

**State Advisory Board on Air Pollution
Cumulative Impacts Subcommittee Report
November 7, 2001**

Background

The State Advisory Board (SAB) on Air Pollution was organized to evaluate key air quality issues of concern and to offer recommendations to the State Air Pollution Control Board for consideration of further action. Prior to the first SAB meeting this year, SAB Chairman Melanie Davenport met with John Daniel, Chuck Turner and Bob Mann to discuss six or seven issues of particular importance to the DEQ. The topics were presented at the first SAB meeting and the SAB members voted on the choices. A review of the cumulative effects issue was chosen as one of three issues to evaluate this year.

Problem Statement

Deregulation of the electric generation industry has spurred a proliferation of proposed new sources of air pollution. Most of the proposed power plants would run on natural-gas with a fuel-oil backup. Although cleaner than traditional coal-fired plants, the number of new proposals has raised questions of their cumulative effects. Most of these plants have demonstrated through air quality modeling that the proposed source will not cause or contribute to exceedances of National Ambient Air Quality Standards or Class I or II air quality increments (maximum allowable increases in air pollution). Minor sources are not generally required to conduct this type of modeling but in several cases the Virginia DEQ has required minor sources to model for significance impacts.

Since most of these sources pass the initial modeling for significance, no cumulative impacts assessment is required. The inventories, meteorology and other data needed to set up multisource cumulative impacts modeling is very difficult to obtain, extremely labor intensive and very costly. Therefore, a thorough multi-source impacts assessment is not a small undertaking and is not generally pursued unless it is necessary. Several wide-scale regional assessments have been conducted by multi-state organizations (e.g., OTAG, SAMI, etc) and some states, like Virginia, have been able to build on these efforts, especially with regard to the inventories, models and other data established as part of the OTAG effort. Although the Virginia DEQ continues to conduct multi-source ozone modeling based on the OTAG work, and the results to date have revealed very small impacts from these new sources, there currently is no formal mechanism to require these types of assessments when the source demonstrates that emissions from that individual plant will not cause or contribute to NAAQS or Class I or II increment exceedances.

Subcommittee's Mission

To make recommendations for evaluating cumulative impacts of ozone precursors, particularly NO_x emissions, from new sources, in a way that helps evaluate technical, economic, and environmental effects of NO_x emissions and emissions control so that the DEQ can form technical and regulatory review policy for NO_x emission sources.

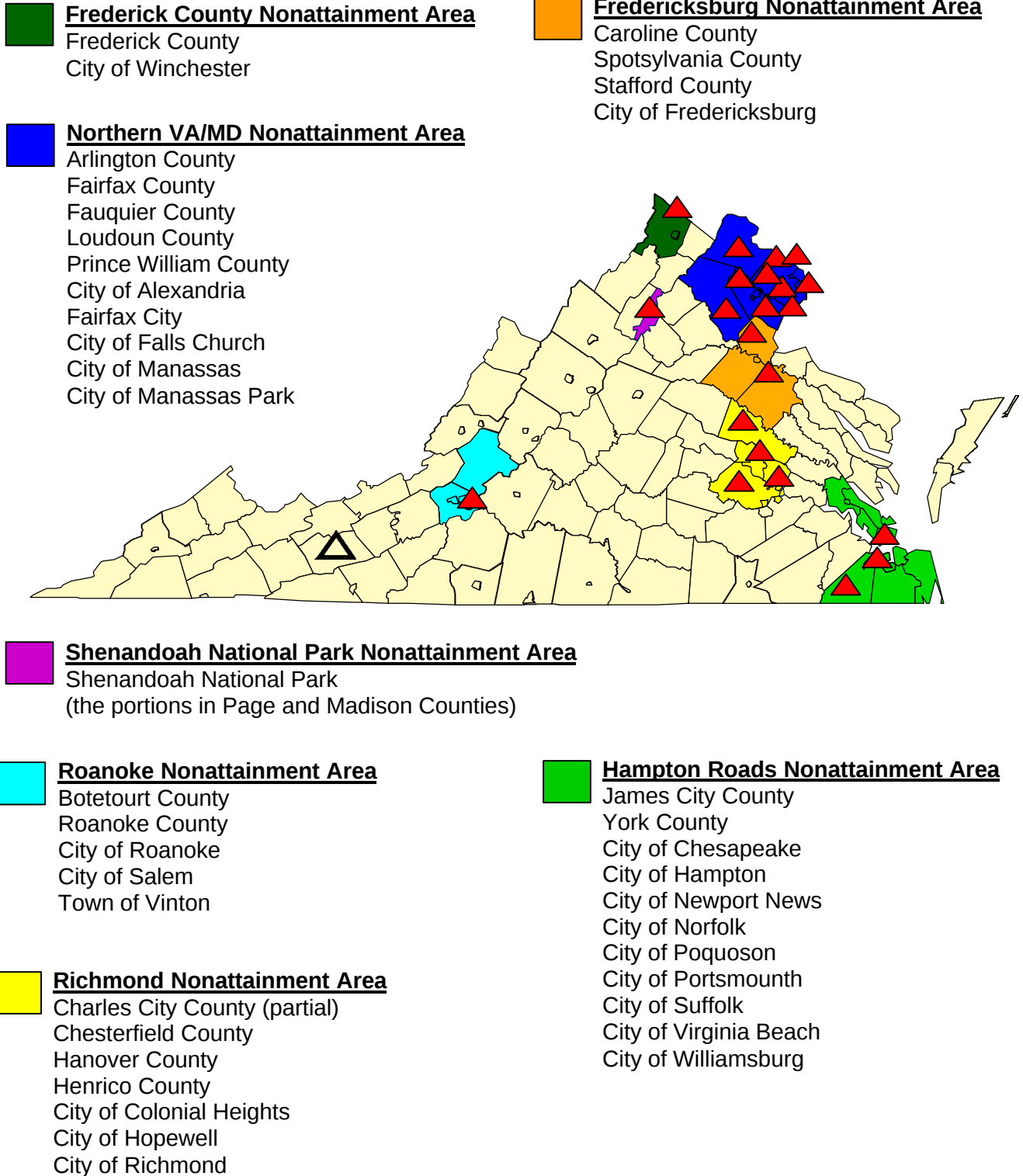
Ozone Attainment Status

Virginia is currently in the process of implementing a new ozone standard. The new standard has been promulgated but the implementation process and some legal issues have not been completely worked out by the Environmental Protection Agency (EPA). Once these issues have been worked out, Virginia will begin transitioning to a system based on the new standard. As with any Ambient Air Standard, areas within the state will be evaluated based on the monitored data and will be given designations as to whether they are attaining the standard or are out of compliance with the standard.

The previous standard was a one hour standard, specified as .12 parts per million. This means that the decisions regarding the attainment status of any given area in the state was based on the monitored concentrations for a one hour period. Under the previous standard, the Northern Virginia area (Arlington County, Alexandria City, Fairfax County, Fairfax City, Loudoun County, Falls Church City, Prince William County, Manassas City, Stafford County, Manassas City) is the only non-attainment area within Virginia. It is rated as a serious non-attainment area. Two other areas within the state are operating under a maintenance plan, each plan established to address past violations of the 1 hour standard. These areas are the Richmond area (Charles City County, Colonial Heights City, Chesterfield County, Hopewell City, Hanover County, Richmond City, Henrico County) and the Hampton Roads area (James City County, Poquoson City, York County, Portsmouth City, Chesapeake City, Suffolk City, Hampton City, Virginia Beach City, Newport News City, Williamsburg City, Norfolk City).

The proposed eight hour ozone standard is specified as .8 ppm and is compared against the fourth highest daily reading obtained from a 24 hour daily period. This more stringent standard has been analyzed within the Commonwealth and DEQ currently has some proposals that reflect DEQ's best evaluation of the attainment status of the various areas around Virginia. These designations are only proposed at this point and will not be finalized until the Environmental Protection Agency has worked out the implementation strategy for attaining the ambient standard for ozone in those areas deemed out of compliance with the proposed eight hour standard. The areas proposed as non-attainment under the eight hour standard are shown in the table below.

Table 1. Proposed 8 Hour Standard Non-attainment Areas



Current Permitting Activity

The following is a listing of power plant projects underway in Virginia. They include plants:

- Already permitted in the last few years;
- With air permit applications in the queue at the DEQ, and;
- In various initial stages.

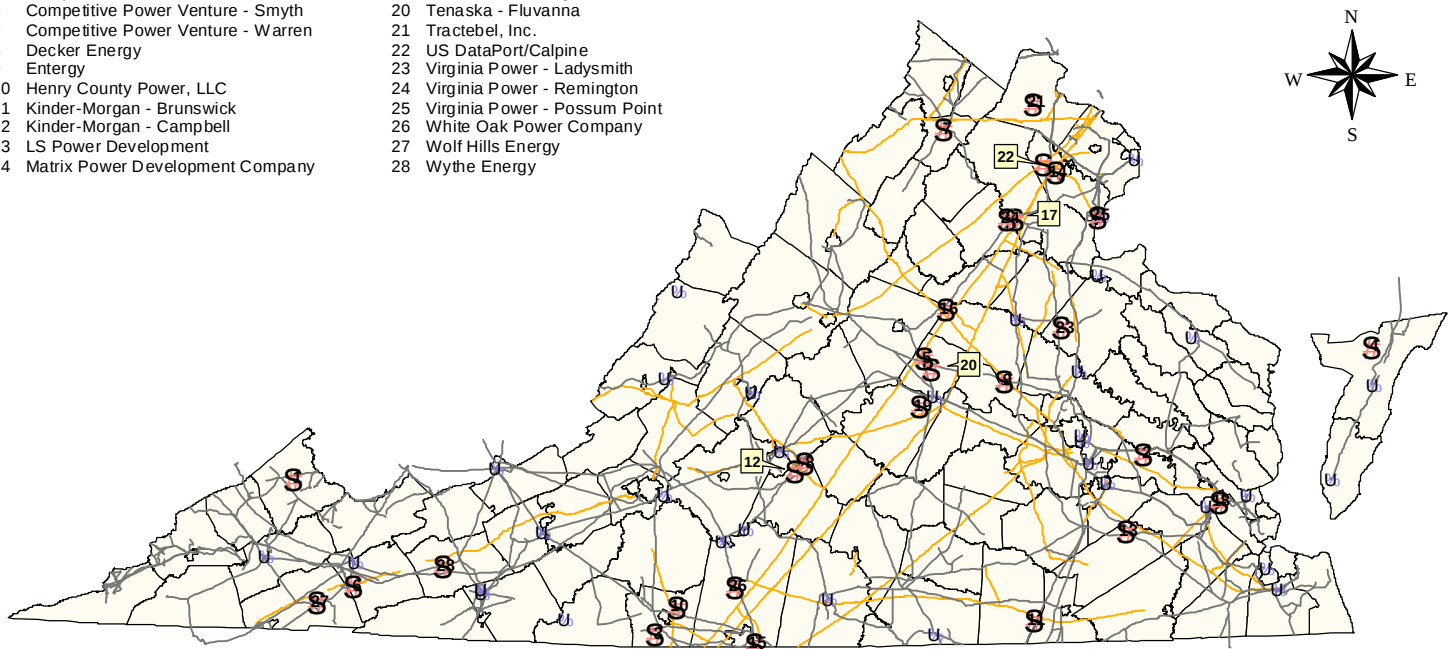
There are currently five air permits that have been issued in the last two years, 14 plants with applications in process and nine in the initial stages. Industry representatives believe that no more than 40-50 percent of the currently-announced projects will actually be constructed.

POWER PLANTS							
Plant Name	County Location	Application Status	Permit Program	Permit Type	Facility Capacity	Fuel Type	Other
Commonwealth Chesapeake Corp	Accomack County	Issued 10/2000	PSD	-	350 Megawatts, 7 GE LM 6000 at 50 mW each, simple cycle turbines	oil fired only	
Virginia Power - Caroline Combustion Turbines	Caroline County	Issued 7/2000	NSR	Syn Minor/State Major	600 Megawatts, 5 simple cycle turbines	Natural Gas, Oil	
Virginia Power - Remington Combustion Turbine	Fauquier County	Issued 7/1999	NSR	Syn Minor/State Major	600 Megawatts, 5 simple cycle turbines	Natural Gas, Oil	
US DataPort/Calpine	Prince William County	Issued 6/2001	NSR/NA	-	200 Megawatts, 6 combined cycle turbines	Natural Gas	
Wolf Hills Energy LLC	Washington County	Issued 5/2000	NSR	Syn Minor/State Major	250 Megawatts, 10 simple cycle turbines	Natural Gas	
Brunswickgenerating station - Kinder morgan (51956)	Brunswick County	Active Application	PSD	-	Hybrid combined cycle power plant	Natural Gas	
Allegheny Energy Supply	Buchanan County	Active Application	NSR	Syn Minor/State Major	2 GE LM 6000 PC's 44 mW each, simple cycle	Natural Gas	
Tenaska	Buckingham County	Active Application	PSD	-	900 Megawatts, 3 combined cycle turbines	Natural Gas, Oil	
Kinder-Morgan	Campbell County	Special use Permit Application	PSD		550 Megawatts, Hybrid Combined Cycle	Natural Gas	
Decker Energy Co.	Campbell County	Special use Permit Application	PSD			Natural Gas	Wastewater Cooled
Chickahominy Power	Charles City County	Active Application	PSD	-	675 Megawatts, 4 Westinghouse 501F simple cycle turbines	Natural Gas, Oil	
ODEC - Remington Marsh Run	Fauquier County	Active Application	NSR	Syn Minor/State Major	750 Megawatts, 4 simple cycle turbines	Natural Gas, Oil	
Tenaska	Fluvanna County	Active Application	PSD	-	900 Megawatts, 3 combined cycle turbines	Natural Gas, Oil	
Competitive Power Venture	Fluvanna County	Pre-application Meeting	PSD	-	530 Megawatts, 2 comined cycle turbines	Natural Gas, Oil	Air Cooled
Henry County Power LLC	Henry County	Active Application	PSD	-	1100 Megawatts, 4 combined cycle turbines (natural gas only)	Natural Gas	
Cincap	Henry County	Active Application	NSR	Syn Minor/State Major	320 Megawatts, 4 simple cycle turbines	Natural Gas	

Standish Energy	James City County		PSD		580 Megawatts, Combined Cycle	Natural Gas, Oil	Wastewater Cooled
Tractebel, Inc	Loudon County	Pre-application Meeting	PSD/NA	-	1400 Megawatts, 4 combined cycle turbines	Natural Gas	
Entergy	Louisa County	County Planning Commission Meeting	PSD		1000 Megawatts	Natural Gas	
ODEC - Louisa Generation Station	Louisa County	Active Application	NSR	Syn Minor/State Major	570 Megawatts, 5 simple cycle turbines	Natural Gas, Oil	
White Oak Power Company	Pittsylvania County	Active Application	PSD	-	625 Megawatts, 4 simple cycle turbines	Natural Gas, Oil	
Mirant (Airside Industrial Park)	Pittsylvania County	Pre-application Meeting	PSD	-	870 Megawatts, 2 combined cycle and 4 simple cycle turbines	Natural Gas	Wastewater Cooled
Virginia Power Possum Point	Prince William County	Active Application	PSD/NA	-	540 Megawatts, 2 combined cycle turbines	Natural Gas	
Competitive Power Venture	Smyth County	Announced	PSD				
LS Power Development	Sussex County	Pre-Application Meting	PSD		800-1600 Megawatts	Coal	35 MGD cooling wate required
Competitive Power Venture	Warren County	Announced	PSD				
Matrix Power Development Company	Wythe County	Local Zoning Request	PSD		375 Megawatts		
Wythe Energy Facility	Wythe County	Active Application	PSD	-	620 Megawatts	Natural Gas	

Proposed Power Generation Facilities in Virginia August 2001

- | | |
|--|----------------------------------|
| 1 Allegheny Energy Supply | 15 Mirant |
| 2 Chickahominy Power | 16 ODEC - Louisa |
| 3 Cincap | 17 ODEC - Remington Marsh |
| 4 Commonwealth Chesapeake Corporation | 18 Standish Energy |
| 5 Competitive Power Venture - Fluvanna | 19 Tenaska - Buckingham |
| 6 Competitive Power Venture - Smyth | 20 Tenaska - Fluvanna |
| 7 Competitive Power Venture - Warren | 21 Tractebel, Inc. |
| 8 Decker Energy | 22 US DataPort/Calpine |
| 9 Entergy | 23 Virginia Power - Ladysmith |
| 10 Henry County Power, LLC | 24 Virginia Power - Remington |
| 11 Kinder-Morgan - Brunswick | 25 Virginia Power - Possum Point |
| 12 Kinder-Morgan - Campbell | 26 White Oak Power Company |
| 13 LS Power Development | 27 Wolf Hills Energy |
| 14 Matrix Power Development Company | 28 Wythe Energy |



Power Plant Siting

To help the Cumulative Effects Subcommittee to understand the process of siting a new power plants, subcommittee members provided the following overview.

Power plant siting involves several steps. First a number of potential areas are selected by inspection of maps, aerial photographs and databases. Candidate sites are selected on the basis of their proximity to existing infrastructure that is needed to support power plant construction and operation. The sites are then examined in greater detail to identify the ones that are most practical from logistical, economic, engineering, environmental and other regulatory considerations. Those sites that have the best combination of the necessary characteristics are the most likely for ultimate selection.

Logistical Considerations

Fuel availability: Transportation of fuels to the plant site must be economically feasible. Pipelines, railroads and highways are needed depending upon the type of fuel expected to be consumed.

Transportation: The site must be accessible by roads of sufficient carrying capacity to allow transportation of heavy equipment for construction and maintenance.

Water availability: Water is necessary to support operation of a power plant, primarily for cooling. Depending on the design of the plant, varying amounts of water are needed. Potential sites must have adequate surface and/or ground water supplies available.

Environmental and Historical Resource Considerations

Applicable environmental requirements: Each candidate site must be examined to identify what type and what level of requirements will be applied. Sites vary considerably as to environmental restrictions. Some sites have very stringent requirements that are impossible or impractical for a power plant to meet. These sites may be excluded from further consideration unless acceptable mitigation measures can be employed. Environmental and historical aspects of a site that are considered include (1) existing air / water quality, (2) projected impact of plant operation on air / water quality, (3) previous industrial development of the site and (4) proximity to wetlands, preserved areas, archeological resources.

In order for a site to ultimately be selected, it must be reasonably certain based on all available information that the power plant, once constructed, can comply with applicable environmental requirements.

Local Considerations

Planning and zoning: Local zoning and planning requirements must be identified specific to each site. These may include restrictions on industrial development, compliance with long-term comprehensive development plans and appropriate use of the proposed site.

Land Availability: An adequate amount of land must be available to allow construction and future operation.

Noise requirements: Many localities have local noise ordinances. These must be identified and the potential impact of the new facility assessed.

Water requirements: Localities may have specific ordinances or requirements for water usage. The water needs of a proposed plant must be consistent with the amount of water that a local governing body will permit.

For each local consideration an assessment must be made of the ability of the plant to comply during operation. If it is determined that compliance with specific requirements is impossible or impractical for a given site, that site is generally excluded from further consideration unless the issue(s) of concern can be resolved.

Engineering Considerations

Topography, drainage and soil conditions: As with any large construction project, the physical characteristics of the site must be appropriate. The topography should be such that a minimum of excavation and site preparation is necessary. Drainage and soil conditions at the site must be adequate for construction and installation of heavy machinery.

Minimize infrastructure required: Since a substantial amount of infrastructure is required to support operation of power generating facility and to allow transmission of the electricity produced, a preferred site must have most of the infrastructure already in place. Otherwise the cost of construction for the facility becomes prohibitive.

Roads, bridges & railroads: Engineering studies must be performed to evaluate the carrying capacity of roads and bridges in terms of traffic and weight load. The cost of any improvements must be assessed as part of the project cost. Preferred sites will need a minimum of improvements and additions.

Pipelines: If natural gas is to be used as a fuel, the proximity of the site to a pipeline is critical. Construction of additional pipeline or spur line is very expensive and time-consuming and must, consequently, be minimized. The amount of gas available for use by the plant must be carefully considered and can present a severe limitation to the generating capacity of the plant.

Electric transmission capacity: Transmission lines must be available for connection to the power plant and must be of appropriate capacity to carry the generated electricity. Power plants are generally located in areas of a system grid appropriate to satisfy the current and projected demand for electricity. For example, if demand is increasing within a particular region of a power system grid, then, logically, locations for new generation are sought within that region in order to maintain appropriate voltage on the grid and to satisfy the growth in demand.

Other utilities: Reliable communications lines must be available to a power plant. In some cases, redundant backup communications using microwave or satellite equipment is

necessary. Potable water and sewage facilities must either be available through local utilities or on-site systems must be constructed.

Capital and Operating Costs: The costs to provide all of the above infrastructure and support along with future operating costs must be evaluated in detail for each candidate site. The site(s) which are projected to require the least capital expenditures and have the least operating costs will be ranked as the preferred sites for final selection.

Modeling Activities

Any thorough evaluation of cumulative impacts of multiple sources of ozone precursors must involve a substantial modeling exercise. Nevertheless, the Virginia DEQ has conducted limited evaluations of the regional impacts on ozone levels from five of the new power plants locating in Virginia. The DEQ has been able to conduct these analyses because of the availability of the inventories and meteorology developed in the late 1990s for the Ozone Transport Assessment Group. The DEQ has also committed to conduct additional regional ozone cumulative analyses for 10 other power plants using the OTAG platform. The background conditions for these analyses will take into account the NO_x reductions mandated under the NO_x SIP Call rules. DEQ has also agreed to conduct the analyses without the NO_x reductions.

Standard modeling approach

Typically, air permit applicants are required to perform air quality modeling of pollutants for which the PSD significant emission thresholds are expected to be exceeded. The modeling must be done according to EPA and state guidelines and must identify the maximum predicted air pollutant concentrations that might occur under worst case meteorological conditions. In order for a permit to be granted, the analysis must demonstrate that the proposed source will not cause or contribute to exceedances of National Ambient Air Quality Standards or Class I or II air quality increments (maximum allowable increases in air pollution).

If preliminary modeling of the proposed source predicts air pollutant concentrations in excess of EPA significance thresholds, the applicant must perform a cumulative analysis which includes emissions from the proposed source, surrounding sources and regional background concentrations of air pollutants as well.

Some states, including Virginia, are requiring modeling of emissions from certain type of proposed sources that fall below the PSD significant emission thresholds. This is being done largely to address public concern over the many power plant projects that are proposed around the country.

Since modeling ozone concentrations is technically very difficult and of questionable accuracy when applied to individual point sources, EPA policy has not required ozone modeling as a condition of permit issuance. Rather, EPA requires monitoring of ambient ozone concentrations prior to construction of a facility if emissions are expected to exceed 100 tons per year of volatile organic compounds.

If a PSD source is proposed to be located sufficiently close to a PSD Class I area to affect air quality or air quality related values in that area, then an additional analysis of Class I area impacts must generally be done. Procedures for conducting such analyses are explained in detail in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) document. Analyses that must be performed include assessments of effects related to visibility and acid deposition.

Cumulative Ozone Modeling Conducted by the Virginia DEQ

The Virginia DEQ has completed multi-source ozone modeling from five of the new generation sources listed in this report (Dominion Remington, Dominion Ladysmith, Tenaska Virginia Partners, ODEC Louisa, and Commonwealth Chesapeake Power). Using the OTAG inventory for the July 4-8, 1996 episode, the DEQ used the photochemical model MAQSIP, the SMOKE emissions model and the MM5 meteorology model on a 36-km and 12-km grid resolution for a nested modeling domain. The DEQ reports a maximum ground level impact of:

- Net ozone concentration increase of 2.2 ppb in no more than 2 grid cells with over 5000 cells evaluated. Each cell is an area of 12 km by 12 km.
- Net ozone concentration increase of 1.0 ppb or above in 20 cells.
- A 1 ppb ozone concentration impact in the Northern Virginia ozone nonattainment area.
- Negligible ozone impact in the Richmond and Hampton roads ozone nonattainment areas.

These modeled impacts for these five sources have been described as “in the noise” by DEQ staffers.

Additional DEQ Modeling

The DEQ is currently conducting two new ozone multi-source modeling efforts to include ten additional new generation sources in Virginia. This effort will include the five sources already modeled plus ten additional sources assuming a 65% reduction in statewide NO_x emissions brought about by the NO_x SIP Call. The model will also be run without the SIP Call reductions to gain perspective on impacts of these sources on the existing background conditions.

“On the Way” Emissions Reductions

In order to perform a reasonably accurate analysis of the cumulative effects of multiple air pollution sources, it is important that the background conditions are properly accounted for in any modeling exercise. The DEQ has been able to conduct some limited regional assessments of the cumulative impacts of ozone precursors relatively easily because of the availability of the OTAG inventories and platform. The subcommittee recognizes that these background conditions have and will continue to change dramatically from the background inventories used during the OTAG efforts in the late 1990s. As these background conditions change, the OTAG work becomes less useful for current applications. At this time there are a number of new emissions reduction initiatives underway. Future assessments of the regional cumulative impacts of emissions

sources on ozone levels (and any cumulative assessments of Class I impacts) must take into account the “on the way” reductions.

Phase II Title IV SO₂ and NO_x Reductions

Phase II of the Title IV acid rain program began in 2000. Because of the nature of the SO₂ allowance program, many companies have made SO₂ reductions earlier in Phase I in order to ensure compliance going into Phase II. As these allowance accounts begin to be drawn down in Phase II, additional SO₂ emissions controls will have to be installed to make up for the shortfall. Several new SO₂ scrubbers will be operational in nearby states in 2002. New scrubbers in Virginia are a virtual certainty in the coming years. There will be additional NO_x reductions as well when the “Early Elected” units must meet the tighter NO_x limits in 2008.

NO_x SIP Call

On September 24, 1998, EPA finalized a rule (known as the NO_x SIP Call) requiring 22 States and the District of Columbia to submit State implementation plans that address the regional transport of ground-level ozone. By improving air quality and reducing emissions of nitrogen oxides (a precursor to ozone formation known as NO_x), the actions directed by these plans will decrease the transport of ozone across State boundaries in the eastern half of the United States. The rule requires emission reduction measures to be in place by May 31, 2004. The NO_x SIP call builds upon analyses conducted by the Ozone Transport Assessment Group (OTAG). OTAG was a partnership between the EPA, the Environmental Council of the States and various industry and environmental groups which assessed the long-range transport of ozone and ozone precursors.

States subject to this action include Alabama, Connecticut, District of Columbia, Delaware, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Michigan, North Carolina, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, Wisconsin and West Virginia.

This rule will reduce total summertime (May 1 through September 30) NO_x emissions by about 25 per cent beginning in the year 2004. Utility NO_x emissions will be reduced by approximately 65% in the 22-state region. Under the rule, any new electric generating source with a net generating capacity over 25 mw will need to obtain allowances to operate during the five month ozone season. EPA projects that these reductions and emission caps will bring the vast majority of all new ozone nonattainment areas into attainment with the 8-hour ozone standard without having to implement more costly local controls. It will also help reduce ozone levels in the remaining ozone nonattainment areas east of the Mississippi River.

EPA has set overall statewide NO_x emissions budgets for the major electric generating units (EGUs) and the large industrial units (non-EGUs). States are required to implement these budgets through regulations as part of their State Implementation Plans (SIPs). The DEQ’s proposed NO_x SIP Call regulations, entitled “NO_x Emissions Budget Trading Program (Rev. D98)”, were presented to and approved by the State Air Pollution Control Board in November, 2000, and issued for public comment on July 16, 2001. Comments

were due to DEQ by September 14, 2001. DEQ is expected to have a final rule for submittal to EPA by early next year.

In addition, in January 2000, EPA promulgated a rule under Section 126 of the Clean Air Act establishing essentially the same state-specific ozone season NO_x emission caps for electric generating units for 12 of the 22 SIP Call region states, to be achieved by May 1, 2003. (A recent Court Order has temporarily tolled the May 1, 2003 compliance date). As in the SIP Call, new units greater than 25 mw will be required to obtain ozone season NO_x allowances under these caps. States subject to this rule include Delaware, District of Columbia, Indiana, Kentucky, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia and West Virginia.

Regional Haze Regulations

In June 1999, EPA issued final regulations to improve visibility in 156 national parks and wilderness areas (Class I areas) across the country. These rules focus on long term goals for reductions of haze-causing pollutants, including fine particles emitted directly to the atmosphere as well as fine particles formed following combustion, such as sulfates and nitrates. Because these particles are transported hundreds of miles, all 50 states will be subject to these rules even though some states do not have Class I areas.

The rules do not establish firm targets for states to achieve progress towards the visibility goals. Instead, states have the flexibility in determining reasonable progress towards an overall goal of reaching natural background conditions within 60 years. States are encouraged to work with surrounding states to achieve the goals in Class I areas affected by activities in each state. The rule requires states establish goals for each affected Class I area to 1) improve visibility on the haziest days and 2) ensure no degradation occurs on the clearest days over the period of each implementation plan.

The states' long term strategy must include enforceable measures designed to meet the interim reasonable progress goals. The first long-term strategy will cover 10 to 15 years, with reassessment and revision of the first goals in 2018 and every 10 years thereafter. The strategies must address all types of manmade emissions contributing to visibility impairment in Class I areas, including mobile sources, stationary sources (such as factories) and the smaller, "area" sources (such as residential wood fires and gasoline stations) and prescribed fires.

The rules also require installation of best available control technology (BART) for certain sources built between 1962 and 1977. There are three basic components to the BART program:

1. A list of BART-eligible sources;
2. A regional analysis of the cumulative emissions reductions and changes in visibility that can be estimated from BART controls; and ,
3. The BART emissions limits for each subject source, or an alternative measure such as an emissions trading program for achieving greater reasonable progress than source-by-source BART implementation.

BART determinations must take into account several factors including the existing control technology in place at the source, the costs of compliance, energy and nonair environmental impacts, remaining useful life of the source, and the degree of visibility improvement reasonably anticipated from the use of the control technology.

Emissions Trading

The successful implementation of the market-based emissions trading program under Title IV of the Clean Air Act to address the regional problems associated with acid deposition has provided a significant departure from traditional emissions reduction regulations. Each affected facility in existence as of enactment was allocated a limited number of annual SO₂ emissions “allowances”. Each allowance is assigned a specific serial number that designates the account and the year to which it has been allocated. Allowances can only be used during or after the year for which it is assigned, and can be traded for use at another facility or banked for future use. Thus, in any given year the annual SO₂ reduction will be slightly higher or lower than the goal of the program but on average will achieve the reduction mandated. One unintended result of this approach is that there has been much larger reductions than required early in the program as companies have chosen to accumulate allowance account balances in order provide a margin for future planning. Furthermore, EPA has reported “100% compliance” with the acid rain program, a testament to the success of this program.

Because the acid rain emissions trading approach has been almost universally accepted as a successful, reasonably cost-effective approach, legislators are now recognizing the benefits of this approach when considering new emissions reduction programs. The 2001 session of the Virginia General Assembly passed Senate Bill 1386, which amended Section 10.1-1322.3 of the Code of Virginia, pertaining to state regulations to provide for emissions trading programs.

The 2001 amendment, which was signed into law by the Governor and became effective July 1, 2001, mandated the adoption of four specific goals to be achieved by the emissions trading program applicable to the electric power industry. The four goals are expressed in the following language which was added to the statute:

The regulations applicable to the electric power industry shall foster competition in the electric power industry, encourage construction of clean, new generating facilities, provide new source set-asides of five percent for the first five plan years and two percent per year thereafter, and provide an initial allocation period of five years.

In adopting the four new public policy goals unanimously (the House of Delegates voted 99-0 in favor; the Virginia Senate vote was 40-0), the legislature signaled its strong desire to encourage construction in Virginia of new, modern, ultra-clean electrical generating facilities.

It is important to note that Senate Bill 1386 amends the existing §10.1-1322.3 which also states that “No regulations shall prohibit the direct trading of air emissions credits or

allowances between private industries, provided such trades do not adversely impact air quality in Virginia.”

Subcommittee’s Conclusions

1. The proliferation of announcements of new power plant developments in the state is a valid reason to continue to investigate cumulative impacts even when the emissions from each of the individual plants are below the threshold levels for a major source category. The concern is based on cumulative impacts of these new plants on air quality from emissions of ozone precursors (particularly NO_x).
2. The Department of Environmental Quality (DEQ) has been reviewing all new permit applications and applications for these new sources as per state and federal regulatory requirements and guidelines of the Clean Air Act. Additionally, the DEQ staff has asked applicants to perform additional modeling above and beyond that normally required for the synthetic minor source size category. The additional modeling information has helped the staff to thoroughly review new applications against concerns of cumulative impacts of NO_x emissions.
3. Cumulative impacts of ozone at the regional level have been studied by the DEQ through use of regional urban airshed models. This modeling effort has revealed small to negligible cumulative impacts of emissions from several synthetic minor sources. DEQ reported that it took about 30 days of model run time to add 3 new power plants to the background, and the results were within the noise level of the model. Ozone models are constantly changing.
4. The DEQ has performed statewide monitoring of O₃, CO₂, NO_x, and SO₂ levels over the past ten years. One hour and eight-hour monitoring of ozone have shown no appreciable or clear trend over the past ten years. Similar results were observed for NO_x emissions. The air quality data collected for the analysis has revealed that some areas in the state were struggling to meet the one-hour ozone standard and more areas would have difficulty achieving the eight-hour standard.
5. Multi-source modeling to process and review permit applications for synthetic minor sources is not only prohibitively expensively, but would yield very little useful information. This was experienced by the DEQ when it performed ozone emissions modeling of three recently proposed synthetic minor sources along with two recently proposed PSD sources. The net increase in ozone concentration was observed at 2.2 ppb maximum in two grid cells. More than 5000 grid cells were analyzed for this effort. The DEQ modelers questioned the ability of the current modeling technology to produce any meaningful predictions at this low concentration. DEQ does not have in-house capability to perform such modeling on routine basis, and believes that the level of effort expended in such exercise is considerable while the results are inconclusive (in the “noise” range) at the best.

6. The current DEQ workload will not accommodate performing frequent regional modeling analyses as the part of the permit review process for minor sources. Although the cost for outsourcing this type of multi-source analyses is difficult to estimate, some estimates range up to \$500,000. The cost could be considerably higher if extensive model set-up is required. Routine multi-source modeling will not resolve the cumulative impacts issue, however, some limited periodic assessments of additional new sources may provide useful information for permit review and processing.
7. DEQ does not have the regulatory authority to require multi-source modeling if the project itself is below PSD significance. Any regulatory change would require **about 3** years to implement.
8. It is extremely difficult (manpower intensive) to create the initial database of all emitters in the state in order to perform routine multi-source modeling. It is also extremely time consuming to require routine updates to this database from all emitting units in the state to take into account process changes. Once the NO_x SIP call is implemented in 2003/2004, major reductions in NO_x emissions will occur statewide and the emissions database will be out of date.
9. Contribution of mobile sources towards cumulative impact assessments of NO_x emissions continue to be under represented. A systematic approach to evaluate such effect would help understand and appreciate contribution of various sources.
10. The Phase II acid rain reductions (Title IV), the NO_x SIP Call, and the regional haze rules mandate severe emission reductions for ozone precursors, especially NO_x emissions over the next few years. The effect of such reductions need to be accounted for while evaluating cumulative impacts of emissions from new sources.
11. Other states evaluating the cumulative impacts are:
 - Kentucky where 24 new power plants have been proposed and 12 permits have been issued before the Governor's moratorium became effective. Cumulative effect analyses is still pending.
 - Maryland is evaluating the effects of several power plants in Frederick County
 - New Mexico has a number of proposed power plants; and
 - Pacific Northwest has analyzed cumulative effects of 45 proposed power plants on several Class I areas. Shenandoah NP has several copies of approved CALPUFF modeling protocols that are available to DEQ and CEWG.
 - Tennessee recently issued a moratorium on new private sector power plants until cumulative effects analysis can be completed.
 - Georgia recently issued a moratorium on new merchant power plants until cumulative effects analysis can be completed.
12. It is scientifically unjustified to single out one source sector, proposed electrical generation plants, when considering cumulative impacts. Other new sources

contributing key pollutants of concerns should also be evaluated using the same criteria.

13. The Shenandoah National Park Federal Land Manager has presented evidence that the air quality and the air quality related values in Class I areas in Virginia may still be compromised despite the achievement of large SO₂ and NO_x emissions reductions over the past several years.
14. Development of Brownfields in the state may offer a “Win-Win” scenario for the industry and the environmental groups, but not enough is being done to promote this alternative. Environmental Justice issues also need to be considered while developing Brownfields. Siting of new electric generating plants is based on available natural gas lines, electric transmission lines, cooling water source, stream capacity for discharges, available transportation routes. Siting is not done based on greenfields Vs brownfields.

Subcommittee’s Recommendations

1. Continue to conduct periodic re-assessments of regional ozone impacts as resources permit, but no more than twice a year to assure that impacts from new sources are properly monitored in Priority Classes 1 and 2. DEQ may be the logical entity to conduct multi-source modeling (regardless of significance threshold test results) when it is not mandated by a federal or a state law. DEQ will need to consider cost and time estimates and available staff resources and priorities, preferably based on the above referenced prioritization scheme.
2. Improve Public Perception and Awareness of the entire Cumulative Impacts issue by:
 - a. Highlighting DEQ work and efforts towards multi-source modeling and the analytical conclusions;
 - b. Clearly stating the emissions of concern (and the principal sources) for cumulative impacts consideration, and;
 - c. Providing projections for emissions of ozone precursors and other emissions of concern in the state taking into account reductions expected under the NO_x SIP CALL, the Regional Haze rule, and Phase II of the acid rain rules.
3. Participate in multi-state initiatives addressing the cumulative effects issues, including the on-going MARAMA CALPUFF effort.
4. Ensure that the contribution of mobile sources in any cumulative effects analysis is properly evaluated.
5. The DEQ should continue to research and evaluate the cumulative impacts issue. The Cumulative Effects Subcommittee was formed in Spring 2001, because the

cumulative effects of multiple new and modified sources of air pollution had been raised by the SAB members and the DEQ staff as a significant air quality issue. Accordingly, the subcommittee effort should continue as an ongoing effort beyond November 2001 with a broad, clearly defined mission to be defined by the SAB and DEQ staff. The subcommittee and Virginia should also take advantage of, and where the opportunity exists, build upon, other work being done that is pertinent to addressing this issue, e.g., multi-source CALPUFF modeling affecting Virginia, Bonneville Power Administration multi-source CALPUFF modeling protocols, SAMI modeling, RADM modeling (when available), etc.

State Advisory Board on Air Pollution

Cumulative Effects Work Group
Environment and Health Subgroup Report

Cumulative Effects of Multiple New & Modified Power Plants

November 7, 2001

Prepared at the Request of the

Virginia State Air Pollution Control Board

By the

State Advisory Board on Air Pollution

Cumulative Effects Work Group

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State Advisory Board on Air Pollution

DRAFT Environment and Health Subgroup Report

Cumulative Effects of Multiple New and Modified Power Plants

I. BACKGROUND

Deregulation of the electric generation industry has spurred a recent and ongoing proliferation of applications for power plants in Virginia that has triggered concerns about the cumulative environmental impacts of new emissions growth (see map in Appendix A). The State Advisory Board chose cumulative effects as one of three issues to evaluate this year, and a Cumulative Effects Work Group (CEWG) was formed with work group members representing industrial, economic development, environmental, and health interests. The CEWG agreed to initially focus on nitrogen oxide emissions and regional ozone modeling since ozone pollution is a major health and environment concern in Virginia and individual source models are not equipped to deal with it. In September, the CEWG was effectively split into two subgroups, one representing industrial and economic development interests, and one representing environment and health interests, because we could not agree on the breadth and scope of how to evaluate complex cumulative effects issues. The Environment and Health Subgroup believes that greater emphasis needs to be placed on the combined environmental health impacts of all new sources in order for the Virginia Department of Environmental Quality (VDEQ) and State Corporation Commission (SCC) to make fully informed decisions. Industry and Economic Development Subgroup members feel that existing regional ozone modeling results from a limited number of new sources and pending major emission reduction

programs will maintain or improve air quality and therefore cumulative effects modeling is not necessary. This, we believe, is the primary reason why the CEWG could not reach consensus on the complex cumulative effects issue by September, and subgroups will therefore prepare two separate reports and separate presentations for the annual State Advisory Board meeting in November.

This subgroup believes that the cumulative “environmental health” effects of multiple new and modified power plants is a critical issue because Virginia’s air quality is already substantially impaired. Last year, the VDEQ determined that 20 of 21 ozone monitors located in urban and rural settings reflected nonattainment of the new 8-Hour ozone standard based on 1997 through 1999 data. Northern Virginia, Richmond-Hampton Roads, and even some rural areas may have trouble meeting the new health-based fine particulates standard. The Class I Shenandoah National Park is widely regarded as “the second most air polluted park in the country” with good reason, and the Class I James River Face Wilderness faces similar threats to its scenic and ecological integrity (Appendix B). While it is certainly true that Virginia “receives” a lot of air pollution from out of state, recent modeling studies reflect that Virginia and other southeastern states contribute surprisingly high amounts of pollution to their own air quality problems. The addition of numerous major and synthetic minor power plants can and likely will “add up” to cumulative impacts that may further degrade Virginia’s air quality. Based on missions and responsibilities outlined below, Environment and Health Subgroup members and the U.S. Forest Service must take affirmative actions to avoid or minimize further air quality degradation and to promote clean air in Virginia.

The National Park Service, Piedmont Environmental Council, and American Lung Association of Virginia members agreed to serve on the Cumulative Effects Work Group (CEWG) due to the vital importance of this issue to agency and nonprofit missions and responsibilities as summarized below.

National Park Service Mission

“...to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same...as will leave them unimpaired for future generations.”

The Wilderness Act

Class I areas managed by the U.S. Forest Service and U.S. Fish and Wildlife Service are federally designated Wilderness. This law also applies to Shenandoah National Park since over 40 percent of the Park was designated as Wilderness by Congress in 1976.

“...the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain...an area of undeveloped Federal Land retaining its primeval character and influence...which is protected and managed so as to preserve its natural conditions”

The Clean Air Act (1977 Amendments)

This law applies to the National Park Service, the U.S. Forest Service, and the U.S. Fish and Wildlife Service who manage mandatory Class I areas.

“The Act assigns the Federal Land Manager of Class I areas affirmative responsibility to protect air quality related values from adverse impacts due to human-caused air pollution.”

The Clean Air Act legislative history instructs the Federal Land Manager to....

“...assume an aggressive role in protecting the air quality related values of Class I areas from adverse impact...”

“In cases of doubt the land manager should err on the side of protecting the air quality related values for future generations.”

Piedmont Environmental Council

“Promoting and protecting the Piedmont’s rural economy, natural resources, history and beauty”

American Lung Association

Nationally, the American Lung Association has advocated for tough health-based air quality standards to improve the quality of the air we breathe. In Virginia, the Lung Association has been an active player in this fight to protect Virginians from the adverse health impacts associated with air pollution.

The proliferation of power plants has elevated an existing concern about the cumulative effects of multiple new and modified sources on environmental health. The primary regulations that affect new major sources and major modifications are the Prevention of Significant Deterioration (PSD) regulations (see summary in Appendix C). Synthetic minor sources are subject to Virginia regulations. The PSD regulations serve as the basis for Virginia’s State Implementation Plan, and include but are not limited to requirements for states to demonstrate that increased air quality deterioration will not cause or contribute to a violation of the applicable increment (allowable increases in certain air pollutants) or health-based air quality standards for six specified pollutants, or cause or contribute to adverse impacts to air quality values in Class I areas. The PSD regulations (40 CFR 51.166) prescribe comprehensive, periodic reviews of the PSD program. To our knowledge, Virginia has never performed such a review, even though we are faced with the second major “wave” of energy development since the late 1980’s and Class I managers in Virginia have maintained *nationally* significant permit review workloads. It is conceivable, if not likely, that historically significant numbers of new

and modified sources will be permitted, constructed, and operated in Virginia with no estimate of their cumulative effects on PSD increments, federal health-based air quality standards, or sensitive environmental resources including but not limited to Class I resources (e.g., visibility, streams, soils, fish, vegetation). The Environment and Health Subgroup believes that the information gained through a cumulative effects analysis is vital to fully informed VDEQ and State Corporation Commission (SCC) decisions.

Cumulative Effects Definition

This subgroup proposes a working definition of “cumulative effects” modeled after the Council on Environmental Quality’s definition:

“The impact on air quality and air quality-related values (e.g., visibility, streams, fish, vegetation, cultural resources) resulting from the total pollutant loading from sources including the contributing effects of known and reasonably foreseeable new and modified sources of air pollution...a single source may cause individually minor, but cumulatively significant, effects on air quality or related values”

Nitrogen oxides (NOX) and particulate matter (PM) emissions (or secondary PM pollutants) from fuel combustion in power plants and other sources contribute to a range of problems. Nitrogen oxides are respiratory irritants, and also form ozone and small particles through atmospheric chemical reactions. Particulate matter contributes to a range of health problems, including impaired lung function, aggravation of serious respiratory and heart diseases, and premature death.

Ozone is a powerful respiratory irritant that can cause lung inflammation, transient decreases in lung function, shortness of breath, chest pain, wheezing, coughing, and exacerbation of respiratory illnesses such as asthma. Long-term and repeated ozone exposures may lead to chronically reduced lung function. Ongoing research being conducted in California suggests that early exposures to ozone pollution may

fundamentally affect the development and structure of the lungs in ways that reduce lung capacity, set the stage for asthma, and make breathing more difficult. On days of peak summertime ozone concentrations when energy demands are typically high, additional pollution emissions may exacerbate health problems for people with asthma, other respiratory ailments, or sensitivities to ozone.

Key emissions of concern to Federal Land Managers include sulfur dioxide, nitrogen oxides, particulate matter, and volatile organic compounds that contribute to regional and local haze, acid deposition, and/or ozone. Known resources at risk include scenery (visibility), streams, soils, fish, and vegetation (Appendix B). Based on Shenandoah National Park's ozone monitoring data, at least one-third of this Class I area is likely to be designated as an "ozone nonattainment area" per the 8-Hour health-based standard. Class I areas are defined as those areas having *cleaner* air than required to meet federal and state health-based air quality standards.

Cumulative Effects Work Group Mission

As discussed in our first two CEWG meetings, there are several key emissions and secondary pollutants of concern related to public "environmental health" issues.

Accordingly, we propose the following CEWG mission statement:

"To make recommendations for evaluating cumulative effects of multiple new and modified sources of air pollution in a way that helps evaluate technical, economic, environmental, and health effects."

To date, most of the permitted or proposed power plants would run on natural gas as a primary fuel with fuel oil back-up. Although natural gas is a cleaner fuel than oil or coal, the number of proposed power plants (30 known as of 9/18/01 including 22 major sources and 8 synthetic minor sources) has already far surpassed Virginia's major wave

of almost 20 co-generation plants in the late 1980's. This unprecedented new emissions growth has triggered public issues and concerns related to the cumulative, or additive, "environmental health" effects of multiple new and modified sources of air pollution. Reliance on relatively clean natural gas as the primary fuel (oil back-up) is a growing concern with the mushrooming national demand and many plants locating in close proximity to each other and proposing to tap into the same pipeline(s). One applicant proposing to locate in close proximity to Shenandoah National Park indicated that oil back-up was essential since "several other" plants were tapping into the same natural gas pipeline. Surges in natural gas prices may result in heavier, if not primary, dependence on dirtier oil fuel.

II. REPORT SUMMARY

This report primarily considers the information gathered and prepared by the CEWG, and other verifiable information, that we believe is germane to the proliferation of power plants issue at hand, the CEWG mission as previously described, and our recommendations. The subgroup reviewed key federal and state laws and regulations concerning new and modified source review programs. In response to initial VDEQ staff and industry concerns about evaluating cumulative effects issues in Virginia, we explored how other states and regions are addressing issues related to significantly increased energy development programs. We also reviewed the related role of the State Corporation Commission (SCC). In this report, we provide recommendations that we believe facilitate resource-efficient ways for VDEQ to evaluate cumulative effects of multiple new and modified power plants. We suggest that human health issues be

addressed by assessing the cumulative effects on two (of six) National Ambient Air Quality Standards (NAAQS) of primary interest: ozone (both 8-Hour and 1-Hour health-based standards) and particulate matter (both PM_{2.5} and PM₁₀ health-based standards). The Federal Land Managers request that W126 Ozone Exposure Index estimates (Appendix E) be included in regional ozone modeling outputs to assess cumulative effects on ozone-sensitive vegetation; and that visibility, acid deposition and Class I increments be analyzed in the CALPUFF modeling. Appendices provide more detailed background information pertinent to the report and our recommendations. **Appendix A** is a map of Virginia's known power plant permitting activity as of September 18, 2001. **Appendix B** includes briefing statements regarding air quality and pollution impacts at Shenandoah National Park and James River Face Wilderness. **Appendix C** contains summaries of selected federal and state laws and regulations applicable to Virginia's energy development program. We wish to highlight that major emissions reductions like the NOX State Implementation Plan were promulgated to augment, not replace, federal and state regulations most pertinent to new emissions growth. **Appendix D** is a glossary excerpt that defines the biologically relevant W126 Ozone Exposure Index requested by Federal Land Managers as an additional regional ozone modeling output.

III. CONCLUSIONS

The Environment and Health Subgroup believes that there needs to be a greater balance between environmental health and Virginia's desire for efficient, clean energy choices and potential future industrial growth (economic development). The State Corporation Commission that has final approval authority for energy projects "shall" consider electric generation reliability, "shall" consider environmental impacts (usually

based on VDEQ air permits), and “may” consider economic development. The 30 known power plants (as of September 18, 2001) in Virginia already represent more than a 100 percent increase to existing electric generation in the Commonwealth, and almost a 100 percent increase in the number of electric generating facilities. Thirty-one existing units in Virginia generate over 18,000 megawatts (MW), while the proposed 30 units would generate over 20,000 MW. If energy development in Virginia continues at its current rate, the number of power plants in the Commonwealth could surpass 45 in the foreseeable future. The Bonneville Power Administration’s recent “worst case” cumulative effects analysis indicates that 45 *natural gas-fired (most with oil back-up)* power plants in the Pacific Northwest would cause significant impacts on visibility at several Class I national parks and wilderness areas. Neighboring states affecting Virginia’s air quality are also experiencing larger permitting program activities due to energy development and other industrial growth. Kentucky (after 24 applications), Tennessee, Georgia, and the Pacific Northwest states have slowed down their energy development programs to allow time for cumulative effects analysis.

The unprecedented number of source applications also consumes valuable time and resources, particularly if source modeling analyses indicate problems related to PSD increments (allowable increases for certain pollutants), health-based air quality standards, or sensitive Class I resource impacts due to haze, acid deposition or ozone. Federal Land Managers have already encountered situations where CALPUFF modeling of individual sources triggered Class I PSD multi-source increment analysis and/or likely adverse impacts on AQRVs.

In the Pacific Northwest, the Bonneville Power Administration has demonstrated that a large-scale, multi-source CALPUFF modeling analysis of multiple power plants can be done on a relatively short timeframe to facilitate informed decisions by disclosing cumulative environmental impacts. VDEQ has an Ozone Transport Advisory Group information base (late 1990's) to support regional or state-wide ozone modeling. The modeling should also benefit other long-term programs such as ozone attainment status and effectiveness monitoring of Virginia's 2001 emissions trading law that prohibits trading that will adversely impact the Commonwealth's air quality. Based on agency missions and findings in the Pacific Northwest analysis (adverse impacts on visibility and acid deposition issues), Federal Land Managers believe that large-scale CALPUFF and state-wide ozone modeling analyses are essential to uphold their affirmative responsibility to protect sensitive resources from adverse impacts due to air pollution. This is particularly important since Virginia has never done a comprehensive periodic review of its Prevention of Significant Deterioration program (CFR 51.166), and this is the second major wave of new and modified source development since the late 1980's. Moreover, the National Park Service and the U.S. Forest Service in Virginia have maintained nationally significant permit review programs affecting Class I areas that have already been adversely impacted by high levels of human-made air pollution over the course of decades. Participation in the permitting program is one important way that Federal Land Managers uphold their "affirmative responsibility" to protect sensitive Class I resources from the adverse impacts of air pollution.

No existing policies *require* state regulatory agencies or applicants to analyze the cumulative effects of historically significant energy development program levels.

However, current impacts of air pollution on environmental health combined with rapidly expanding power plant development has greatly elevated the need for a state-wide, cumulative “environmental health” effects analysis on an expedited timeline to inform key DEQ and SCC decisions. Greater balance is needed between environmental health impacts, one of two primary SCC considerations, and economic development that is a secondary SCC consideration. Modeling tools and, for the most part, adequate information bases are available to perform “worst case” cumulative effects analyses. “Worst case” scenarios should assume all sources would be permitted, built, and operated. The analysis should also model cumulative effects of new emissions growth from new and modified sources separate from and prior to any additional modeling for pending regional emissions reductions programs such as the NOX State Implementation Plan, Acid Rain Program Phase II, Regional Haze Rule, etc. The VDEQ should consider the following kinds of environmental health assumptions in designing the analysis, and summarize key modeling assumptions for CEWG review/comment with adequate time allowed for modeler consultation. Based on agency and nonprofit missions, the Environmental and Health Subgroup believes we must err on the conservative side to protect public health and welfare, including but not limited to sensitive Class I resources.

- Meeting the 1-Hour and 8-Hour health-based ozone standards;
- Meeting the PM_{2.5} and PM₁₀ health-based particulates standards;
- Meeting the Class I and Class II Prevention of Significant Deterioration increments for nitrogen dioxide, sulfur dioxide, and particulate matter (PM₁₀)
- Using the default EPA-designated ozone nonattainment areas;

- Avoiding adverse impacts on Class I air-quality related values (e.g., visibility, water quality, fish, soils, vegetation)
- Using the default EPA-allocated NOX emission budget for electric generating units;

With all due respect, we cannot endorse the DRAFT Industry and Economic Development Subgroup Report shared with the CEWG on September 30, 2001 as a consensus report. As agreed at the September 18, 2001 State Advisory Board meeting and discussed in the “Background” section of this report, the full CEWG does not have consensus on substantive aspects of this complex issue. However, we sincerely hope that the Virginia State Air Pollution Control Board adopts our recommendation to continue CEWG efforts in a way that is directly responsive to key public “environmental health” issues surrounding the proliferation of power plants. We remain willing and motivated to serve in this important endeavor.

II. RECOMMENDATIONS FOR EVALUATION OF THE CUMULATIVE EFFECTS OF MULTIPLE POWER PLANTS

Although the cumulative effects issue has largely been triggered by the energy development program, the CEWG agrees that approaches should apply to all stationary source sectors emitting key pollutants of concern. At this point, it is clear that the scope, magnitude, and rate of power plant proliferation in Virginia warrants an expanded and accelerated modeling analysis of cumulative effects to fully inform Virginia Department of Environmental Quality (VDEQ) and State Corporation Commission (SCC) decisions regarding environmental impacts.

Short-term Recommendations

1. Continue the CEWG Effort – We recommend adoption of the “CEWG Mission” as described in the “Background” section of this report, with a clear and immediate focus on the proliferation of power plants issue at hand.
2. Expand and Accelerate VDEQ Modeling Activities – Expansion is essential to address cumulative effects of emissions on human health (non-ozone health-based standards), Class I and II Prevention of Significant Deterioration (PSD) increments (allowable increases in certain pollutants), and Class I visibility and acid deposition issues. Perform a regional ozone modeling analysis incorporating all sources. Also perform a large-scale, “worst case” multi-source CALPUFF analysis similar to the Bonneville Power Administration effort, and build upon existing and pending multi-source CALPUFF modeling efforts in Virginia and neighboring states. Due to rapidly expanding power plant applications, these should be a state-wide efforts. If state-wide efforts are not feasible, “hotspots” and a larger number of individual sources should be included. Acceleration of the modeling timeline is recommended to fully inform VDEQ and SCC decisions regarding environmental impacts.
3. Install and Operate Additional Ozone and PM2.5 Monitors – Recommended higher priority locations include the monitoring network gaps in the heart of the Piedmont and south central Virginia, which are also “hotspots” for energy development. (Albemarle County may be a cost-effective option due to the presence of a VDEQ air quality station.) Without additional ozone and PM2.5 monitors, VDEQ cannot provide verifiable, quantitative data to ensure that adverse impacts on air quality are not taking place in Virginia per the Commonwealth’s 1999 NOX Emissions Trading Act. If additional ozone monitors are not an option, then modeling analyses that use ozone data interpolation techniques are recommended. EPA-certified monitors in Caroline, Fauquier, and Madison Counties in Virginia, and several monitors in north-central North Carolina, provide an existing data base. VDEQ should also consider the use of Shenandoah National Park’s 1999 ozone data collected in Warren County and the University of Virginia’s 199X-Present ozone data collected in Fluvanna County. Consider expansion of ozone health advisory program (notification if not forecasting) to “hotspot” areas as a minimum.
4. Consider Additional Key VDEQ Positions – Given the significant increase in permitting workload, it appears that additional staffing may be beneficial and necessary to carry out the recommended analyses. Recommended higher priority needs would be a meteorologist/modeler(s) in the permitting division and an Emissions Inventory Coordinator.
5. Form a Separate Work Group to Address Mobile Sources - We acknowledge that mobile source emissions are important, but they are not directly responsive to the proliferation of power plants issue, mobile sources are not subject to Prevention of Significant Deterioration regulations, and they are beyond the scope of our proposed CEWG mission and expertise of CEWG members.

Long-term Recommendations

1. CALPUFF Initialization Project - We gratefully acknowledge the VDEQ's August 2001 agreement for a (still subject to funding) comprehensive CALPUFF Initialization Project affecting Virginia and West Virginia Class I areas.
2. Consider Additional VDEQ Regional/Field Compliance Staff Larger permit processing workload could shift to a larger field compliance workload, depending on the number of new and modified sources that are permitted, built and operated. Based on the late 1980's wave of energy development, many if not most plants will be built unless the applicant or permittee withdraws development plans.
3. Perform a Comprehensive Review of PSD Program (40 CFR 51.166) We believe this should shift to a short-term recommendation if timely expansion and acceleration of cumulative environmental effects modeling analyses is not an option.

Appendix B

National Park Service

Shenandoah National Park
Briefing Statement

Prepared for:

Date: 09/21/01

TITLE: Air Quality & Air Pollution Impacts

PROJECT/ISSUE: Air resource management; natural and cultural resource protection

BACKGROUND:

- Park surveyors proclaimed a “possible sky-line drive” as the greatest single feature
- Congress designated Shenandoah National Park as 1 of 48 “Class I” national parks afforded special protection under the Clean Air Act (1977 Amendments)
- Congress assigned Federal Land Managers “an affirmative responsibility” to protect sensitive resources from adverse impact due to human-made air pollution
- Based on long-term monitoring and research, air pollution poses a significant threat to the scenic and ecological integrity of Shenandoah National Park
- Key issues include regional and local haze, acid rain, and ground-level ozone
- Key resources at risk include scenery, streams, fish, soils, and vegetation

CURRENT STATUS:

- Visibility has been reduced from an estimated natural visual range of about 90 miles to an annual average visual range of less than 20 miles and is often lower in the summer
- Poor visibility is a frequent visitor complaint affecting natural and historic landscapes
- Acidification of streams has caused measurable adverse impacts to native fish, including the acid-tolerant, highly prized Appalachian brook trout
- University of Virginia scientists have documented the need for substantial further reductions in acid-forming air pollution to protect and restore sensitive aquatic systems
- Research documents visible foliar injury, growth loss, and/or early leaf drop in about 25% of the 40 known ozone-sensitive plant species found at Shenandoah National Park
- Virginia recommended part of the Park as a preliminary “ozone nonattainment area” based on the Environmental Protection Agency’s (EPA) 1997 human health-based standard
- Shenandoah National Park actively engaged at regional and state clean air planning tables

POSITION OF INTERESTED PARTIES:

- Overwhelming majority of people who testified at recent regional haze public hearings support strong rules to clear the views at Class I national parks and wildernesses
- Industries typically concerned about costs of new air pollution control regulations

DEPARTMENT/BUREAU PERSPECTIVE:

- In July 2000, Department requested EPA Rule to Protect and Restore Air Quality Related Values; and more immediate assistance for Shenandoah and Great Smoky Mountains
- Management Policies 2001 provides strong guidance for air resource management and prohibition of resource impairment
- Department recently submitted comments to EPA in support of strong EPA rules to combat regional haze

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Summary of Air Pollution Effects on Resources of the George Washington and Jefferson National Forests

Visibility at James River Face Wilderness is among the poorest in the nation. Aerosol monitoring of fine particulates shows us that our annual median visibility range is 23 miles. This means that half the time you can see farther, half the time less. This is only 1/4 of what the National Acid Precipitation Assessment Program estimated as natural background visibility (90 miles for the east). The best days in the summer only allow us to see 29 miles and on the worst days visibility is 7 miles or less. Visibility is the best in winter and early spring. On the clearest days of the best seasons we have visibility of 46-49 miles, still only half of the natural background condition. Most of the visibility deterioration is due to sulfate, which comes from burning fossil fuels.

Streams are acidifying. Half of the streams on the Forest are currently in one of the more advanced stages of acidification. Thirty percent of streams are either chronically or episodically acidic. Twenty percent of the streams are very sensitive to acidification, and may have isolated acidic pulses. This is due to past and continuing levels of sulfate and nitrate deposition. Just this year the St. Marys River was limed within the Wilderness boundaries to mitigate the negative impact of acidic deposition on the aquatic resource.

Soil productivity is being reduced. Sulfates and nitrates from the air enter the soil. From this point on both aquatic and terrestrial ecosystems are affected. Where streams are acidifying, it is highly likely that major nutrients are being depleted from the soil matrix. This includes calcium, a major building block for tree growth.

Ozone is affecting vegetation across the Forest. Ozone injury (a purplish stippling of leaves) is apparent on sensitive vegetation somewhere on the Forest every year. **We also know that the northern and central regions of the Forest have a high potential for growth loss due to ozone exposure.**

Appendix C

Summary of Pertinent Laws and Regulations

I. Prevention of Significant Deterioration of Air Quality

The primary regulations that affect new major sources and major modifications are the Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21) that have been in effect since the 1977 Amendments to the Clean Air Act. The primary objective of the PSD program is to prevent substantial degradation of air quality in areas that comply with National Ambient Air Quality Standards (NAAQS), and yet maintain a margin for industrial growth. One of the purposes of the PSD program is “to preserve, protect, and enhance the air quality in national parks, national wilderness areas, (and) national monuments...” while ensuring “that economic growth will occur in a manner consistent with the preservation of existing clean air resources”. As required by the visibility protection provision of the Clean Air Act, additional PSD procedural requirements apply when a proposed source has the potential to impair visibility in a Class I area (40 CFR 52.27(d)).

Twenty of 28 sources on the September 18, 2001 “current permitting activity” list are major sources subject to PSD provisions. A PSD permit applicant must demonstrate that the proposed polluting facility will (1) not violate national or state NAAQS, (2) use the best available control technology to limit emissions, (3) not violate either Class I or Class II PSD increments for sulfur dioxide, nitrogen dioxide or particulate matter (see table below), and (4) not cause or contribute to adverse impacts to Air Quality Related Values in any Class I area. The PSD increments are allowable pollutant concentrations that can be added to baseline concentrations. Increments are not defined for ozone or fine particulate matter (PM-2.5).

Prevention of Significant Deterioration Increments ($\mu\text{g}/\text{m}^3$)

Note: Virginia has no designated Class III areas

Constituent	Averaging Time	Class I	Class II	Class III
Sulfur Dioxide (SO ₂)	Annual Arith. Mean	2	20	40
	24-hour	5	91	182
	3-hour	25	512	700
Particulate Matter (PM-10)	Annual Arith. Mean	4	17	34
	24-hour	8	30	60
Nitrogen Dioxide	Annual Arith. Mean	2.5	25	50

The PSD regulations provide the basis for the Virginia State Implementation Plan (SIP). 40 CFR51.166 provides that:

(a)(1) Plan requirements. In accordance with the policy of section 101(b)(1) of the act and the purposes of section 160 of the Act, each applicable State implementation plan shall contain emissions limitations and such other measures as may be necessary to prevent significant deterioration of air quality.

(4) Plan assessment. The State shall review the adequacy of a plan on a periodic basis and within 60 days of such time as information becomes available that an applicable increment is being violated.

II. Virginia Emissions Trading

The 2001 session of the Virginia General Assembly passed Senate Bill 1386, which amended Section 10.1-1308 of the Code of Virginia, pertaining to state regulations to provide for emissions trading programs.

The 2001 amendment, which was signed into law by the Governor and became effective July 1, 2001, mandated the adoption of four specific goals to be achieved by the emissions trading program applicable to the electric power industry. The four goals are expressed in the following language which was added to the statute:

The regulations applicable to the electric power industry shall foster competition in the electric power industry, encourage construction of clean, new generating facilities, provide new source set-asides of five percent for the first five plan years and two percent per year thereafter, and provide an initial allocation period of five years.

In adopting the four new public policy goals *unanimously* (the House of Delegates voted 99-0 in favor; the Virginia Senate vote was 40-0), the legislature signaled its strong desire to encourage construction in Virginia of modern electrical generating facilities. This law does not include language regarding retirement of older, dirtier coal-fired facilities.

Each new electric generating source will be required to purchase emissions offsets under the proposed Nitrogen Oxides State Implementation Plan in Virginia. Enabling legislation for the purchase and/or trading of emissions has been enacted by the General Assembly in Virginia that includes language prohibiting such trades if they “adversely impact air quality” in Virginia.