Impacts of EPA's Reinterpretation of New Source Review Requirements – Potential Loss of Generating Capability on the TVA System

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Executive Summary

The United States electricity supply infrastructure is facing extreme demands on its capability to continue delivery of reliable electricity supplies. The Administration's report on a National Energy Policy acknowledges the need for massive investment in new plants to support expected growth in electricity consumption. This report generally assumes that the existing sources would continue to operate. The report directs EPA and other relevant federal agencies to assess the potential impact of EPA's New Source Review (NSR) program on energy resources in this country. To support this effort, TVA has analyzed the energy implications on its electric generating system if NSR is applied to common utility maintenance, repair, and replacement projects. TVA's analysis indicates that within the first three years of implementation of this NSR extension, there would be a loss of 10.45 percent of the total electrical capability of the TVA fossil system. Within 20 years, this would increase to a loss of more than 32 percent. The actual loss of generation capability would likely exceed this amount since the TVA analysis assumed that required permits would be in place at the time of implementation of the maintenance project. This is unlikely to be the case. Maintenance projects may be initiated by events that occur unexpectedly and result in forced outages of the generating units. Often, the projects needed to return the unit to service could be accomplished long before a permit, even a synthetic minor NSR permit, could be obtained (based on review of the time required to obtain synthetic minor permits within the states served by TVA). In these cases, the unit could be unavailable for service because of the lack of a permit, rather than for physical reasons.

Background

The President's National Energy Policy report (May 2001) recommended that the Administrator of the Environmental Protection Agency, in consultation with the Department of Energy and other relevant federal agencies, review the NSR regulations, their implementation, and

interpretation to determine the effect on energy resources.[1] The results of this review are to be reported to the President within 90 days or by August 17, 2001. In response to this recommendation, an interagency task force has undertaken the review and is seeking public comments and analyses of relevant issues.

The Energy Policy report identified an increasing gap between energy resources and demand for energy in the United States. To close this gap, the report concludes that almost 1,900 new power plants will have to be built over the next 20 years. In the report, President Bush states:

> *America must have an energy policy that plans for the future, but meets the needs of today. I believe we can develop our natural resources and protect our environment.*[2]

The President also stated that the goals of the Administration's energy strategy are "to ensure a steady supply of affordable energy for America's homes and businesses and industries." This is one of TVA's primary goals as it carries out its mandate from Congress to improve the social well-being of the residents of the Tennessee Valley region.

Providing the public with reliable supplies of affordable energy is one of TVA's primary missions and is key to maintaining the social well-being of the residents of the Tennessee Valley region.

EPA's NSR program and its implementation bear directly on the Administration's energy goals and the President's recognition that the Nation's energy needs must be addressed both for today and the future. The NSR program is one of many regulatory programs that govern the construction of new fossil fuel generating units. The complexities and permitting delays frequently associated with the program will impact the ability to build sufficient plants to help close the energy gap. Assessing this impact is one of the principle issues that must be addressed during the 90-day interagency review.

The NSR program also potentially affects existing generating units if they are modified in certain ways. Prior to "modifying" an existing

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[1] NSR typically refers to the Clean Air Act's regulatory programs for Prevention of Significant Deterioration (PSD) and nonattainment areas. The Act's New Source Performance Standard (NSPS) program also has energy resource implications and is sometimes grouped with the other two programs as "NSR." This paper applies the first usage.

[2] Energy Policy Report, ix.

generating unit, NSR permitting processes must be completed, including an assessment of Best Available Control Technology (BACT) at the modified unit. If pollution controls at the unit are not equal to BACT, BACT-level controls must be installed before the unit can be returned to service. Under the Clean Air Act, NSR permitting processes can take up to a year to complete, but can and do frequently take longer. This is due in part in the kinds of information, such as ambient air quality monitoring data and modeled emissions data, that are required before an NSR permit application is deemed "complete." Determining the impact of NSR on "modifications" at existing generating units is another of the principle issues that must be assessed as part of the 90-day interagency review process.

The ongoing assessment of NSR energy impacts must consider the effect of EPA's new NSR interpretation that will subject many common maintenance projects to NSR.

This is acknowledged in EPA's "NSR 90-Day Review Background Paper," (June 22, 2001) ("90-Day Background Paper"). EPA expressly asks for data on how the NSR program affects existing sources, including the extent to which the program impacts pollution control and energy efficiency projects and the ability to maintain reliable and effective utilization of existing generating resources. These are critically important questions. If implementation of the NSR program forces the early retirement of existing generating resources or limits full utilization, the challenge of closing the growing energy gap becomes even more daunting.

NSR Impacts on Existing Generating Resources

Determining the impact of the NSR program on reliable and efficient operation of existing generating resources is no easy task. As EPA's 90-Day Background Paper indicates, doing this requires an understanding of when the NSR program applies to utility maintenance projects. From its inception, EPA's NSR regulations have allowed "routine" maintenance, repair, and replacement projects ("maintenance" projects) to proceed without NSR permits. These and other activities have been excluded from the program for more than two decades. TVA and other utilities have long understood that maintenance projects that are common across the utility industry are "routine" for purposes of this exclusion. Utility maintenance projects and

Common maintenance projects have been excluded from NSR for more than two decades.

practices are well known and well established. TVA has issued two reports describing these practices.[3]

In the late 1990s, EPA began an enforcement initiative against coal-fired electric utilities, including TVA, on the basis that maintenance projects that are common and frequent in the utility industry are not routine and are not excluded from the NSR program.[4] Rather, EPA asserts that determining if a project is routine requires the weighing and balancing of more than 20 different factors. EPA has yet to make clear how these factors are to be applied and balanced, and the full scope of the NSR program under this enforcement interpretation remains highly uncertain. However, EPA has specifically identified a substantial number of maintenance projects in its enforcement cases that it argues violate NSR absent an NSR permit. As EPA acknowledges in its enforcement initiative, these projects are common across the utility industry.

TVA issued reports in 1972 and 2000 describing the projects and practices that are necessary and common throughout the utility industry to maintain reliable and safe operation of utility generating units.

Three consequences can result from the enforcement initiative if EPA adheres to the NSR interpretations it is advancing in the initiative. Utilities can forego the projects that would trigger NSR, they can obtain NSR permits before commencing such projects, or they can accept a permit limit on the amount of emissions (or generation) at a unit to avoid increasing emissions by significant amounts and thereby not trigger NSR. This last approach is frequently referred to as obtaining a synthetic minor NSR permit. EPA's 90-Day Background Paper refers to this as obtaining a PTE (Potential to Emit) limit (at 6).[5]

Utilities undertake maintenance projects to ensure that their generating units operate efficiently and reliably. If these projects are not undertaken, unit operation would soon become uneconomical, undependable and eventually

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[3] T. S. Gladney and H. S. Fox, *TVA's Power Plant Maintenance Program, Philosophy and Experience*, (April 1972); J. L. Golden, *Routine Maintenance of Electric Generating Stations*, (February 2000).

[4] 90-Day Background Paper at 4.

[5] Multi-unit plants also may be able to "net" out of NSR review. This requires reducing emissions at one unit to offset emission increases that may result from the "modified" unit. Eventually, however, emissions at a plant would be reduced to the point where netting would no longer be feasible.

physically impossible. Projects involving the replacement of large boiler components that are necessary for the proper functioning of generating units are common across the utility industry. These projects can occur early in the economic life of a unit. In a limited survey of the utility industry, TVA determined that replacement of cyclone burners has occurred within 10 years of the in-service date of generating units, replacement of reheaters within 5 years, and replacement of economizers within 6 years. Forgoing such projects is not a realistic alternative at most utility units, especially when early in their economic lives.

Replacement of boiler parts occurs frequently throughout the utility industry and can begin to occur within a few years after a generating unit commences operation.

Obtaining NSR permits for maintenance projects would seriously disrupt normal utility maintenance activities and obviously undermine reliable electric service. EPA's 90-Day Background Paper states that the average time to obtain an NSR permit for a coal-fired electric generating unit has been 10 months. This statistic is potentially misleading because it appears to refer to permits for new units, not the modification of existing units. It also reflects the *average* amount of time needed to finish the permit process after a "complete" permit application has been submitted.

Depending on the availability of usable ambient air quality monitoring data in the vicinity of a plant, it may be necessary to install monitors and collect such data for up to a year prior to submitting a permit application[6]. Best Available Control Technology analyses must also be done to support a permit application, and these can take several months. In addition, computer modeling analyses of potential impacts on ambient standards and PSD increments are required. All of these analyses and monitoring activities have to be completed before NSR-permitting agencies begin the processing of the "complete" permit and would add significantly to the permit processing times identified in the 90-Day Background Paper. Maintenance projects would have to be deferred until the permitting process is complete and a permit issued. Units could not then be returned to service until BACT controls have been installed and this can itself take several years.

Obtaining NSR permits for maintenance projects would be time-consuming and costly, both in terms of the resources expended in permitting processes as well as the cost of BACT controls. Even if component replacement planning periods could accommodate these permitting

[6] 40 C.F.R. § 52.21(m).

processes,[7] EPA has suggested in its enforcement initiative that many smaller maintenance projects also trigger NSR, and these have shorter planning periods. EPA has also identified projects that utilities have undertaken on a forced-outage basis.

A forced outage involves the unexpected or unscheduled shutdown of a unit because of an operating problem or event. They are not planned. For example, TVA had to replace a substantial part of the boiler floor, part of adjacent waterwalls, and boiler structural supports at one of its 1300 megawatt Cumberland units after slag the size of a bus fell 150 feet to the boiler floor in 2000. (This slag build-up resulted because of changes in boiler operating characteristics following the installation of low-NO_x burners, a pollution control project.) TVA managed to complete this project within 14 days and return the unit to service. Obtaining an NSR permit before initiating this work would have delayed returning the unit to service by months and possibly a year or longer.

Additionally, the scope of work associated with a project that is planned for implementation during a scheduled outage frequently changes due to the discovery of additional needed work that could not be identified while the unit was in service. Under the EPA reinterpretation of the NSR program, this additional work could not proceed until a revised permit is obtained. Thus, either needed work would go undone or the unit would be kept out of service until the permit revision could be processed.

Such permitting disruptions and costs would occur many times during a generating unit's economic life because new permits would have to be obtained every time a maintenance project was conducted at a unit. Even if a unit had previously installed NSPS or BACT level controls, control levels would have to be re-assessed and upgraded if BACT levels have increased in the interim. Utilities (and other industries) would be constantly re-permitting units, upgrading pollution controls, and delaying maintenance projects to account for all of this. The ability to successfully plan and operate a power system to meet the growing demand for power would be severely compromised.

Under EPA's new NSR interpretation, utilities would be constantly re-permitting units, upgrading pollution controls, and delaying maintenance projects to account for all of this.

[7] The engineering and planning for large component projects at utilities can take several years. However, the level of design needed to support permit applications typically comes at the end of engineering and design process. Project planning and permitting would to a substantial extent be sequential and not overlapping.

In its enforcement initiative, EPA has suggested that all of these problems could easily be avoided if utilities agreed to cap or limit their emissions or unit utilization. This would have to be done by obtaining a minor synthetic NSR permit or permit limit. While this last approach would avoid some of the problems associated with obtaining full NSR permits for utility maintenance projects, it has its own problems and would also adversely impact reliable and efficient operation of existing generating resources. The purpose of this paper is to analyze such impacts for the TVA power system.

Minor Synthetic NSR Permit Limits

There are two immediate issues associated with obtaining a minor synthetic NSR permit limit for utility maintenance projects. First, these permit processes take time themselves. Second, capping unit emissions or utilization reduces the capability of units and this has direct energy consequences.

Obtaining minor NSR permit caps would not prevent disruption of necessary maintenance projects. Minor permit processes take time themselves and capping unit utilization would have severe energy consequences.

TVA operates generating units in the States of Kentucky, Tennessee, and Alabama. NSR permitting agencies were contacted in each of these States to determine how long it took to issue minor synthetic NSR permits (or the similar State permit) in 2000. In Kentucky , the maximum number of permit-processing days was 840 days or 28 months. The average period of time was 127 days or more than 4 months. In Tennessee, the maximum number of days was 254 days or more than 8 months. Tennessee's average permit-processing period was 82 days or about 3 months. Alabama does not maintain permit processing statistics for minor source permits but reported that its permitting periods ranged from a few days up to 200 days or almost 7 months.

A conservative average estimate for the minor NSR permitting periods in the States in which TVA would have to obtain permits for its maintenance projects under EPA's NSR enforcement interpretation would be 3 to 8 months. This would be conservative because public participation is one of the factors that slows permit processes, and the permitting of coal-fired utility units tends to attract public opposition. In addition, current permitting averages do not account for the significant increase in resource burdens that permitting agencies would confront if permits have to be issued for maintenance projects at utility plants and other industrial facilities.

Similar to the problems associated with obtaining full NSR permits, preceding utility maintenance projects with permit processes that take 3 to 8 months to complete would delay initiating many maintenance projects, especially the smaller projects that occur with even greater frequency than the larger component-replacement projects. Forced-outage maintenance projects and projects that have changes in scope during implementation would be especially vulnerable to and disrupted by such permit delays. The 14 days it took to complete the emergency project at TVA's Cumberland plant after the slag fall in 2000 would have been extended by more than two months and possibly much longer. Because these kinds of maintenance projects are common and frequent across the entire utility industry, utility generating resources throughout the country would frequently be restrained from returning to service for weeks and months at a time. This in turn would undermine reliable electric service to the public, especially during peak demand periods.

Restrictions on Unit Capabilities

In addition to the temporary, but frequent, loss of energy resources that would result from delays associated with minor NSR permitting processes, there would be longer-term losses of energy resources due to the caps or limits that utilities would have to accept under this approach. TVA estimated these losses on its system using two different approaches. The first looks forward and assumes that EPA's enforcement interpretation is in effect requiring the use of the minor NSR permitting approach for future maintenance projects. The second looks back in time and assumes, as EPA asserts in its enforcement initiative, that the enforcement interpretation has been in effect since 1980. This second analysis provides a means of capturing the effect of taking repeated caps on unit operation over time.

Analytical Approach

The theoretical maximum possible amount of electricity that can be generated by an electricity-generating unit ("unit") in any time period can be very simply determined by multiplying the unit's maximum generating rate ("capacity") in megawatts by the number of hours in the period. For example, a 200 megawatt unit can produce no more than 1,752,000 megawatt hours in a calendar year (200 megawatts x 8,760 hours). Realistically, a generating unit is unable to generate at this maximum level over the course of an entire year.

Units may be totally removed from service in accordance with a predetermined schedule to perform needed maintenance that cannot be performed while the unit is generating. Other planned maintenance activities may require the unit to operate at a lower generating capability while certain components are taken out of service. Additionally, units may be either totally or partially forced out of service due to failures of equipment. The electric utility industry uses the term "equivalent availability factor" (EAF) as a measure of the actual maximum capability of a unit to generate electricity relative to the theoretically possible amount. For example, if during a year, the same 200 megawatt unit was removed from service for two weeks for a planned maintenance activity, an additional week for an unplanned failure, and operated for two weeks of 100 megawatts due to failure of a boiler feedpump, the unit would have an equivalent availability of 92.3 percent. This corresponds to a maximum capability for the year of 1,617,096 megawatt-hours.

$$\text{Equivalent availability factor} = \frac{(200*8760-(200*2*7*24+200*1*7*24+100*2*7*24))}{200*8760} = 0.923$$

The maximum capability of an electrical system is the sum of the maximum capabilities of each generating unit within the system.

Many factors other than availability (or equivalent availability) determine the actual amount of electricity produced by a generating unit during a year. These include the hourly, daily, and seasonal fluctuations in demand on the total electrical system; the condition (availability) of other units within the control of the electrical system operator; the cost of generation from the unit relative to other units available to the electrical system operator; and the cost and availability of supply of electricity from independent power producers or connections to other electrical systems. Even if the equivalent availability of a unit were to be constant from year to year, the historical utilization of the unit will vary from year to year due to changes in rainfall (this affects the amount of generation from TVA's hydro system, which impacts the demand from the fossil system), outage schedules for nuclear units, and variations in weather conditions. Thus, the actual, historical utilization of a generating unit is rarely, if ever, equal to its maximum capability. (Particularly on a system like TVA's with a large amount of low-cost hydro and nuclear powered generation, even the most reliable and low-cost coal-fired units typically will not operate at full capability 100 percent of the hours in a year.)

Any permit restriction placed on a unit that limits it to historical operation levels will result in loss of capability of the unit. As discussed above, TVA has used two approaches to analyze the loss of capability for the TVA coal-fired units that would occur if normal maintenance, repair, and replacement activities required accepting a permit restriction that would limit generation. First, TVA evaluated the short-term impact of such restrictions looking forward. Next, it evaluated the compounding effect that continuing implementation of such a policy would produce by looking backward.[8]

Any permit restriction on unit utilization will unavoidably lead to a loss of generating capabilities.

Short-Term Impact

In its enforcement activities, EPA has indicated that any capitalized project of greater than $100,000 that might improve the reliability or efficiency of a generating unit could trigger NSR unless generation is appropriately limited. Virtually every unit in the TVA system undertakes a project of that nature every planned outage. To evaluate the short-term impact of EPA's enforcement interpretation if that interpretation became the law of the land today, TVA compared the high 2-year rolling average generation experienced by each unit on its system between 1996 and 2000 with the current maximum capability of each unit based on equivalent availability in 2000. The results of this calculation are shown in Table 1 below.

The near-term loss of energy on the TVA coal-fired system would be almost 11 percent, or more than 12 million megawatt hours per year.

[8] As EPA's 90-Day Background Paper acknowledges, a synthetic minor NSR permit could either restrict utilization or emissions. TVA assumes that most utilities would take restrictions on utilization rather than emissions for several reasons. First, the ability to continue to reduce emissions in order to maintain unit generating capabilities would decline with successive maintenance projects. Second, some pollutants are already well controlled at utilities or, like carbon monoxide, cannot be easily controlled and the ability to further control these pollutants is already limited. Third, it takes time to put in place pollution control strategies and if this includes additional controls, delays of several years could be experienced. Finally, an initial reduction of emissions only delays the loss of generating capability. The next project that triggers the new EPA interpretation would likely require generation limits and the beginning of the utilization "death spiral" for the unit.

Table 1 - Short Term Loss in Generating Capability

Plant/Unit	High 2 0f 5 Generation for 4/1/96-3/31/01 MWH	EAF Generation for High 2 of 5 Period MWH	% Reduction in Annual Generation Capability if Limited to High 2 of 5 Generation	Total Reduction in Annual Generation Capability if Limited to High 2 of 5 Generation MWH
Allen 1-3	5058071	5941751	14.87%	883,680
Bull Run	6297723	6523570	3.46%	225,847
Colbert 1-5	7822231	9175903	14.75%	1,353,672
Cumberland 1-2	19145389	19720271	2.92%	574,882
Gallatin 1-4	7509113	8061627	6.85%	552,514
John Sevier 1-4	5590933	6052452	7.63%	461,519
Johnsonville 1-10	7911102	9899415	20.09%	1,988,313
Kingston 1-9	10607090	11806990	10.16%	1,199,900
Paradise 1-3	14847824	16159536	8.12%	1,311,712
Shawnee 1-10	8733246	10845685	19.48%	2,112,439
Widow's Creek 1-8	9880192	11287958	12.47%	1,407,766
TOTAL for TVA Coal Fired Plants	103402912	115475156	10.45%	12,072,244

As can be seen from Table 1, TVA coal-fired units alone would lose 10.45 percent of their capability for electricity production within the first outage cycle for the units (the amount of time required for all units to experience at least one planned outage - a maximum time of three years). This would result in loss of more than 12 million megawatt hours capability. To compensate for this, TVA would have to construct 1,722 megawatts of new generation (operating at a 80 percent capacity factor).

Long-Term Impact

The reduction in capability of coal-fired units would not be limited to the short-term impact under EPA's NSR enforcement interpretation. Each succeeding unit outage would likely include a project that would again require a new permit limit based on the high two of the prior five years generation. This could

The long-term energy loss on the TVA coal-fired system would be almost 32 percent or 34 million megawatt hours annually. It would take ten 500 MW power plants to make up this loss.

then require a further reduction in the permit limit. TVA evaluated this long-term impact by analyzing its maintenance project and operational history over the last twenty years and applying the new EPA interpretation. This approach assumes past maintenance practices would continue into the future and the effect of the new EPA interpretation on historical operation would be indicative of its effect going forward.

Compliance margins are typically used to provide a buffer between permit limits and actual source performance. Accordingly, TVA assumed that internal administrative procedures would be implemented to establish a minimal two percent compliance margin. This would mean limiting annual generation at each unit to 98 percent of the permit cap on generation from the unit. This resulted in the approach to calculating loss of generating capability provided in Appendix A.

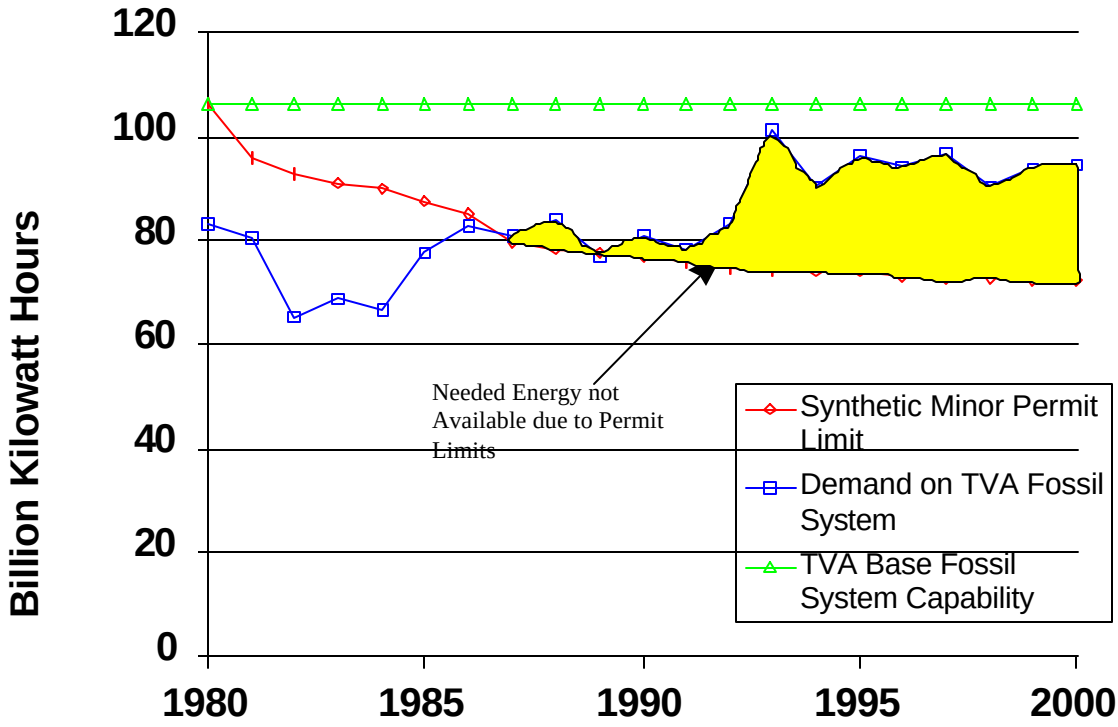
The results of this analysis for Allen Unit 1 are provided below.

Table 2 - Allen Unit 1, Long-Term Loss in Generating Capability

Work Order	Date in Service	Notes	Generation Cap
		Base EAF Generation Capability	1,836,645
		Actual Generation High 2 of 5 generation for first project	1,399,483
20016	04/27/82	New project; take cap of 98% of high 2 of 5 generation	1,371,493
20733	12/31/84	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,371,493
20170, 20293	10/11/86	Actual high 2 of 5 generation was more restrictive than the cap; therefore take 98% of the high 2 of 5 generation to establish a new cap	1,190,226
20312	12/01/88	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,190,226
20418	09/30/89	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,190,226
45175	12/01/89	Project occurs greater than 3 years since previous emissions cap; therefore, take 98% of the old cap to establish a new cap	1,166,421
45219	09/30/90	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,166,421
45357	09/30/91	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,166,421
4926, 4905	11/22/93	Project occurs greater than 3 years since previous emissions cap; therefore, take 98% of the old cap to establish a new cap	1,143,093
ALF008, ALF006	12/31/94	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,143,093
ALF035, 4900-21634900-2174	04/30/96	Project occurs less than 3 years since previous emissions cap; therefore, assume the same cap	1,143,093
ALF030	05/06/98	Project occurs greater than 3 years since previous emissions cap; therefore, take 98% of the old cap to establish a new cap	1,120,231
Reduction from base generation			**39.01%**

When the same analysis is applied to all 59 TVA coal-fired generating units, the loss of generating capability is shown in Figure 1 below.

Figure 1 - Long Term Loss of Energy Capability of TVA Fossil System



As evidenced in Figure 1, had EPA's NSR enforcement interpretation been in place for the last 20 years, the TVA system would have lost 34 million megawatt hours of generating capability in 2000. In order to replace this capability, TVA would have been required to add 4850 megawatts of electrical capacity at a cost of more than $6 billion. The same level of generation capability loss would be incurred over the next 20 years if EPA's enforcement interpretation becomes the law of the land. Similar losses would be suffered by other utilities with substantial amounts of fossil-fuel-fired generation.

Figure 1 also shows that from about 1986 to the present, TVA's coal-fired units would not have been able to meet the demands placed on them due to these artificial restrictions. This energy shortfall would have had to have been made up by non-coal-fired units on the TVA system or from purchases of energy off-system. Undoubtedly, during this period there would

have been times when this could not have been done, and TVA would have had to curtail service to its customers.

Forced Outages

The above analysis under-predicts the loss of electrical generating capacity in several respects. As mentioned earlier, this analysis considers only the specific maintenance projects identified by EPA in its NSR enforcement activities and ignores the many smaller projects that EPA has suggested also trigger NSR. It also assumes that no loss of capability is experienced as a result of permitting process delays. This clearly would not be the case for maintenance activities that are initiated in response to unplanned events, such as forced outages and work scope changes identified during planned outages. In these unplanned situations, a generating unit would have to be held out of service while waiting for the permitting authority to issue the new or revised synthetic minor permit.

TVA's analyses of energy losses are conservative because they do not include the losses due to permit delays, forced outages, and the many other, smaller maintenance projects that EPA now says would trigger NSR.

For example, a permit from Tennessee would have been required before the Cumberland unit discussed earlier could have returned to service following repairs from the slag fall under EPA's enforcement interpretation. Assuming that the average time for Tennessee to issue a synthetic minor permit was only three months, this process would have extended the unit outage by two and one half months, or 75 days. This would have resulted in a loss of capability of more than 2.3 million megawatt hours. This loss of capability would have occurred during TVA's winter peak period, when the demand on the TVA system is high, and would have impacted TVA's ability to serve the heating load of its customers during cold weather.

Appendix A

Procedure for Calculating Long-Term Impact on Energy Capability of TVA Coal-Fired System

The loss of capability for TVA coal-fired units if the revised EPA NSR interpretation had been in place since 1980 was calculated in the following manner.

1. The maintenance history of each individual unit was reviewed to identify all projects similar to those performed by TVA and other utilities that have been cited by EPA as violations of New Source Review. (This does not include the many kinds of smaller projects that EPA suggests also trigger NSR.)
2. Baseline capability (based on EAF as described above) was established as the maximum capability of each unit (using equivalent availability capacity factors) prior to the implementation of the first project that EPA has identified as a violation under the new interpretation.
3. Initial capability loss was calculated as the difference between the baseline capability and the historical high two years generation of the five years prior to implementation of the "violating" project. The high "two of five" years generation was then established as a permit limit.
4. Subsequent "violating" projects resulted in a comparison of the historical high "two of five" years generation and 98 percent of the permit limit.
5. If the historical "two of five" generation was lower than 98 percent of the permit limit, a new permit limit was established at the new "high two of five" level.
6. If the historical "two of five" generation was not lower than 98 percent of the permit limit, a new limit was established at 98 percent of the previous permit limit.
7. If a project occurred less than 3 years from the date of the previous project which resulted in a permit limit, the previous limit was retained unchanged unless the actual "two of five" generation was more restrictive.
8. This analysis was continued to year 2000.