Table 5.4-1 were based on information provided in licensing application documents, such as the Environmental Report submitted to the U.S. Nuclear Regulatory Commission, which were estimates based on early design concepts and engineering, procurement and construction experience for projects of this magnitude. The values provided in response to DNR Data Request No. 7-6 reflect the results of further refinement of the design details (e.g., the use of higher strength concrete, which requires a higher water-to-concrete ratio, and clarification on positioning/sizing of major structures). Further refinement of concrete quantities and placement rate will be made as the design matures and as the construction schedule is finalized. Design/construction parameters to be developed, such as detailed concrete release curves, will further determine the specifics of water usage. As such, at this time the water values provided in response to DNR Data Request No. 7-6 represent the Co-Applicants' best estimate of a conservative upper boundary value based on the current level of maturity of the design and construction plan.

Dimitri Lutchenkov is the respondent for this data request.

Response to DNR Data Request No. 8
Maryland Public Service Commission Case No. 9127
UniStar Nuclear Energy, LLC and UniStar Nuclear Operating Services, LLC
June 27, 2008

Question 8-4

Please confirm that all drinking water provided to workers during construction of the plant will be from bottled water. Please indicate the name of the respondent for the data request.

RESPONSE

Bottled water will be used during early construction when infrastructure is not in place and the number of personnel on site is low. As staffing increases, the logistics of supply and the disposal of large quantities of used bottles will likely require shifting to a more practical source of water. While field offices may continue to utilize bottled water and/or cooler stations, the majority, if not all, of the craft personnel are expected to be supplied drinking water via large water jugs typically found in construction environments. The water for these jugs would be supplied from a central construction site potable water processing facility. Water for this potable water processing facility would be provided via storage tanks which are replenished from on site well(s) and/or off site water.

Dimitri Lutchenkov is the respondent for this data request.

Appendix C

Radiological Emergency Planning

The evaluation of radiological emergency response plans and preparedness in support of nuclear power plants is the responsibility of the NRC and FEMA under the Atomic Energy Act. Under 50 CFR 50.47, no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The NRC bases its finding on a review of the FEMA findings and determinations as to whether State and local emergency plans are adequate, and whether there is reasonable assurance that they can be implemented. A FEMA finding is based primarily on a review of emergency plans. NRC provides guidance to nuclear facility operators, States and local governments, in cooperation with other federal agencies for preparing radiological emergency response plans and evaluating the adequacy of these plans. The primary guidance documents in the development of emergency plans are NUREG-0654/FEMA-REP-1, as supplemented, and NUREG-0396.

UniStar's Emergency Response Plan for Calvert Cliffs Unit 3 establishes the procedures for limiting and mitigating the consequences of potential or actual radiological or non-radiological emergencies that may impact the health and safety of the public or on-site employees (CCNPP, 2008). It describes the functions and operation of the emergency response organization, including assignments of authority and responsibility. It is used to evaluate emergency situations (emergency classification system), identify protective measures and establish notification methods and procedures. The plan provides for document review and control, emergency preparedness assessment, and training of all emergency personnel.

The State's Radiological Emergency Plan is documented in its Radiological Emergency Plan (REP) for Fixed Nuclear Facilities (Annex Q of the Maryland Emergency Operations Plan). Annex Q contains the planning basis, concept of operations and policies associated with REP implementation. It also contains procedures for State, county, private and federal agencies, including each agency's role, and addresses generic ingestion zone actions and evacuation support. The plan covers four classes of accident at a fixed nuclear facility: Unusual Event, Alert, Site Area Emergency, and General Emergency. The geographic focus for the REP is a 10-mile plume Emergency Planning Zone (EPZ) for the Calvert Cliffs Nuclear Power Plant and part of an EPZ for the Peach Bottom Atomic Power Station in southeastern Pennsylvania. The plume EPZ for

Calvert Cliffs includes parts of Calvert, St. Mary's and Dorchester counties. The ingestion zone for Calvert Cliffs extends 50 miles from the site.

In conjunction with the State's REP, each county in the EPZ has developed planned radiological emergency response operations as part of its emergency management plan. Calvert County's Radiological Emergency Plan for Calvert Cliffs Nuclear Power Plant is prepared and maintained by the Emergency Management Division of the Department of Public Safety (Calvert County, 2007). Under the plan, notification of an accident at Calvert Cliffs could result in the President of the Board of County Commissioners declaring an emergency, activating the Calvert County Emergency Operations Center (EOC). The EOC would serve as the focal point for County emergency operations and information. County emergency operations will be under the overall direction of the President of the Board of County Commissioners. Similar plans exist for Dorchester and St. Mary's counties.

Protective actions associated with a radiological emergency are designed to prevent or minimize abnormal radiological exposures. Primary protective actions are ingestion of potassium iodide, shelter, evacuation, access control and consumption restrictions on food, water, milk and livestock feed. The determination of an appropriate protective action for a specific radiological event is dependent on a number of factors including the severity of the event, potential pathways to the population at risk, and time available. Parallel actions, such as emergency medical services, radiation exposure control, law enforcement, mass care, relocation and reentry are put into effect after protective actions have been initiated.

Residents living within the 10-mile EPZ of Calvert Cliffs are eligible to receive a supply of potassium iodide tablets, which can be obtained from the Calvert County Health Department. Schools within the Calvert Cliffs nuclear power plant emergency protective zone have a supply of potassium iodide tablets on hand for staff and students. Nursing homes within the emergency protective zone have a supply of potassium iodide tablets on hand for residents and staff (CCHD, 2008). Note that the American Thyroid Association has recommended making potassium iodide available to all households within 200 miles of a nuclear power plant and pre-distributing potassium iodide pills to all households within 50 miles (ATA, 2002). In addition, the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, enacted by Congress in May 2002, extended the radius of distribution to 20 miles. On January 22, 2008, President Bush, through his science adviser Dr. John H. Marburger, invoked a waiver provision in the Act rescinding the expanded protective zone in favor of exposure avoidance through evacuation and interdiction of contaminated food (OSTP, 2008).

Evacuation time estimates within the plume EPZ of Calvert Cliffs were last updated in 2002 (CCNPP, 2002). Revision 6 reflects changes in population and the road network that have occurred in the EPZ since the last evacuation time estimate analysis performed in 1998. The population basis for the estimates is the 2000 Census. Vehicle demand is based on population and county vehicle statistics from the Maryland Motor Vehicle Administration. Characterization of the road network is from field surveys. Evacuation time estimates, using the NETVAC2 computer traffic simulation model, were developed for 64 scenarios that varied seasonal populations, time of day and weather conditions for eight evacuation zones, called Protective Action Zones (PAZs) within the EPZ. Population estimates include permanent residents and special plus transient populations, the latter which vary by season and time-of-day. The transient population estimate does not appear to include Calvert Cliffs' outage workface, which is periodically on-site for reactor refueling. Note that NRC uses no time standard for evaluating evacuation times.

Simulations suggest that a full evacuation from the entire EPZ would take between 290 and 380 minutes in winter and between 310 and 440 minutes in summer, depending on weather conditions and time-of-day (night/day). Closure of the Thomas Johnson Memorial Bridge would increase the summer evacuation time to 600 minutes and winter evacuation time to 520 minutes. These estimates include times to evacuate special populations from schools and nursing homes within the EPZ. Times for evacuating the PAZ within two miles of the site would be considerably less, ranging from 140 minutes at night during normal weather conditions to 230 minutes in a daytime evacuation during adverse weather conditions. Beyond two miles evacuation time estimates exhibit only minor variations from a full EPZ evacuation. Model simulations identified intersections on MD 765 (Cove Point Road and Rousby Hall Road) where traffic congestion increased evacuation times for daytime scenarios. However, the study concluded that additional traffic control points both within and outside the EPZ would reduce potential delays to traffic exiting the EPZ.

As noted earlier, FEMA is responsible for all offsite nuclear planning and response. These responsibilities include review and evaluation of Radiological Emergency Response Plans and evaluation of exercises conducted by State and local governments. The policies and procedures for FEMA's initial and continued approval of tribal, State, and local governments' radiological emergency planning and preparedness for commercial nuclear power plants is codified in 44 CFR 350. Approval is contingent on State and local government participation in joint exercises with nuclear licensees.

FEMA's criteria for evaluating emergency plans are based on the following:

- NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980;
- FEMA Guidance Memoranda MS-1, "Medical Services," November 1986;
- FEMA-REP-14, "Radiological Emergency Preparedness Exercise Manual," September 1991;
- 66 FR 47546, "FEMA Radiological Emergency Preparedness: Alert and Notification," September 12, 2001; and
- 67 FR 20580, "FEMA Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002.

FEMA Region III conducted a radiological emergency preparedness exercise (CALVEX 07) for Calvert Cliffs on October 30, 2007 (FEMA, 2008). The exercise was held to test the offsite emergency response capabilities of local governments in the 10-mile EPZ surrounding Calvert Cliffs. FEMA's evaluation concluded that local organizations, except where noted in the report, demonstrated knowledge of their emergency response plans and implemented them appropriately. The evaluation identified no Deficiencies, four Areas Requiring Corrective Action (ARCA), and one Planning Issue from the exercise. Two ARCAs were resolved through re-demonstration. Three ARCAs and eight Planning Issues from a previous exercise (CALVEX 05) were successfully demonstrated.

Annual Project Emissions

	PM	PM10	PM2.5	NOx	CO	VOC	SO2
Cooling Water System Cooling Tower	306.5	238.4	39.7	--	--	--	--
Essential Service Water System Cooling Towers	3.1	3.1	1.6	--	--	--	--
Diesel Generators	1.6	1.6	1.5	22.8	28.9	3.8	1.3
Total	**311.1**	**243.0**	**42.8**	**22.8**	**28.9**	**3.8**	**1.3**
UniStar Total	311.0	249.5	NP	22.8	29.0	3.8	1.3

NP - Not Provided

Maximum Hourly Project Emissions

	PM	PM10	PM2.5	NOx	CO	VOC	SO2
Cooling Water System Cooling Tower	70.0	53.0	8.8	--	--	--	--
Essential Service Water System Cooling Towers[1]	1.4	1.4	0.7	--	--	--	--
Diesel Generators[2]	24.4	24.4	23.7	385.1	422.5	59.0	18.0

[1] Maximum hourly is based on two of the four proposed cooling towers. Two serve as backup units.
[2] Maximum hourly is based on the six diesel generators for this project.

Emissions (lb/MMBtu)

	PM	PM10	PM2.5	NOx	CO	VOC	SO2
Emergency Diesel Generators	0.037	0.037	0.036	0.399	0.873	0.097	0.050
Station Black Out Generators	0.117	0.117	0.113	2.572	1.169	0.257	0.001

Emissions are stated for one engine.

Calvert Cliffs PTE for 4 EDG and 2 SBO Generators

	Emergency Diesel Generators	Station Black Out Generators
Engine (kWe)	10,130	5,000
Heat Input (MMBtu/hr)	89.5	47.1
No. Generators	4	2
Annual Hrs All Eng	600	200
Displacement (liter/cylinder)		
Fire Pump Engines	≥ 30	< 30
Criteria Pollutant Emission Factors		
PM (g/kW-hr)	0.15	0.5
PM-10 (g/kW-hr)	0.15	0.5
PM-2.5 (g/kW-hr)	0.15	0.49
NOx (g/kW-hr)	1.60	11.0
CO (g/kW-hr)	3.5	5.0
VOC (g/kW-hr)	0.39	1.10
SOx (g/kW-hr)	0.20	0.0064

	Emergency Diesel Generators	Station Black Out Generators	Annual Emissions (tpy)
PM			
Hourly (lb/hr)	3.3	5.5	
Annual (tpy)	1.0	0.6	1.6
PM-10			
Hourly (lb/hr)	3.3	5.5	
Annual (tpy)	1.0	0.6	1.6
PM-2.5			
Hourly (lb/hr)	3.2	5.3	
Annual (tpy)	1.0	0.5	1.5
NOx			
Hourly (lb/hr)	35.7	121.1	
Annual (tpy)	10.7	12.1	22.8
CO			
Hourly (lb/hr)	78.1	55.1	
Annual (tpy)	23.4	5.5	28.9
VOC			
Hourly (lb/hr)	8.7	12.1	
Annual (tpy)	2.6	1.2	3.8
SOx			
Hourly (lb/hr)	4.5	0.1	
Annual (tpy)	1.3	0.0	1.3

Hourly emissions are based on a single diesel engine.
Annual emissions are based on the total number of generators in each category.
There are four emergency diesel generators and two station black out diesel generators.

Callvert Cliffs Annual HAP Emissions for Diesel Engines

Pollutant	Emission Factor (lb/MMBtu)[1]	Emissions (tpy)
Benzene	7.76E-04	2.45E-02
Toluene	2.81E-04	8.86E-03
Xylenes	1.93E-04	6.09E-03
Formaldehyde	7.89E-05	2.49E-03
Acetaldehyde	2.52E-05	7.95E-04
Acrolein	7.88E-06	2.49E-04
Naphthalene[2]	1.30E-04	4.10E-03
POM[2]	8.15E-05	2.57E-03
Total		**4.96E-02**

[1] AP-42, Ch. 3.4, Tables 3.4-3 and 3.4-4

[2] Polycyclic Organic Matter (listed as "Total PAH" in AP-42, Table 3.4-4)
Naphthalene, is listed as a individual HAP and is classified as a PAH. To avoid doubt counting, naphthalene has been subtracted from the total PAH value (<2.14E-04 lb/MMBtu) listed in Table 3.4-4.

Calvert Cliffs Greenhouse Gas Emissions From Proposed Diesel Engines

Pollutant	Emission Factor (kg/GJ)	Emissions (tpy)
CO2	68.97	5,057
CH4	0.002	0.1
N2O	0.001	0.1
Energy Usage		
Annual Energy Usage (MMBtu)	6.31E+04	
Annual Energy Usage (GJ)	6.66E+04	

Emission factors, emission data, density of fuel, higher heating value of the fuel and oxidation factor (% conversion of carbon to carbon dioxide) are provided by the GHG Protocol Guidance: Direct Emissions from Stationary Combustion. Assumed No. 2 fuel oil parameters were equivalent to diesel. The CO2 emission factor is based on 19 kg C available for emissions/MJ and a 99% oxidation factor.

Calvert Cliffs Cooling Tower Emissions

Parameter	Cooling Water System Cooling Tower	Essential Service Water System Cooling Towers
Number of Units	1	4
Design Water Flow Rate (gpm)	777,560	19,075
Cooling Tower Drift Rate (% of circulating water)	0.0005	0.005
Total Dissolved Solids (ppm)	17,500	372
Cycles of Concentration Ratio (tower/makeup water)	2	2

	Cooling Water System Cooling Tower	Essential Service Water System Cooling Towers	
		One Unit	Two Units[1]
PM			
Hourly (lb/hr)	70.0	0.4	0.7
Annual (tpy)	306.5	1.6	3.1
PM10			
Hourly (lb/hr)	53.0	0.4	0.7
Annual (tpy)	238.4	1.6	3.1
PM2.5			
Hourly (lb/hr)	8.8	0.19	0.4
Annual (tpy)	39.7	0.8	1.6

[1] Annual emissions are based on two of the four proposed cooling towers. Two serve as backup units.

CWS

EPRI Droplet Diameter (um)	Droplet Volume (um3)	Droplet Mass (ug)	Particle Mass (Solids) (ug)	Solid Particle Volume (ug3)	Solid Particle Diameter (um)	Droplet Fraction (SPX)	Calculated Droplet Size Distribution (Percent)		
10	524	5.2E-04	1.83E-05	8.33	2.5	0.00007	13.0	PM2.5 =	13.0
20	4189	4.2E-03	1.47E-04	66.64	5.0	0.00010	18.5		
30	14137	1.4E-02	4.95E-04	224.91	7.5	0.00013	24.1		
40	33510	3.4E-02	1.17E-03	533.12	10.1	0.00012	22.2	PM10 =	77.8
50	65450	6.5E-02	2.29E-03	1041.25	12.6	0.00009	16.7		
60	113097	1.1E-01	3.96E-03	1799.28	15.1	0.00003	5.6		
70	179594	1.8E-01	6.29E-03	2857.18	17.6	0.00000	0.0		
80	268083	2.7E-01	9.38E-03	4264.95	20.1	0.00000	0.0		
90	381704	3.8E-01	1.34E-02	6072.56	22.6	0.00000	0.0		
100	523599	5.2E-01	1.83E-02	8329.98	25.2	0.00000	0.0		
110	696910	7.0E-01	2.44E-02	11087.20	27.7	0.00000	0.0		
120	904779	9.0E-01	3.17E-02	14394.21	30.2	0.00000	0.0		
						0.00054	100.0		

ESWS

EPRI Droplet Diameter (um)	Droplet Volume (um3)	Droplet Mass (ug)	Particle Mass (Solids) (ug)	Solid Particle Volume (ug3)	Solid Particle Diameter (um)	Droplet Fraction (SPX)	Calculated Droplet Size Distribution (Percent)		
10	524	5.2E-04	3.9E-07	0.18	0.7	0.00033	6.4	PM2.5 =	52.3
20	4,189	4.2E-03	3.1E-06	1.42	1.4	0.00050	9.7		
30	14,137	1.4E-02	1.1E-05	4.78	2.1	0.00083	16.1		
40	33,510	3.4E-02	2.5E-05	11.33	2.8	0.00104	20.2	PM10 =	100.0
50	65,450	6.5E-02	4.9E-05	22.13	3.5	0.00108	20.9		
60	113,097	1.1E-01	8.4E-05	38.25	4.2	0.00071	13.8		
70	179,594	1.8E-01	1.3E-04	60.74	4.9	0.00033	6.4		
80	268,083	2.7E-01	2.0E-04	90.66	5.6	0.00017	3.3		
90	381,704	3.8E-01	2.8E-04	129.09	6.3	0.00008	1.6		
100	523,599	5.2E-01	3.9E-04	177.07	7.0	0.00004	0.8		
110	696,910	7.0E-01	5.2E-04	235.68	7.7	0.00002	0.4		
120	904,779	9.0E-01	6.7E-04	305.98	8.4	0.00003	0.6		
						0.00516	100.0		

Calvert Cliffs TAP Emissions From CWS Cooling Tower

Chemical	NaOCl	NaOH	HEDP	Petroleum Distillate
Annual Feed Rate (gal/yr)	547000	547000	182816	18250
Density (lb/gal)	10.17	10.17	10.48	7.23
TAP Content (wt%)	20	5	20	100
TAP Emissions				
Hourly (lb/hr)	0.00064	0.00016	0.00022	0.00008
Annual (tpy)	0.002781	0.000695	0.000958	0.0003299

Calvert Cliffs Maximum Annual Construction Emissions (tons/year)

	PM	PM10	PM2.5	NOx	CO	VOC	SO2
Construction Vehicles	4.9	4.9	4.9	165.3	54.9	12.3	6.6
Vehicle Travel - Unpaved and Paved Roads	59.3	14.6	1.5	-	-	-	-
Disturbed Earth Movement	10.9	5.2	1.6	-	-	-	-
Wind Erosion	6.6	6.6	6.6	-	-	-	-
Aggregate Movement	0.3	0.2	0.0	-	-	-	-
Concrete Plant	2.3	1.4	1.4	-	-	-	-
Total	84.3	32.8	16.1	165.3	54.9	12.3	6.6

Calvert Cliffs

Vehicle Travel - Unpaved and Paved Roads

AP-42 Ch. 13.2.2 Unpaved Roads

$E = k (s/12)^a (w/3)^b$	**Units**			
s (Silt Material Content)	%	4		
W (Vehicle Weight)	tons	2		
Maximum Yearly VMT	miles	3,133,590		
Total VMT	miles	8,978,500		
Control Efficiency	%	98%		
		PM2.5	**PM10**	**PM**
a (Empirical Constant)	--	0.9	0.9	0.7
b (Empirical Constant)	--	0.45	0.45	0.45
k (Empirical Constant)	lb/VMT	0.15	1.5	4.9
Emission Factor		**PM2.5**	**PM10**	**PM**
E =	lb/VMT	0.05	0.46	1.89
Emission Rate				
Maximum Yearly VMT	**tons/year**	**1.46**	**14.57**	**59.29**
Total VMT	**tons**	**4.17**	**41.75**	**169.89**

Disturbed Earth Movement

AP-42 Ch. 13.2.4 Aggregate Handling and Storage Piles

$E = k (0.0032) (U/5)^{1.3} / (M/2)^{1.4}$	**Units**			
Max Yearly Tons excavated	tons	11,756,000		
Total Tons excavated	tons	22,940,000		
M (Material Moisture Content)	%	3		
U (mean wind speed)	mph	6.2		
		PM2.5	**PM10**	**PM**
k (particle size multiplier)	--	0.11	0.35	0.74
Emission Factor		**PM2.5**	**PM10**	**PM**
E =	lb/tons	2.76E-04	8.77E-04	1.85E-03
Emission Rate				
Max Yearly Tons excavated	**tons/year**	**1.62**	**5.15**	**10.89**
Total Tons Excavated	**tons**	**3.16**	**10.06**	**21.26**

Wind Erosion				
	Units			
Max Yearly Acres Disturbed	acres	218		
Total Acres Disturbed	acres	924		
Control Efficiency	%	90%		
Emission Factor		**PM2.5**	**PM10**	
E =	lb/acre/day		1.66	
Emission Rate				
Max Yearly Acres Disturbed	**tons/year**	**6.60**	**6.60**	
Total Acres Disturbed	**tons**	**27.99**	**27.99**	

Aggregate Movement				
AP-42 Ch. 13.2.4 Aggregate Handling and Storage Piles				
$E = k\,(0.0032)\,(U/5)^{1.3} / (M/2)^{1.4}$	**Units**			
Annual tons of aggregate moved	tons	331,734		
U (mean wind speed)	mph	6.2		
M (Material Moisture Content)	%	2.8		
		PM2.5	**PM10**	**PM**
k (particle size multiplier)	--	0.11	0.35	0.74
Emission Factor				
E =	lb/ton	2.91E-04	9.25E-04	1.96E-03
Emission Rate	**tons/year**	**0.05**	**0.15**	**0.32**

Concrete Plant
AP-42 Ch. 11.12 Concrete Batching

	Units			
Conversion Factor for Cement and Supplement from tons to cubic yards	**tons/yd^3**	0.282		
Annual Cubic yards of Concrete produced	**yd^3**	206,061		
Control Efficiency				
Baghouse on Storage Silo (Control)	%			
Transfer operation control efficiency based on aggreate moisture content (3%)	%	90%		
Emission Factors - Transfer Operations			**PM10**	**PM**
Aggregate (sand and gravel) delivery to plant	lb/tons		0.0033	0.0069
Sand and gravel transfer to conveyor	lb/tons		0.0033	0.0069
Sand transfer to elevated storage	lb/tons		0.0021	0.00099
Cement and supplement loaded into storage silo	lb/tons		0.0049	0.0089
Weigh hopper loading of sand, gravel, and cement	lb/yd^3		0.0079	0.0038
Loading into mix trucks of sand, gravel and cement	lbs/tons		0.0160	0.0568
Emissions			**PM10**	**PM**
Aggregate (sand and gravel) delivery to plant	tons		0.0096	0.020
Sand and gravel transfer to conveyor	tons		0.0096	0.020
Sand transfer to elevated storage	tons		0.0061	0.0029
Cement and supplement loaded into storage silo	tons		0.14	0.26
Weigh hopper loading of sand, gravel, and cement	tons		0.81	0.39
Loading into mix trucks of sand, gravel and cement	tons		0.46	1.65
Total	**tons**		**1.45**	**2.34**

Calvert Cliffs Activity Data for Construction Equipment Fuel Combustion

Equipment Type	Fuel Type	Quantity	Motor Size (hp)	Construction Year 1	2	3	4	5	6	7	Max Annual Hrs Operated	Emission Factors (g/hp-hr) HC	CO	NOx	PM	SO2	Year 2 Emissions (lbs) HC	CO	NOx	PM	SO2
				Combined Yearly Total Hours of Use																	
DEWATERING AND EARTHWORK																					
Dewatering Deep Well or Wellpoint Pumps (24-hr/day)	Diesel	4	180	35,000	17,500	0	0	0	0	0	**35,000**	0.3085	0.7475	4.0000	0.0853	0.1624	2,142	5,191	27,778	592	1,128
Scraper, Self-Propelled, 24 cy Struck	Diesel	10	450	13,000	13,000	3,900	0	0	0	0	**13,000**	0.1788	1.3658	4.1402	0.1330	0.1626	2,306	17,614	53,395	1,715	2,097
CAT D9 Dozer	Diesel	4	410	5,200	5,200	2,600	1,500	0	0	0	**5,200**	0.1788	1.3658	4.1402	0.1330	0.1626	840	6,420	19,460	625	764
CAT D6 Dozer	Diesel	2	185	2,600	2,600	1,500	500	500	0	0	**2,600**	0.3304	1.2118	3.8202	0.1330	0.1624	350	1,285	4,051	141	172
CAT 330 Crawler/Hydraulic Backhoe, 3-1/4 cy Struck	Diesel	4	268	2,600	5,200	2,600	2,000	1,000	0	0	**5,200**	0.7115	1.9618	4.4083	0.1985	0.1620	2,186	6,027	13,544	610	498
CAT 953 Crawler/Loader, 2-1/2 cy	Diesel	4	133	2,600	5,200	2,600	2,000	1,000	0	0	**5,200**	0.3624	1.4051	3.9157	0.2091	0.1624	553	2,142	5,970	319	248
Case 521D Articulated 4X4 Wheel Loader, 2-14/ cy	Diesel	2	110	2,600	5,200	2,600	2,000	1,000	500	0	**5,200**	0.7805	2.2747	4.5185	0.3033	0.1620	984	2,868	5,698	382	204
Kenworth t-800 Dump Trucks, 13/15 cy	Diesel	10	250	6,500	13,000	6,500	2,000	1,000	0	0	**13,000**	0.3304	1.2118	3.8202	0.1330	0.1624	2,367	8,682	27,371	953	1,164
CAT 825 Vibratory Compactor	Diesel	4	354	5,200	5,200	2,600	1,000	500	0	0	**5,200**	0.1669	0.8425	4.3351	0.0583	0.1626	677	3,419	17,593	237	660
Case 580 Tractor Loader/Backhoe, 1 cy/18"	Diesel	2	75	0	0	1,000	1,000	1,000	1,000	500	**1,000**	0.8469	6.2083	5.1798	0.4236	0.1801	0	0	0	0	0
Case Skid Loader, 1/2 cy	Diesel	2	50	0	0	1,000	1,000	1,000	1,000	500	**1,000**	0.6432	4.0215	5.2105	0.6378	0.1803	0	0	0	0	0
JCB Mini Backhoe/Loader, 1/2 cy/12"	Diesel	2	50	0	0	1,000	1,000	1,000	1,000	0	**1,000**	0.6432	4.0215	5.2105	0.6378	0.1803	0	0	0	0	0
CAT 14H Motor Grader, 14' Blade	Diesel	1	220	1,000	1,500	1,000	0	0	0	0	**1,500**	0.3304	1.2118	3.8202	0.1330	0.1624	240	882	2,779	97	118
Gradall	Diesel	1	220	1,000	1,000	500	500	500	0	0	**1,000**	0.3304	1.2118	3.8202	0.1330	0.1624	160	588	1,853	65	79
GMC Truck 2/6000 gal water tank	Diesel	1	300	1,000	1,000	1,000	1,000	1,000	0	0	**1,000**	0.3304	1.2118	3.8202	0.1330	0.1624	219	801	2,527	88	107
BATCH PLANT																					
Central Mix Plant w/ chiller & heater, ~130 cy/hr	Electric	2	0	400	1,200	1,600	1,600	400	200	100	**1,600**	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0	0	0
CAT 966F Loader, 5cy Bucket at Stockpiles	Diesel	1	266	400	1,200	1,600	1,600	400	200	100	**1,600**	0.7115	1.9618	4.4085	0.1985	0.1620	501	1,381	3,102	140	114
CAT D6H Dozer at Stockpiles	Diesel	1	165	400	1,200	1,600	1,600	400	200	100	**1,600**	0.3624	1.4051	3.9157	0.2091	0.1624	158	613	1,709	91	71
Crawler/Backhoe, 1 cy at Spoils	Diesel	1	115	100	300	400	400	100	50	40	**400**	0.7805	2.2747	4.5185	0.3303	0.1620	59	173	344	25	12
GMC 12/14 cy Dump Truck at Spoils	Diesel	1	300	100	300	400	400	100	50	40	**400**	0.3304	1.2118	3.8202	0.1330	0.1624	66	240	758	26	32
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	1	113	100	300	400	400	100	50	40	**400**	0.3384	0.8667	4.1000	0.1067	0.1624	25	65	306	8	12
Dump Trucks for Aggregate and Sand, 30 cy*	Diesel	5	480	1,600	5,000	6,500	6,500	1,600	800	400	**6,500**	0.1788	1.3658	4.1402	0.1330	0.1626	946	7,226	21,906	704	860
CONCRETE																					
Concrete Transport Trucks, Agitator/Mixer, 10 cy capacity	Diesel	15	250	4,220	13,100	2,400	17,200	16,800	4,200	2,100	**17,200**	0.3304	1.2118	3.8202	0.1130	0.1624	2,385	8,749	27,582	816	1,173
Creter Crane w/ Grove RT990 Hydraulic Crane & 200 ft Conveyor at 200 cy/hr	Diesel	1	300	200	600	800	800	0	0	0	**800**	0.3085	0.7475	4.0000	0.0583	0.1624	122	297	1,587	23	64
Concrete Pump Truck at 170 cy/hr	Diesel	4	250	800	2,400	3,200	3,200	800	400	200	**3,200**	0.3085	0.7475	4.0000	0.0583	0.1624	408	989	5,291	77	215
Concrete Pump, Trailer Mounted at 11/120 cy/hr	Diesel	4	180	800	2,400	3,200	3,200	800	0	0	**3,200**	0.3085	0.7475	4.0000	0.0583	0.1624	294	712	3,810	56	155
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	2	113	800	2,400	3,200	3,200	800	400	200	**3,200**	0.3384	0.8667	4.1000	0.1067	0.1624	202	518	2,451	64	97
IR 750 cfm Air Compressor, Trailer Mounted	Diesel	1	250	400	1,200	1,600	1,600	400	200	100	**1,600**	0.3085	0.7475	4.0000	0.0583	0.1624	204	494	2,646	39	107
LIFTING/RIGGING																					
Manitowoc 4600 S-5 Crawler Crane with S-4 Ringer Attachment, 750-ton capacity	Diesel	1	685	0	1,000	2,000	2,000	2,000	1,000	0	**2,000**	0.1669	1.3272	4.1000	0.0583	0.1626	252	2,004	6,192	88	246
Manitowoc M-250 S-2 Crawler Crane with 300' Boom Attachment & Luffing Jib, 300-ton Capacity	Diesel	2	450	0	1,000	2,000	2,000	2,000	500	0	**2,000**	0.1669	0.8425	4.3351	0.0583	0.1626	166	836	4,301	58	161
Manitowoc 4100 S-2 Crawler Crane 230-ton Capacity, w/ Tower Attachment 31-ton Capacity	Diesel	2	333	1,000	2,000	4,000	4,000	2,000	1,000	0	**4,000**	0.1669	0.8425	4.3351	0.0583	0.1626	245	1,237	6,365	86	239
Manitowoc 3900W Cralwer Crane, w/ 180' Boom & 30' Jib, 140-ton Capacity	Diesel	2	287	1,000	2,000	4,000	4,000	2,000	1,000	0	**4,000**	0.3085	0.7475	4.0000	0.0583	0.1624	390	946	5,062	74	206
Linkbelt HC248 Lattice Boom Truck Crane w/ 200' Boom Attachment & LuffingJib, 165-ton Capacity	Diesel	2	405	1,000	2,000	4,000	4,000	4,000	1,000	500	**4,000**	0.1669	0.8425	4.3351	0.0583	0.1626	298	1,504	7,741	104	290
Kenworth T-800 Prime Mover for Heavy -Haul Trailers	Diesel	2	330	0	200	400	400	200	0	0	**400**	0.1788	1.3658	4.1402	0.1330	0.1626	26	199	602	19	24
Grove RT-635 Rough Terrain Hydr. Crane, 35-ton Capacity	Diesel	2	152	2,000	4,000	4,000	4,000	4,000	200	1,000	**4,000**	0.3384	0.8667	4.1000	0.1067	0.1624	454	1,162	5,496	143	218
Grove RT-835 Rough Terrain Hydr. Crane, 65-ton Capacity	Diesel	4	250	2,000	4,000	4,000	4,000	4,000	2,000	1,000	**4,000**	0.3085	0.7475	4.0000	0.0583	0.1624	680	1,648	8,818	129	358
IR Telboom Forklift 4x4, 4.5-ton	Diesel	2	65	0	1,000	2,000	2,000	2,000	1,000	500	**2,000**	0.3933	3.8349	4.4887	0.3035	0.1623	56	550	643	43	23
GMC 16-ft Flatbed Truck to haul rigging gear	Diesel	1	180	400	500	600	600	500	400	200	**600**	0.3304	1.2118	3.8202	0.1330	0.1624	66	240	758	26	32
SHOP FABRICATION																					
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	2	125	1,000	2,000	2,000	2,000	2,000	1,000	500	**2,000**	0.3384	0.8667	4.1000	0.1067	0.1624	187	478	2,260	59	90
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	1	76	500	750	1,000	1,000	1,000	750	500	**1,000**	0.3672	2.3655	4.7000	0.1667	0.1624	46	297	591	21	20
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	2	65	500	750	1,000	1,000	1,000	750	500	**1,000**	0.3933	3.8349	4.4887	0.3035	0.1623	42	412	482	33	17
GMC 18' Flatbed/Stakebed Trucks	Diesel	1	165	500	1,000	1,500	1,500	1,000	750	500	**1,500**	0.3624	1.4051	3.9157	0.2091	0.1624	132	511	1,424	76	59
IR 375 cfm Air Compressor, Trailer Mtd	Diesel	1	113	500	750	1,000	1,000	1,000	750	500	**1,000**	0.3384	0.8667	4.7000	0.1067	0.1624	63	162	878	20	30
WAREHOUSE																					
Linkbelt 228 Lattice Boom Truck Crane, 180-ft Boom, 30-ft Jib	Diesel	1	250	500	750	750	750	750	500	250	**750**	0.3085	0.7475	4.0000	0.0583	0.1624	128	309	1,653	24	67
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	2	125	1,000	2,000	2,000	2,000	2,000	1,000	500	**2,000**	0.3384	0.8667	4.1000	0.1067	0.1624	187	478	2,260	59	90
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	2	65	500	750	1,000	1,000	1,000	750	500	**1,000**	0.3933	3.8349	4.4887	0.3035	0.1623	42	412	482	33	17
GMC Topkick Knuckle Boom Truck w/ 6-ton Capacity	Diesel	2	1810	0	500	750	750	750	500	500	**750**	0.3304	1.2118	3.8202	0.1330	0.1624	659	2,418	7,622	265	324
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	1	76	500	750	750	750	750	500	500	**750**	0.3672	2.3655	4.7000	0.1667	0.1624	46	297	591	21	20
GMC 18' Flatbed/Stakebed Trucks	Diesel	4	165	1,000	2,000	3,000	3,000	3,000	1,500	1,000	**3,000**	0.3624	1.4051	3.9157	0.2091	0.1624	264	1,022	2,849	152	118
EQUIPMENT MAINTENANCE																					
GMC Fuel Truck w/ Meters, 4000 gal Diesel Fuel	Diesel	3	250	1,500	1,500	1,500	1,500	1,000	500	0	**1,500**	0.3304	1.2118	3.8202	0.1330	0.1624	273	1,002	3,158	110	134
GMC Fuel & Lubrication Truck w/ Pwr Wash; Cont/Waste Oil Tank; 2000 gal Diesel Fuel	Diesel	2	250	1,000	1,000	1,000	1,000	1,000	500	500	**1,000**	0.3304	1.2118	3.8202	0.1330	0.1624	182	668	2,105	73	90
GMC 3500 HD Mechanics Truck, w/ Tools, Welder, Air Comp;	Diesel	2	180	1,000	1,000	1,000	1,000	1,000	500	0	**1,000**	0.3304	1.2118	3.8202	0.1330	0.1624	131	481	1,516	53	64
GMC Wrecker & Tire Service Truck	Diesel	1	300	500	500	500	500	250	0	0	**500**	0.3304	1.2118	3.8202	0.1330	0.1624	109	401	1,263	44	54
Utility, Gasoline-powered Pick-up Trucks & Automobiles	Gasoline	100	231	26,400	52,800	105,600	105,600	105,600	52,800	26,400	**105,600**	0.0438	0.4728	0.0748	0.0021	0.0006	1,178	12,713	2,011	56	16
		Total		132,920	193,700	208,650	**208,550**	178,000	81,400	40,270						**Total**	24,698	109,764	330,634	9,761	13,159

Calvert Cliffs Activity Data for Construction Equipment Fuel Combust

Equipment Type	Fuel Type	Year 2 Emissions (tons)					Year 1 Emissions (tons)					Year 3 Emissions (tons)					Year 4 Emissions (tons)				
		HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
DEWATERING AND EARTHWORK																					
Dewatering Deep Well or Wellpoint Pumps (24-hr/day)	Diesel	1.07	2.60	13.89	0.30	0.56	2.14	5.19	27.78	0.59	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper, Self-Propelled, 24 cy Struck	Diesel	1.15	8.81	26.70	0.86	1.05	1.15	8.81	26.70	0.86	1.05	0.35	2.64	8.01	0.26	0.31	0.00	0.00	0.00	0.00	0.00
CAT D9 Dozer	Diesel	0.42	3.21	9.73	0.31	0.38	0.42	3.21	9.73	0.31	0.38	0.21	1.60	4.86	0.16	0.19	0.12	0.93	2.81	0.09	0.11
CAT D6 Dozer	Diesel	0.18	0.64	2.03	0.07	0.09	0.18	0.64	2.03	0.07	0.09	0.10	0.37	1.17	0.04	0.05	0.03	0.12	0.39	0.01	0.02
CAT 330 Crawler/Hydraulic Backhoe, 3-1/4 cy Struck	Diesel	1.09	3.01	6.77	0.30	0.25	0.55	1.51	3.39	0.15	0.12	0.55	1.51	3.39	0.15	0.12	0.42	1.16	2.60	0.12	0.10
CAT 953 Crawler/Loader, 2-1/2 cy	Diesel	0.28	1.07	2.99	0.16	0.12	0.14	0.54	1.49	0.08	0.06	0.14	0.54	1.49	0.08	0.06	0.11	0.41	1.15	0.06	0.05
Case 521D Articulated 4X4 Wheel Loader, 2-14/ cy	Diesel	0.49	1.43	2.85	0.19	0.10	0.25	0.72	1.42	0.10	0.05	0.25	0.72	1.42	0.10	0.05	0.19	0.55	1.10	0.07	0.04
Kenworth t-800 Dump Trucks, 13/15 cy	Diesel	1.18	4.34	13.69	0.48	0.58	0.59	2.17	6.84	0.24	0.29	0.59	2.17	6.84	0.24	0.29	0.18	0.67	2.11	0.07	0.09
CAT 825 Vibratory Compactor	Diesel	0.34	1.71	8.80	0.12	0.33	0.34	1.71	8.80	0.12	0.33	0.17	0.85	4.40	0.06	0.16	0.07	0.33	1.69	0.02	0.06
Case 580 Tractor Loader/Backhoe, 1 cy/18"	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.51	0.43	0.04	0.01	0.07	0.51	0.43	0.04	0.01
Case Skid Loader, 1/2 cy	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.22	0.29	0.04	0.01	0.04	0.22	0.29	0.04	0.01
JCB Mini Backhoe/Loader, 1/2 cy/12"	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.22	0.29	0.04	0.01	0.04	0.22	0.29	0.04	0.01
CAT 14H Motor Grader, 14' Blade	Diesel	0.12	0.44	1.39	0.05	0.06	0.08	0.29	0.93	0.03	0.04	0.08	0.29	0.93	0.03	0.04	0.00	0.00	0.00	0.00	0.00
Gradall	Diesel	0.08	0.29	0.93	0.03	0.04	0.08	0.29	0.93	0.03	0.04	0.04	0.15	0.46	0.02	0.02	0.04	0.15	0.46	0.02	0.02
GMC Truck 2/6000 gal water tank	Diesel	0.11	0.40	1.26	0.04	0.05	0.11	0.40	1.26	0.04	0.05	0.11	0.40	1.26	0.04	0.05	0.11	0.40	1.26	0.04	0.05
BATCH PLANT																					
Central Mix Plant w/ chiller & heater, ~130 cy/hr	Electric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT 966F Loader, 5cy Bucket at Stockpiles	Diesel	0.25	0.69	1.55	0.07	0.06	0.08	0.23	0.52	0.02	0.02	0.33	0.92	2.07	0.09	0.08	0.33	0.92	2.07	0.09	0.08
CAT D6H Dozer at Stockpiles	Diesel	0.08	0.31	0.85	0.05	0.04	0.03	0.10	0.28	0.02	0.01	0.11	0.41	1.14	0.06	0.05	0.11	0.41	1.14	0.06	0.05
Crawler/Backhoe, 1 cy at Spoils	Diesel	0.03	0.09	0.17	0.01	0.01	0.01	0.03	0.06	0.00	0.00	0.04	0.12	0.23	0.02	0.01	0.04	0.12	0.23	0.02	0.01
GMC 12/14 cy Dump Truck at Spoils	Diesel	0.03	0.12	0.38	0.01	0.02	0.01	0.04	0.13	0.00	0.01	0.04	0.16	0.51	0.02	0.02	0.04	0.16	0.51	0.02	0.02
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	0.01	0.03	0.15	0.00	0.01	0.00	0.01	0.05	0.00	0.00	0.02	0.04	0.20	0.01	0.01	0.02	0.04	0.20	0.01	0.01
Dump Trucks for Aggregate and Sand, 30 cy'	Diesel	0.47	3.61	10.95	0.35	0.43	0.15	1.16	3.50	0.11	0.14	0.61	4.70	14.24	0.46	0.56	0.61	4.70	14.24	0.46	0.56
CONCRETE																					
Concrete Transport Trucks, Agitator/Mixer, 10 cy capacity	Diesel	1.19	4.37	13.79	0.41	0.59	0.38	1.41	4.44	0.13	0.19	0.22	0.80	2.53	0.07	0.11	1.57	5.74	18.11	0.54	0.77
Creter Crane w/ Grove RT990 Hydraulic Crane & 200 ft Conveyor at 200 cy/hr	Diesel	0.06	0.15	0.79	0.01	0.03	0.02	0.05	0.26	0.00	0.01	0.08	0.20	1.06	0.02	0.04	0.08	0.20	1.06	0.02	0.04
Concrete Pump Truck at 170 cy/hr	Diesel	0.20	0.49	2.65	0.04	0.11	0.07	0.16	0.88	0.01	0.04	0.27	0.66	3.53	0.05	0.14	0.27	0.66	3.53	0.05	0.14
Concrete Pump, Trailer Mounted at 11/120 cy/hr	Diesel	0.15	0.36	1.90	0.03	0.08	0.05	0.12	0.63	0.01	0.03	0.20	0.47	2.54	0.04	0.10	0.20	0.47	2.54	0.04	0.10
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	0.10	0.26	1.23	0.03	0.05	0.03	0.09	0.41	0.01	0.02	0.13	0.35	1.63	0.04	0.06	0.13	0.35	1.63	0.04	0.06
IR 750 cfm Air Compressor, Trailer Mounted	Diesel	0.10	0.25	1.32	0.02	0.05	0.03	0.08	0.44	0.01	0.02	0.14	0.33	1.76	0.03	0.07	0.14	0.33	1.76	0.03	0.07
LIFTING/RIGGING																					
Manitowoc 4600 S-5 Crawler Crane with S-4 Ringer Attachment, 750-ton capacity	Diesel	0.13	1.00	3.10	0.04	0.12	0.00	0.00	0.00	0.00	0.00	0.25	2.00	6.19	0.09	0.25	0.25	2.00	6.19	0.09	0.25
Manitowoc M-250 S-2 Crawler Crane with 300' Boom Attachment & Luffing Jib, 300-ton Capacity	Diesel	0.08	0.42	2.15	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.17	0.84	4.30	0.06	0.16	0.17	0.84	4.30	0.06	0.16
Manitowoc 4100 S-2 Crawler Crane 230-ton Capacity, w/ Tower Attachment 31-ton Capacity	Diesel	0.12	0.62	3.18	0.04	0.12	0.06	0.31	1.59	0.02	0.06	0.25	1.24	6.37	0.09	0.24	0.25	1.24	6.37	0.09	0.24
Manitowoc 3900W Cralwer Crane, w/ 180' Boom & 30' Jib, 140-ton Capacity	Diesel	0.20	0.47	2.53	0.04	0.10	0.10	0.24	1.27	0.02	0.05	0.39	0.95	5.06	0.07	0.21	0.39	0.95	5.06	0.07	0.21
Linkbelt HC248 Lattice Boom Truck Crane w/ 200' Boom Attachment & LuffingJib, 165-ton Capacity	Diesel	0.15	0.75	3.87	0.05	0.15	0.07	0.38	1.94	0.03	0.07	0.30	1.50	7.74	0.10	0.29	0.30	1.50	7.74	0.10	0.29
Kenworth T-800 Prime Mover for Heavy -Haul Trailers	Diesel	0.01	0.10	0.30	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.20	0.60	0.02	0.02	0.03	0.20	0.60	0.02	0.02
Grove RT-635 Rough Terrain Hydr. Crane, 35-ton Capacity	Diesel	0.23	0.58	2.75	0.07	0.11	0.11	0.29	1.37	0.04	0.05	0.23	0.58	2.75	0.07	0.11	0.23	0.58	2.75	0.07	0.11
Grove RT-835 Rough Terrain Hydr. Crane, 65-ton Capacity	Diesel	0.34	0.82	4.41	0.06	0.18	0.17	0.41	2.20	0.03	0.09	0.34	0.82	4.41	0.06	0.18	0.34	0.82	4.41	0.06	0.18
IR Telboom Forklift 4x4, 4.5-ton	Diesel	0.03	0.27	0.32	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.06	0.55	0.64	0.04	0.02	0.06	0.55	0.64	0.04	0.02
GMC 16-ft Flatbed Truck to haul rigging gear	Diesel	0.03	0.12	0.38	0.01	0.02	0.03	0.10	0.30	0.01	0.01	0.04	0.14	0.45	0.02	0.02	0.04	0.14	0.45	0.02	0.02
SHOP FABRICATION																					
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.09	0.24	1.13	0.03	0.04	0.05	0.12	0.56	0.01	0.02	0.09	0.24	1.13	0.03	0.04	0.09	0.24	1.13	0.03	0.04
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	0.02	0.15	0.30	0.01	0.01	0.02	0.10	0.20	0.01	0.01	0.03	0.20	0.39	0.01	0.01	0.03	0.20	0.39	0.01	0.01
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.02	0.21	0.24	0.02	0.01	0.01	0.14	0.16	0.01	0.01	0.03	0.27	0.32	0.02	0.01	0.03	0.27	0.32	0.02	0.01
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.07	0.26	0.71	0.04	0.03	0.03	0.13	0.36	0.02	0.01	0.10	0.38	1.07	0.06	0.04	0.10	0.38	1.07	0.06	0.04
IR 375 cfm Air Compressor, Trailer Mtd	Diesel	0.03	0.08	0.44	0.01	0.02	0.02	0.05	0.29	0.01	0.01	0.04	0.11	0.59	0.01	0.02	0.04	0.11	0.59	0.01	0.02
WAREHOUSE																					
Linkbelt 228 Lattice Boom Truck Crane, 180-ft Boom, 30-ft Jib	Diesel	0.06	0.15	0.83	0.01	0.03	0.04	0.10	0.55	0.01	0.02	0.06	0.15	0.83	0.01	0.03	0.06	0.15	0.83	0.01	0.03
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.09	0.24	1.13	0.03	0.04	0.05	0.12	0.56	0.01	0.02	0.09	0.24	1.13	0.03	0.04	0.09	0.24	1.13	0.03	0.04
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.02	0.21	0.24	0.02	0.01	0.01	0.14	0.16	0.01	0.01	0.03	0.27	0.32	0.02	0.01	0.03	0.27	0.32	0.02	0.01
GMC Topkick Knuckle Boom Truck w/ 6-ton Capacity	Diesel	0.33	1.21	3.81	0.13	0.16	0.00	0.00	0.00	0.00	0.00	0.49	1.81	5.72	0.20	0.24	0.49	1.81	5.72	0.20	0.24
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	0.02	0.15	0.30	0.01	0.01	0.02	0.10	0.20	0.01	0.01	0.02	0.15	0.30	0.01	0.01	0.02	0.15	0.30	0.01	0.01
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.13	0.51	1.42	0.08	0.06	0.07	0.26	0.71	0.04	0.03	0.20	0.77	2.14	0.11	0.09	0.20	0.77	2.14	0.11	0.09
EQUIPMENT MAINTENANCE																					
GMC Fuel Truck w/ Meters, 4000 gal Diesel Fuel	Diesel	0.14	0.50	1.58	0.05	0.07	0.14	0.50	1.58	0.05	0.07	0.14	0.50	1.58	0.05	0.07	0.14	0.50	1.58	0.05	0.07
GMC Fuel & Lubrication Truck w/ Pwr Wash; Cont/Waste Oil Tank; 2000 gal Diesel Fuel	Diesel	0.09	0.33	1.05	0.04	0.04	0.09	0.33	1.05	0.04	0.04	0.09	0.33	1.05	0.04	0.04	0.09	0.33	1.05	0.04	0.04
GMC 3500 HD Mechanics Truck, w/ Tools, Welder, Air Comp;	Diesel	0.07	0.24	0.76	0.03	0.03	0.07	0.24	0.76	0.03	0.03	0.07	0.24	0.76	0.03	0.03	0.07	0.24	0.76	0.03	0.03
GMC Wrecker & Tire Service Truck	Diesel	0.05	0.20	0.63	0.02	0.03	0.05	0.20	0.63	0.02	0.03	0.05	0.20	0.63	0.02	0.03	0.05	0.20	0.63	0.02	0.03
Utility, Gasoline-powered Pick-up Trucks & Automobiles	Gasoline	0.59	6.36	1.01	0.03	0.01	0.29	3.18	0.50	0.01	0.00	1.18	12.71	2.01	0.06	0.02	1.18	12.71	2.01	0.06	0.02
		12.3	54.9	165.3	4.9	6.6	8.4	36.4	119.9	3.4	4.8	9.7	48.8	125.2	3.5	4.9	9.7	47.2	120.1	3.3	4.7

Calvert Cliffs Activity Data for Construction Equipment Fuel Combust

Equipment Type	Fuel Type	Year 5 Emissions (tons)					Year 6 Emissions (tons)					Year 7 Emissions (tons)				
		HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2	HC	CO	NOx	PM	SO2
DEWATERING AND EARTHWORK																
Dewatering Deep Well or Wellpoint Pumps (24-hr/day)	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper, Self-Propelled, 24 cy Struck	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT D9 Dozer	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT D6 Dozer	Diesel	0.03	0.12	0.39	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT 330 Crawler/Hydraulic Backhoe, 3-1/4 cy Struck	Diesel	0.21	0.58	1.30	0.06	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT 953 Crawler/Loader, 2-1/2 cy	Diesel	0.05	0.21	0.57	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Case 521D Articulated 4X4 Wheel Loader, 2-14/ cy	Diesel	0.09	0.28	0.55	0.04	0.02	0.05	0.14	0.27	0.02	0.01	0.00	0.00	0.00	0.00	0.00
Kenworth t-800 Dump Trucks, 13/15 cy	Diesel	0.09	0.33	1.05	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT 825 Vibratory Compactor	Diesel	0.03	0.16	0.85	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Case 580 Tractor Loader/Backhoe, 1 cy/18"	Diesel	0.07	0.51	0.43	0.04	0.01	0.07	0.51	0.43	0.04	0.01	0.04	0.26	0.21	0.02	0.01
Case Skid Loader, 1/2 cy	Diesel	0.04	0.22	0.29	0.04	0.01	0.04	0.22	0.29	0.04	0.01	0.02	0.11	0.14	0.02	0.00
JCB Mini Backhoe/Loader, 1/2 cy/12"	Diesel	0.04	0.22	0.29	0.04	0.01	0.04	0.22	0.29	0.04	0.01	0.00	0.00	0.00	0.00	0.00
CAT 14H Motor Grader, 14' Blade	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gradall	Diesel	0.04	0.15	0.46	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GMC Truck 2/6000 gal water tank	Diesel	0.11	0.40	1.26	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BATCH PLANT																
Central Mix Plant w/ chiller & heater, ~130 cy/hr	Electric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAT 966F Loader, 5cy Bucket at Stockpiles	Diesel	0.08	0.23	0.52	0.02	0.02	0.04	0.12	0.26	0.01	0.01	0.02	0.06	0.13	0.01	0.00
CAT D6H Dozer at Stockpiles	Diesel	0.03	0.10	0.28	0.02	0.01	0.01	0.05	0.14	0.01	0.01	0.01	0.03	0.07	0.00	0.00
Crawler/Backhoe, 1 cy at Spoils	Diesel	0.01	0.03	0.06	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.00
GMC 12/14 cy Dump Truck at Spoils	Diesel	0.01	0.04	0.13	0.00	0.01	0.01	0.02	0.06	0.00	0.00	0.00	0.02	0.05	0.00	0.00
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	0.00	0.01	0.05	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Dump Trucks for Aggregate and Sand, 30 cy'	Diesel	0.15	1.16	3.50	0.11	0.14	0.08	0.58	1.75	0.06	0.07	0.04	0.29	0.88	0.03	0.03
CONCRETE																
Concrete Transport Trucks, Agitator/Mixer, 10 cy capacity	Diesel	1.53	5.61	17.69	0.52	0.75	0.38	1.40	4.42	0.13	0.19	0.19	0.70	2.21	0.07	0.09
Creter Crane w/ Grove RT990 Hydraulic Crane & 200 ft Conveyor at 200 cy/hr	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Pump Truck at 170 cy/hr	Diesel	0.07	0.16	0.88	0.01	0.04	0.03	0.08	0.44	0.01	0.02	0.02	0.04	0.22	0.00	0.01
Concrete Pump, Trailer Mounted at 11/120 cy/hr	Diesel	0.05	0.12	0.63	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IR 375 cfm Air Compressor, Trailer Mounted	Diesel	0.03	0.09	0.41	0.01	0.02	0.02	0.04	0.20	0.01	0.01	0.01	0.02	0.10	0.00	0.00
IR 750 cfm Air Compressor, Trailer Mounted	Diesel	0.03	0.08	0.44	0.01	0.02	0.02	0.04	0.22	0.00	0.01	0.01	0.02	0.11	0.00	0.00
LIFTING/RIGGING																
Manitowoc 4600 S-5 Crawler Crane with S-4 Ringer Attachment, 750-ton capacity	Diesel	0.25	2.00	6.19	0.09	0.25	0.13	1.00	3.10	0.04	0.12	0.00	0.00	0.00	0.00	0.00
Manitowoc M-250 S-2 Crawler Crane with 300' Boom Attachment & Luffing Jib, 300-ton Capacity	Diesel	0.17	0.84	4.30	0.06	0.16	0.04	0.21	1.08	0.01	0.04	0.00	0.00	0.00	0.00	0.00
Manitowoc 4100 S-2 Crawler Crane 230-ton Capacity, w/ Tower Attachment 31-ton Capacity	Diesel	0.12	0.62	3.18	0.04	0.12	0.06	0.31	1.59	0.02	0.06	0.00	0.00	0.00	0.00	0.00
Manitowoc 3900W Cralwer Crane, w/ 180' Boom & 30' Jib, 140-ton Capacity	Diesel	0.20	0.47	2.53	0.04	0.10	0.10	0.24	1.27	0.02	0.05	0.00	0.00	0.00	0.00	0.00
Linkbelt HC248 Lattice Boom Truck Crane w/ 200' Boom Attachment & LuffingJib, 165-ton Capacity	Diesel	0.30	1.50	7.74	0.10	0.29	0.07	0.38	1.94	0.03	0.07	0.04	0.19	0.97	0.01	0.04
Kenworth T-800 Prime Mover for Heavy -Haul Trailers	Diesel	0.01	0.10	0.30	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grove RT-635 Rough Terrain Hydr. Crane, 35-ton Capacity	Diesel	0.23	0.58	2.75	0.07	0.11	0.01	0.03	0.14	0.00	0.01	0.06	0.15	0.69	0.02	0.03
Grove RT-835 Rough Terrain Hydr. Crane, 65-ton Capacity	Diesel	0.34	0.82	4.41	0.06	0.18	0.17	0.41	2.20	0.03	0.09	0.09	0.21	1.10	0.02	0.04
IR Telboom Forklift 4x4, 4.5-ton	Diesel	0.06	0.55	0.64	0.04	0.02	0.03	0.27	0.32	0.02	0.01	0.01	0.14	0.16	0.01	0.01
GMC 16-ft Flatbed Truck to haul rigging gear	Diesel	0.03	0.12	0.38	0.01	0.02	0.03	0.10	0.30	0.01	0.01	0.01	0.05	0.15	0.01	0.01
SHOP FABRICATION																
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.09	0.24	1.13	0.03	0.04	0.05	0.12	0.56	0.01	0.02	0.02	0.06	0.28	0.01	0.01
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	0.03	0.20	0.39	0.01	0.01	0.02	0.15	0.30	0.01	0.01	0.02	0.10	0.20	0.01	0.01
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.03	0.27	0.32	0.02	0.01	0.02	0.21	0.24	0.02	0.01	0.01	0.14	0.16	0.01	0.01
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.07	0.26	0.71	0.04	0.03	0.05	0.19	0.53	0.03	0.02	0.03	0.13	0.36	0.02	0.01
IR 375 cfm Air Compressor, Trailer Mtd	Diesel	0.04	0.11	0.59	0.01	0.02	0.03	0.08	0.44	0.01	0.02	0.02	0.05	0.29	0.01	0.01
WAREHOUSE																
Linkbelt 228 Lattice Boom Truck Crane, 180-ft Boom, 30-ft Jib	Diesel	0.06	0.15	0.83	0.01	0.03	0.04	0.10	0.55	0.01	0.02	0.02	0.05	0.28	0.00	0.01
Grove RT-528 Rough Terrain Hyd. Crane, 28-ton	Diesel	0.09	0.24	1.13	0.03	0.04	0.05	0.12	0.56	0.01	0.02	0.02	0.06	0.28	0.01	0.01
IR Teleboom Forklift 4x4, 4.5-ton	Diesel	0.03	0.27	0.32	0.02	0.01	0.02	0.21	0.24	0.02	0.01	0.01	0.14	0.16	0.01	0.01
GMC Topkick Knuckle Boom Truck w/ 6-ton Capacity	Diesel	0.49	1.81	5.72	0.20	0.24	0.33	1.21	3.81	0.13	0.16	0.33	1.21	3.81	0.13	0.16
Grove AP308 Carry Deck Hyd. Crane, 8-1/2 ton	Diesel	0.02	0.15	0.30	0.01	0.01	0.02	0.10	0.20	0.01	0.01	0.02	0.10	0.20	0.01	0.01
GMC 18' Flatbed/Stakebed Trucks	Diesel	0.20	0.77	2.14	0.11	0.09	0.10	0.38	1.07	0.06	0.04	0.07	0.26	0.71	0.04	0.03
EQUIPMENT MAINTENANCE																
GMC Fuel Truck w/ Meters, 4000 gal Diesel Fuel	Diesel	0.09	0.33	1.05	0.04	0.04	0.05	0.17	0.53	0.02	0.02	0.00	0.00	0.00	0.00	0.00
GMC Fuel & Lubrication Truck w/ Pwr Wash; Cont/Waste Oil Tank; 2000 gal Diesel Fuel	Diesel	0.09	0.33	1.05	0.04	0.04	0.05	0.17	0.53	0.02	0.02	0.05	0.17	0.53	0.02	0.02
GMC 3500 HD Mechanics Truck, w/ Tools, Welder, Air Comp;	Diesel	0.07	0.24	0.76	0.03	0.03	0.03	0.12	0.38	0.01	0.02	0.00	0.00	0.00	0.00	0.00
GMC Wrecker & Tire Service Truck	Diesel	0.03	0.10	0.32	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Utility, Gasoline-powered Pick-up Trucks & Automobiles	Gasoline	1.18	12.71	2.01	0.06	0.02	0.59	6.36	1.01	0.03	0.01	0.29	3.18	0.50	0.01	0.00
		7.1	36.6	83.2	2.3	3.3	2.9	16.1	31.7	0.9	1.2	1.5	7.9	15.0	0.5	0.6

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Eric Schwaab, Deputy Secretary

June 23, 2008

Mr. John E. Price
UniStar Nuclear Energy
750 E. Pratt Street, 14th Floor
Baltimore, MD 21202

RE: Environmental Review for Constellation Energy's Calvert Cliffs Nuclear Power Plant Site, Lusby, Calvert County, Maryland.

Dear Mr. Price:

The Wildlife and Heritage Service has determined that there is a Natural Heritage Area (NHA) known as Flag Ponds NHA in the northern portion of the project site, along the shoreline of the Chesapeake Bay. This NHA supports a population of the Puritan Tiger Beetle (*Cicindela puritana*) and a population of the Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*). Both of these species are listed as endangered by the State and as threatened by the US Fish and Wildlife Service. Activities within NHAs are regulated by the Critical Area Commission so that the structure and species composition of the area are maintained. In addition, this area along the shoreline that supports the tiger beetles is designated in state regulations as a Wetland of Special State Concern and regulated by Maryland Department of the Environment.

South of the existing power plant, on CCNP property along the Chesapeake Bay shoreline, there are records for the Puritan Tiger Beetle. Habitat management or restoration for this endangered species is encouraged.

In the southeast portion of the project site near Rock Point the site overlaps with another NHA known as Cove Point Marsh, however, there are no known RT&E species associated with this NHA that occur on the project site. Just to the south of Rock Point there is an unnamed tributary to the Chesapeake Bay designated as a Wetland of Special State Concern which may overlap with the project site.

Three Bald Eagle nests occur on the property, one within the Critical Area and two outside the Critical Area. The nest within the Critical Area is along the shoreline north of Rocky Point. The two outside of the Critical Area are along Johns Creek and at Camp Conoy. The eagle nest at Camp Conoy is within the proposed development window. The bald eagle is currently listed as a threatened species by the state. Standard guidelines for Bald Eagle nest site protection are as follows:

1. Establish a protection area of ¼ mile radius around the nest tree. Within this area, establish three zones of protection: Zone 1 extends from the nest tree to a radius of 330

feet, Zone 2 extends from 330 feet to 660 feet in radius, and Zone 3 extends from 660 feet to ¼ mile (1320 ft).

2. No land use changes, including development or timber harvesting, should occur in Zone 1.

3. Construction activities, including clearing, grading, building, etc., should not occur within Zones 1 and 2 and ideally no closer than 750 feet from the nest.

4. Selective timber harvesting may occur in Zone 2, but clearcutting should be avoided.

5. No construction or timber harvesting activities should occur within the ¼ mile protection zone during the eagle nesting season, which is from December 15 through June 15.

These general guidelines are used by our biologists for Bald Eagle nest site protection. Specific protection measures depend on the site conditions, planned activities, nest history and other factors. If these guidelines cannot be followed, an incidental take permit will be required for disturbance to or removal of any Bald Eagle nests. If take of the Camp Conoy nesting territory cannot be avoided, consideration should be given to protecting the Rocky Point area of the property for nesting eagles.

Based on surveys by UniStar, there is a newly discovered population of Showy Goldenrod (*Solidago speciosa*) in the Camp Conoy area. Several large patches of this state threatened species were observed in lawn, old field, and mixed deciduous forest. The best-case scenario for the protection of this species is to avoid habitat alteration during the proposed construction activities. Mitigation for impacts to this population through transplanting individuals is discouraged. Transplanting of threatened or endangered plants is not considered a substitute for the protection of existing populations and may result in limited or no conservation value. However, since threatened and endangered plants are the property of the landowner, transplanting such species is not illegal provided the plants are not transported off the property. If such an action is pursued, adherence to DNR's guidelines for the reintroduction of rare plants (http://www.dnr.state.md.us/wildlife/rteplantreintro.html) is recommended.

UniStar surveys also documented several specimens of the state threatened Shumard's Oak (*Quercus shumardii*) on the CCNP property. These trees were found in well-drained bottomland deciduous forest in the floodplain adjoining the southern of the two main headwater streams to Johns Creek. Conservation of these trees and their habitat is encouraged.

There is a record for state rare Spurred Butterfly-pea (*Centrosema virginianum*) known to occur south of Johns Creek on the project site, in the western portion of the site. This record describes the population of Spurred Butterfly-pea as occurring in an open area along a fire-road through the wooded area there. Conservation of this species and its habitat is encouraged.

Our analysis of the information provided also suggests that the forested area on the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of this habitat is mandated within the Critical Area and must be addressed by the project plan. Specifically, if FIDS habitat is present, the following guidelines should be incorporated into the project plan:

1. Restrict development to nonforested areas.
2. If forest loss or disturbance is unavoidable, concentrate or restrict development to the following areas:
   a. the perimeter of the forest (i.e., within 300 feet of existing forest edge)
   b. thin strips of upland forest less than 300 feet wide
   c. small, isolated forests less than 50 acres in size
   d. portions of the forest with low quality FIDS habitat, (i.e., areas that are already heavily fragmented, relatively young, exhibit low structural diversity, etc.)
3. Maximize the amount if forest “interior” (forest area >300 feet from the forest edge) within each forest tract (i.e., minimize the forest edge:area ratio). Circular forest tracts are ideal and square tracts are better than rectangular or long, linear forests.
4. Minimize forest isolation. Generally, forests that are adjacent, close to, or connected to other forests provide higher quality FIDS habitat than more isolated forests.
5. Limit forest removal to the “footprint” of houses and to that which is necessary for the placement of roads and driveways.
6. Minimize the number and length of driveways and roads.
7. Roads and driveways should be as narrow and as short as possible; preferably less than 25 and 15 feet, respectively
8. Maintain forest canopy closure over roads and driveways.
9. Maintain forest habitat up to the edges of roads and driveways; do not create or maintain mowed grassy berms.
10. Maintain or create wildlife corridors.
11. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
12. Landscape homes with native trees, shrubs and other plants and/or encourage homeowners to do so.
13. Encourage homeowners to keep pet cats indoors or, if taken outside, kept on a leash or inside a fenced area.
14. In forested areas reserved from development, promote the development of a diverse forest understory by removing livestock from forested areas and controlling white-tailed deer populations. Do not mow the forest understory or remove woody debris and snags.
15. Afforestation efforts should target a) riparian or streamside areas that lack woody vegetative buffers, b) forested riparian areas less than 300 feet wide, and c) gaps or peninsulas of nonforested habitat within or adjacent to existing FIDS habitat.

The Critical Area Commission's document "A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area" provides details on development standards and information about mitigation for projects where impacts to FIDS habitat cannot be totally avoided. Mitigation plantings for impacts to FIDS habitat may be required under the local government's Critical Area Program. The amount of mitigation required is generally based in whether or not the guidelines listed above are followed.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8572.

Sincerely,

Glenn D. Therres

Glenn D. Therres, Associate Director
Wildlife and Heritage Service
Natural Heritage Program

ER # 2008.1111.CT

cc: S. Gray, PPRP
M. Owens, CAC
A. Widmayer, CAC
D. Lutchenkov, UNE
L. Byrne, DNR

Martin O'Malley, *Governor*
Anthony G. Brown, *Lt. Governor*

SHA
State Highway Administration
Maryland Department of Transportation

John D. Porcari, *Secretary*
Neil J. Pedersen, *Administrator*

June 26, 2008

RE: Calvert County
MD2/4 Calvert Cliffs Nuclear Power Plant
Proposed New Unit 3
(CCNPP3-CPCN Case 9127)
Phase II Traffic Study
Milepoint 8.00

Ms. Susan Gray
Power Plant Assessment Division
Tawes State Office Building, B3
580 Taylor Avenue
Annapolis, MD 21401-2397

Dear Ms. Gray:

Thank you for the opportunity to review the revised Traffic Impact Study prepared by KLD Associates, Inc., dated May 23, 2008, for the proposed Phase I expansion of the Calvert Cliffs Nuclear Power Plant in Calvert County. The study was revised in response to the State Highway Administration's (SHA's) July 30, 2007 comment letter. It is my pleasure to respond.

The SHA has completed a review of the information provided and offers the following comments:

- The counts conducted in the year 2006 cannot be used in CLV and HCS analysis as the existing conditions. They have to be projected to the current year by applying a growth factor.

- The Consultant employed a growth rate of 2.5% and indicated that the rate accounted for local development, as well as regional traffic growth. The SHA has been employing a growth rate of three to four percent in recent studies in the area for regional growth in addition to trip generation of approved developments. Given that the MD2/4 corridor serves as the primary transportation link in the area, the 2.5% factor is too low. The Consultant must employ a regional growth rate of 4% in addition to quantifying background developments (in both St. Mary's and Calvert Counties) for the construction phase and full build-out scenarios.

- The Consultant indicated that no major roadway projects are proposed for the study area. However, the SHA CTP 2008-2013 Line, Item 2 (Lusby Connector) is now under construction and will have an impact on traffic operations. Trip distribution patterns must be adjusted accordingly.

- The existing lane configuration for the Ball Road approach at MD2/4 should be shown as a shared through/left turn lane and an exclusive right turn lane. Under the mitigation measures for MD 2/4 and Calvert Beach Road/Ball Road, the report recommends that the shoulder be converted to a travel lane. It is unclear whether the northbound lanes of MD 2/4 downstream of the intersection will continue as three through lanes or will be reduced to two through lanes.

- The study recommends the improvements based on the assumption that the MD2-4 intersections with Pardoe Road and Cove Point Road would be signalized. The SHA is not in a position to render a decision regarding whether proposed signalization is warranted and justified until the issues of trip distribution and traffic projections are resolved. It should be noted that the satisfaction of a traffic signal warrant and/or warrants shall not in itself justify requiring the installation of a traffic control signal. These intersections should also be evaluated assuming they will be unsignalized and recommend improvement measures accordingly. Typically, if an exclusive right turn lane is present, the SHA will exclude right-turn traffic volumes when calculating the minor street signal warrant test volumes.

- The queue, capacity, and traffic signal warrant analyses must be recomputed with the updated traffic volumes and lane configurations.

- The Critical Lane Analyses do not appear to be computed correctly. The shared lane left turn PCE factor must not be applied to the left-turn volume shown as the "opposing left" in the calculations. In addition, if an exclusive right turn lane is present, a portion of the right turn traffic can be assumed to clear during the corresponding left turn movement, thus reducing the Critical Lane Volume.

- The SHA will not accept the use of shoulders for maintaining traffic unless the shoulders are traffic bearing, which would require the applicant to reconstruct the shoulders to an acceptable pavement section. Cores are typically taken during design to establish the existing pavement section and necessary adjustments.

- The use of the existing shoulders will require construction of a shoulder area to maintain the continuity of the mainline and shoulder needs along this high-speed heavy traffic corridor.

- The SHA will require a queue analyses based on the SHA's 95% Probability methodology with the 1.4 surge factor included. The queue analyses must also consider the impacts to queue lengths caused by construction vehicles in the queues.

- Provide SYNCHRO analysis of the entire study area with the proposed lane configuration during construction. In particular, it is important to model the effects of the extra lane (on the shoulder) ending. This will result in three through lanes going down to two through lanes at some point. The queues resulting from this bottleneck need to be analyzed.

- On Page 28 of the report, it is assumed that at the intersection of MD 2/4 and Calvert Beach Road, the shoulder (converted to a travel lane) will primarily handle the construction workers traffic and not the heavy vehicles. Please explain. How will construction vehicles and other traffic be restricted from using this lane?

- On page 28, it is mentioned that the peak construction traffic is expected through the year 2013 with a gradual build up and reduction before and after the period. An analysis showing when this traffic volume will trigger the use of the mitigation measures needs to be shown.

- The lane configuration shown on Figure 12 and Figure 15 is unclear and unsatisfactory.

- The double left turn from the Nursery Road and the double left turn from MD 2/4 southbound together would create congestion in the median and would affect the safety of the intersection. By converting the shoulders into travel lanes, there would not be enough room for vehicles to stop in the median and wait to complete the turning maneuver. A condition diagram showing the available storage area in the median has to be provided.

- Figure 15 shows a lateral lane shift for the northbound through traffic at the intersection. The lateral shift is abrupt, does not meet acceptable standards. It has to be designed according to the AASHTO standards.

- Figure 15 also shows a shared through and left turn on the southbound MD 2/4, which is unacceptable.

- The roadway improvements necessary to mitigate the power plant generated traffic impacts should be completed in place when the traffic demand occurs. The SHA would accept additional traffic impacts while the engineering details are resolved to issue an access permit through SHA. The applicant should be required to have the roadway improvements permitted by SHA and under construction when the construction reaches 500 workers with all improvements substantially in place and completed to open to unrestricted traffic by the time the activities reach 1000 construction workers.

The SHA understands the need for additional power generation facilities in Maryland and would work with the applicant and other agencies to coordinate the continued reviews of revised traffic study reports, engineering plans, calculations and supporting documentation necessary to obtain SHA approval for an access permit. The revised reports must determine the extent of traffic impacts caused by the anticipated workforce and the roadway improvements necessary to mitigate those impacts.

The SHA recommends the applicant be required to revise the traffic impact study report and submit 8 copies to SHA for review, comments, and acceptance of the report to SHA satisfaction. The SHA will require that the above items be addressed in the revised report with a point-by point response. If you have any questions, please contact me or Mr. Matt Sichel at 410-545-5600 or by e-mail at msichel@sha.state.md.us.

Sincerely,

Steven D. Foster, Chief
Engineering Access Permits Division

SDF/jh
cc: Mr. Steve Autry, SHA, Engineering Access Permits Division
Mr. Robert French, SHA, Office of Traffic and Safety
Mr. Jim Holls, Whitney, Bailey, Cox and Magnani, LLC
Ms. Bobbie Hutchison, Calvert County, Department of Planning and Zoning
KLD Associates, Inc.
Ms. Olivia Vidotto, Calvert County Government, Department of Planning & Zoning
Mr. Matt Sichel, KCI
Mr. Eric Tabacek, SHA, Traffic Development & Support Division
Mr. Morteza Tadayon, SHA, Travel Demand Forecasting Section
Mr. Robert Taylor, Calvert County, Department of Public Works
Mrs. Kimberly Tran, SHA, District 5 Traffic