



# Air Pollution Control Division

## Stationary Sources Program

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**PS Memo #: 98-07B**

To: Permit Engineers  
From: Matt Burgett  
Date: (ver) January 23, 2013  
RE: Turbine Alternate Operating Scenarios: Turbines without CEM

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The attached Alternate Operating Scenario (AOS) permit conditions are intended to provide sources with the flexibility to make equipment changes in order to deal with a turbine breakdown or periodic maintenance and repair of an existing onsite turbine. It is the purpose of this AOS to provide flexibility while still maintaining practical enforceability of both construction and operating permits and meeting all state and federal regulatory requirements. The AOS will not be applied retroactively and may need to be amended as conditions warrant. Future changes in Federal or State rules may also require revisions.

### 1. Overview

This guidance covers two scenarios: 1) replacement of certain turbine parts, and 2) temporary or permanent replacement of the entire turbine unit. In both instances, the replacements must be of the same make, manufacturer, design, and capacity/horsepower. The replacement of an existing turbine with a new turbine constitutes construction of a new emissions unit, not “routine replacement” of an existing unit. Ordinarily, the source would have to go through the permitting process and obtain a construction permit or an operating permit modification prior to such construction. The AOS serves as an advanced permit for the new turbine, and therefore allows the source to replace an existing turbine without undertaking a separate permit review. The AOS cannot be used for additional new emission points for any site. In other words, a turbine that is being installed as an entirely new emission point and not as part of an AOS-approved installation related to an existing onsite turbine has to go through the regular Construction or Operating Permitting process.

Note that none of the testing discussion relates to the New Source Performance Standards (NSPS) or Reg 1 SO<sub>2</sub> limits or the Reg 1 fuel burning particulate limit. *Note to OP engineers:* The NSPS & Reg 1 limits can be handled with the natural gas fuel restriction (be sure to use the same phrasing as for the opacity).

### 2. Reasonably Available Control Technology (RACT) Implications

For any turbine located in a designated attainment/maintenance or non-attainment area the Temporary Replacement provisions can be used, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent replacement turbine. This is because as a “new” source it is subject to RACT requirements. In the Denver Metropolitan PM<sub>10</sub> attainment/maintenance area, RACT applies to PM<sub>10</sub> at any level of emissions for sources that are not otherwise exempt

from the construction permitting requirements of Reg. 3, Part B. and to NO<sub>x</sub> and SO<sub>2</sub>, as precursors to PM<sub>10</sub>, if the potential to emit of NO<sub>x</sub> or SO<sub>2</sub> exceeds 40 tons/yr. (Reference: Regulation No. 3, Part B, Section III.D.2) In any ozone non-attainment area, including the Denver 8-hour Ozone Nonattainment area, RACT applies to VOC and NO<sub>x</sub> at any level of emissions for sources that are not otherwise exempt from the construction permitting requirements of Reg. 3, Part B. (Reference: Regulation No. 3, Part B, Section III.D.2)

### 3. New Source Performance Standards (NSPS) Implications

EPA has promulgated two NSPS regulations applicable to stationary combustion turbines under 40 CFR Part 60: Subparts GG and KKKK. Subpart GG applies to gas combustion turbines with heat input at peak load greater than or equal to 10 MMBtu/hr that commence construction, modification or reconstruction after October 3, 1977. Subpart KKKK applies to combustion turbines with heat input at peak load greater than or equal to 10 MMBtu/hr based on the higher heating value of the fuel that commence construction, modification or reconstruction after February 18, 2005.

EPA has determined on several previous occasions<sup>1</sup> that the relocation of a turbine from one site to another does not, in and of itself, change the status of the relocated unit with respect to NSPS requirements. Specifically, units that originally commenced construction prior to the applicability date of Subpart GG and were subsequently relocated between October 3, 1977 and February 18, 2005 did not become subject to Subpart GG based solely on the fact that they were relocated. Similarly, units that originally commenced construction prior to the applicability date of Subpart KKKK and were subsequently relocated after February 18, 2005 did not necessarily become subject to Subpart KKKK upon relocation. EPA has clarified that changes in applicability under Subparts GG and KKKK is caused not by relocation, but by modifications and/or reconstructions as defined under 40 CFR §§60.2 & 60.15. Note also that relocations by themselves are not considered a modification under § 60.14(e)(6). For example, relocation of a Subpart GG unit after February 18, 2005 does not subject the unit to Subpart KKKK requirements, but if the unit was overhauled during that relocation effort such that the overhaul meets the definition of reconstruction, the turbine will be subject to Subpart KKKK standards for reconstructed units at its new location. The same unit that is relocated without being reconstructed would continue to be subject to NSPS GG.

Colorado has adopted the federal NSPS regulations promulgated into 40 CFR Part 60 by reference into Colorado Regulation No. 6, Part A, including Subparts, GG, KKKK and the general provisions in Subpart A. Part B of Regulation No. 6 establishes non-federal NSPS for specific facilities and sources. Part B adopted the general provisions in 40 CFR Part 60 Subpart A by reference in Section I.A but also includes a general provision under Section I.B. requiring that the relocation of a source from outside of the State of Colorado into the State of Colorado is considered to be a new source, subject to the requirements of Regulation No. 6 (i.e. the date that the source is first located within Colorado becomes equivalent to the commence construction date for purposes of determining the applicability of NSPS requirements). Section I.B. also specifies that this relocation provision is only triggered when units are moved in from out-of-state, but not when units are relocated within the state. Regulation No. 6, Part A includes a statement indicating that for the

<sup>1</sup> See the following determinations posted on EPA's Applicability Determination Index: Document Control Numbers 0000110, 0300006, 0800043 and 0900067  
<http://www.epa.gov/compliance/monitoring/programs/caa/adi.html>

NSPS general provisions see Part B for additional requirements regarding modifications, hence the relocation provisions in Part B apply via this statement in Part A. The original intention of the requirement was to address a situation where older units exempt from standards would be relocated into Colorado as they are phased out or replaced elsewhere.

Because the relocation requirement of Section I.B was originally designed to address units exempt from standards upon their relocation into the State, in the case of turbines it is not appropriate to apply the requirement to units that are already subject to standards upon their arrival. The result would cause one set of requirements to apply on a state-only basis, while the original requirements would continue to apply on a federal basis. Subparts GG and KKKK are so fundamentally different in their structure and design that it may not always be possible to streamline out a Subpart GG requirement in favor of a Subpart KKKK counterpart. For example, Subpart GG limits the definition of an affected source to the turbine itself while Subpart KKKK expands the definition to address heat recovery systems, control systems and other ancillary equipment. This allows Subpart KKKK to exempt any duct burners associated with Heat Recovery Steam Generator (HRSG) systems from boiler standards under NSPS Subparts D, Da, Db or Dc, while the same burner associated with a Subpart GG unit would not be exempt. Another example is that NO<sub>x</sub> limits for combined cycle turbines are based on 4-hour averages under Subpart GG while Subpart KKKK allows 30-day averages for a similar unit.

For these reasons, NSPS requirements for replacement turbines that are brought in from outside of Colorado are established as shown in the following table. Note that the table below applies to the replacement of an entire turbine, not to the replacement of turbine components, such as the combustion chamber. Generally, the relocated units will retain their NSPS applicability as determined under the federal rules, but older units that pre-date any federal standards will become subject to standards as per Colorado Regulation No. 6, Part B, Section I.B. This application of the Regulation No. 6, Part B, Section I.B. requirements pertains only to turbines involved in AOS equipment changes based on the unique details, rules and requirements associated with turbines, and shall not be applied to any other emission unit or situation.

**Requirements for Permanent Replacement Turbines Relocated from Outside Colorado**

Status of Replacement Unit Prior to Relocation	NSPS Requirements Upon Installation
<p><u>Pre-Subpart GG, New to Colorado</u>                      The unit originally commenced construction outside of Colorado on or before October 3, 1977, and has not been reconstructed or modified after October 3, 1977.</p>	<p>Subpart KKKK: requirements for new units apply.</p>
<p><u>Pre-Subpart GG, Returning to Colorado</u>                      The unit originally commenced construction outside of Colorado on or before October 3, 1977, and has not been reconstructed or modified after October 3, 1977. The unit was previously installed within the State of Colorado during the applicability dates of NSPS Subpart GG (October 4, 1977 – February 18, 2005).</p>	<p>Subpart GG: the date on which the unit was previously installed within the State of Colorado shall be used to determine the applicable requirements.</p>
<p><u>Subpart GG, New or Returning to Colorado</u>                      The unit originally commenced construction between October 3, 1977 and February 18, 2005, and has not been reconstructed or modified after February 18, 2005.</p>	<p>Subpart GG: the applicable requirements shall be determined based on the date the unit initially commenced construction, or on the date of modification/reconstruction (if applicable), whichever is later.</p>

Status of Replacement Unit Prior to Relocation	NSPS Requirements Upon Installation
<p><u>Subpart KKKK, New or Returning to Colorado</u>                      The unit originally commenced construction after February 18, 2005</p>	<p>Subpart KKKK: the applicable requirements shall be determined based on the date the unit initially commenced construction, or on the date of modification/reconstruction (if applicable), whichever is later.</p>

The owner or operator should maintain records on site to document the location history of replacement turbines. These records shall be provided to the Division upon request.

When the replacement unit is being relocated from within Colorado, the provisions of Regulation No. 6, Part B, Section I.B, as referenced in Regulation No. 6, Part A, do not apply and the NSPS applicability of the replaced turbine is determined based on the language of the federal rules and any applicable determinations made by EPA in the usual manner.

The Division will provide Permanent Replacement language in the AOS for situations when the existing unit and the replacement unit are subject to the same NSPS Subpart. In the case where the replacement unit is subject to a different NSPS Subpart, the Division will allow the Temporary Replacement provisions to be used, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent replacement turbine.

**4. Non-Attainment New Source Review (NANSR) and Prevention of Significant Deterioration (PSD) Implications**

The AOS **cannot be used** for the permanent replacement of a turbine at any source that is an existing major stationary source for a regulated NSR pollutant unless the turbine has federally enforceable emission limits that are below the significance levels in Regulation No 3, Part D, Section II.A.42. (e.g. a 39 TPY NO<sub>x</sub> limit).

The AOS **cannot be used** for the permanent replacement of a turbine at any source where: (1) the facility-wide potential to emit of CO<sub>2e</sub> is equal to or greater than 100,000 tpy of CO<sub>2e</sub>, and (2) the originally permitted turbine does not have a CO<sub>2e</sub> emission limit below 75,000 tpy. In the absence of a numerical CO<sub>2e</sub> limit, the PTE of CO<sub>2e</sub> should be based on 8760 hours per year of operation and emission factors from AP-42 Chapter 3.1, 40 CFR Part 75, and/or other factors approved by the Division. Since many older permits that predate the GHG tailoring rule will not have CO<sub>2e</sub> limits, the engineer should consider adding limits when updating permits with permanent AOS provisions.

The Division is placing the restrictions described above on permanent turbine replacements because there is no method to pre-determine that every possible replacement project (even when limited to the same make and model) will not be subject to major modification requirements under PSD and/or NANSR. Colorado’s rules implementing the NSR Reform Provisions of 40 CFR 52.21 were approved by EPA, effective May 10, 2012. Based on these rules, a source has multiple options for evaluating a project for PSD/NANSR applicability. Depending on the methodology chosen by the source, the applicability test could include some or all of the following: (1) a projection of actual emissions following the project, based on historical operational data, expected business activities, compliance plans and other information, (2) a projection of actual fugitive and or emissions associated with startup, shutdown and malfunctions following the project, (3) selection of a baseline period that can be any 24 month period over five or ten years, depending on the type of

unit, (4) an evaluation of the baseline period to determine whether any additional emissions could have been legally and physically accommodated and that are also unrelated to the project (5) determination of whether the replacement unit definition can be used to establish the existing unit test instead of the new unit test, which is dependent on the location history of the replacement.

In the case where an existing turbine has emission limits (or PTE) below significance levels and below 75,000 tons per year of CO<sub>2e</sub>, the emissions increase due to the replacement project can never meet or exceed significance levels or 75,000 tons per year of CO<sub>2e</sub> (the most conservative applicability test would be based on the permit limit as the PTE and zero as the baseline emissions). Because this provides certainty that these types of replacements will not trigger major modification requirements, the AOS can allow for them in the permanent replacement provisions.

When an existing turbine does not have emission limits (or PTE) below significance thresholds and 75,000 tons per year of CO<sub>2e</sub>, a case-by-case determination is required using data and information described above that is not in existence at the time that the original unit is permitted. In some cases, additional requirements may apply following the replacement project that are not part of the original permit (e.g., enforceable conditions barring the return of an original unit to service if its replacement is evaluated using existing rather than new unit provisions, addition of the applicability determination calculations to the permit appendix or notes to permit holder section, etc.). Some replacement projects may not pass the applicability test at the project level and may need to be further evaluated using the significant net emission increase test over the contemporaneous period. The Division has never intended to implement a permanent AOS provision that would pre-authorize a netting analysis that has never been identified.

For the reasons described above, only the Temporary Replacement provisions can be used for these situations, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent turbine replacement.

Note that in the case where the entire source is not a major stationary source and does not have CO<sub>2e</sub> potential to emit above 100,000 tons per year, the permanent turbine replacement provisions can be allowed. In these cases, PSD/NANSR would not apply since the replacement turbine would never qualify as a major stationary source in and of itself (i.e., permit limits for the existing turbine will always be below the major stationary source thresholds and 100,000 tpy CO<sub>2e</sub> if facility-wide limits are below those values).

## 5. Other Implications

Any situation not covered by this AOS will require that the facility utilize the Regulation No. 3 permitting procedures to obtain a new or modified Permit, as appropriate.

**For Temporary Replacements Only:** In the case of a grandfathered or permit exempt turbine that is not covered by an Operating Permit, the facility would have to voluntarily seek a permit, thus losing their grandfathered or permit exempt status. If the facility is covered by an Operating Permit, the turbine may maintain its grandfathered or permit exempt status.

In regard to the permanent replacement of the entire existing turbine with the exact make and model turbine: since the dispersion characteristics of the turbines will not differ from those of the existing turbine, the permit review engineer may not need to conduct (or have the source conduct)

appropriate air impact modeling to demonstrate that operation of the permanent replacement turbine will not cause a violation of the NAAQS. A possible exception to this general rule would be a situation wherein the emissions from the existing turbines at a facility have not been previously modeled. In such cases, the review engineer may conduct/require such appropriate modeling for the permanent turbine replacement AOS.

## 6. Component Replacement Notes

Certain provisions of this guidance that deal with component replacements that do not trigger modifications can be used by any source even if the suggested language is not in their operating or construction permit. However, the language should be included in all new and revised permits for clarity. Note that if replacement of any of the components listed results in a change in serial number for the turbine, a letter explaining the action as well as a revised APEN and appropriate filing fee shall be submitted to the Division within 30 days of the replacement.

Note that the component replacement provisions described below apply ONLY to those turbines subject to NSPS GG. Neither pre-GG turbines nor post GG turbines (i.e. KKKK turbines) can use those provisions. In the event that EPA promulgates amendments to Subparts GG and/or KKKK that further define or alter the definition of component replacements that will not trigger modifications, the provisions of those rules shall supersede the component replacement provisions below.

In 1977, EPA determined that certain physical or operational changes will not be considered as modifications to existing gas turbines for NSPS GG purposes, irrespective of any change in the emission rate.<sup>2</sup> These changes, therefore, would not trigger any regulatory review under NSPS. From the referenced document:

**For NSPS Subpart GG purposes only**, physical or operational changes that **might be** considered a modification are:

- A. Replacement of components with a different design than the original to permit firing a turbine with fuels for which it was not originally designed.
- B. Replacement of components with a different design than the original to increase the power output of the turbine.
- C. Sustained operation of a turbine at higher outputs than design.

**For NSPS Subpart GG purposes only**, physical or operational changes that **are not** considered a modification are:

- A. Changes determined to be routine maintenance, repair, or replacement in kind. This will include repair or replacement of stator blades, turbine nozzles, turbine buckets, fuel nozzles,

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<sup>2</sup> Standards Support and Environmental Impact Statement Volume 1: Proposed Standards of Performance for Stationary Gas Turbines. EPA-450/2-77-017a

combustion chambers<sup>3</sup>, seals, and shaft packings (provided that they are of the same design as the original).

- B.** Changes in the type or grade of fuel used, if the original gas turbine installation, fuel nozzles, etc. were designed for its use.
- C.** An increase in the hours of operation (unless limited by permit).
- D.** Variations in operating loads within the turbine design specification.

For purposes of this guidance, the Division is extending the NSPS modification exemptions for physical or operational changes to NSPS GG turbines as set forth above to also apply to modifications under major stationary source NSR/PSD and Regulation No. 3, Part B minor source permitting requirements.

Note that the repair or replacement of the components listed under A above (in the section on physical or operational changes that are not considered a modification) must be genuinely the same design. The Division does not consider that this section of the guidance allows for the entire replacement or reconstruction of an existing emissions unit with an identical new one or one similar in design or function. Rather, the guidance considers the repair or replacements provision to encompass the repair or replacement of certain components at an emissions unit with the same components.

The following **will not be eligible** for coverage under this guidance and will have to undergo the appropriate review under the NSPS, NSR/PSD, or Regulation No. 3 requirements:

- A.** Replacement of components with a different design than the original to permit firing a turbine with fuels for which it was not originally designed
- B.** Replacement of components with a different design than the original to increase the power output of the turbine.
- C.** Sustained operation of a turbine at higher outputs than design.
- D.** Permanent replacement of the entire existing turbine at any source that is currently major for NSR/PSD purposes unless all turbines onsite have permits limiting their PTE to below the PSD significance levels. Temporary replacement (up to 270 days) is allowed.

## **7. Air Pollutant Emission Notice (APEN) Reporting Requirements**

When a permanent turbine replacement occurs under the provisions of the AOS (or when a component replacement resulting in a serial number change occurs as allowed under the provisions of Section 6 above), the source is required to submit an APEN to the Division. These APENs are processed using typical procedures for APEN updates: they are scanned, logged into the inventory system and included in the facility-specific file. For AOS APENs associated with facilities subject to the Title V Operating Permit Program, a copy of the APEN should be routed to the assigned Title V engineer or the Operating Permit Unit Manager so that the serial number change can be

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<sup>3</sup> Note that the term "combustion chambers" may be called by different names by different manufacturers, e.g. "gas combustor" or "power unit".

incorporated into the next permit modification or renewal. For sources that are not subject to Title V permitting, the AOS APENs are maintained in the file with all APENs for that facility. Construction permits will not necessarily be reopened solely for the purpose of incorporating the serial number change, but any subsequent requested modifications will require additional APEN submittals with the most current serial numbers and the permits would be updated accordingly.

## **8. Summary of the AOS**

The AOS allows a facility to temporarily (up to 90/270 operating days in any 12 month period) replace an existing turbine with the exact make and model turbine as long as the replacement turbine complies with any limitations or other requirements applicable to the original turbine. The 90 (270) day period is the total number of operating days that the temporary replacement turbine may operate. If the temporary replacement turbine operates only part of a day, that day counts towards the 90 (270) day total. Portable monitoring using the Division-approved Protocol is required upon turbine replacement to monitor the compliance of the temporary replacement turbine with the original turbine's permitted emission limits (except that you can use AP42/Mfg emission factors instead of testing if the original turbine is grandfathered, permit exempt, or has no emission limits on their permit and is covered by an Operating Permit).

The AOS allows a facility (except as described above for certain NANSR/PSD/NSPS sources and sources located in an attainment/maintenance or non-attainment area ) to permanently (more than 90 total operating days in any 12 month period) replace an existing turbine with the exact make and model turbine as long as the permanent replacement turbine complies with any permit limitations and other requirements applicable to the existing turbine as well as any new applicable requirements for the replacement turbine.

Measurement of emissions from the permanent replacement turbine and compliance with the applicable emission limitations shall be made using a portable analyzer as set forth in permit condition 2.2.

**Turbine AOS – with CEM  
ver 1/23/2013**

**Permit Engineer User Notes:**

- The use of 8760 hours to “ramp up” test results comes from PS Memo 98-3, Short Term Limits Policy:

In the case of permits issued under the new policy, monitoring results, such as those from stack testing, will be projected out for comparison to the emissions limits in the permit. If the reference test method lasts one hour and there are monthly and annual limits in the permit with no restriction on hours of operation, the test data will be multiplied by the number of hours in a month or hours in a year to determine compliance.
- There are two NSPS for combustion turbines: NSPS GG and NSPS KKKK.
- Note that under the provisions of Regulation No. 6. Part B, Section I.B, as referenced in Part A that relocation of a source from outside the State into Colorado is considered to be a new source, subject to the requirements of Regulation No. 6 (i.e. the date that the source is first relocated to Colorado becomes equivalent to the commence construction date for purposes of determining the applicability of NSPS requirements). This requirement applies to turbines that are not subject to any NSPS standards upon their relocation into the State; this requirement will not be used to apply NSPS KKKK requirements on a state-only basis to turbines that are already subject to NSPS GG requirements. Refer to the table and discussion in Section 3 above to determine applicability for units relocated in from outside the State.
- For any replacement turbine that is subject to a different NSPS subpart than the unit it is replacing, only the Temporary Replacement provisions can be used, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent replacement turbine.
- For any turbine located in a designated attainment/maintenance or non-attainment area only the Temporary Replacement provisions can be used, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent replacement turbine. This is because as a “new” source it would have to undergo RACT.
- In regard to MACT rules, combustion turbines that burn gas only or that burn oil for less than 1000 hrs/yr are not subject to the substantive requirements of Subpart YYYY - National Emission Standards for Stationary Combustion Turbines, although they do have some initial notification requirements.
- The AOS cannot be used for the permanent replacement of an entire turbine at any source that is currently a major stationary source for purposes of non-attainment area new source review and/or prevention of significant deterioration (NANSR/PSD) unless the turbine has emission limits that are below the significance levels in Reg 3, Part D, II.A.42. (e.g. a 39 TPY NO<sub>x</sub> limit). Note that a permit would not necessarily need specific limits for all of the pollutants listed in Part D, II.A.42. For example, they would not need a TPY limit for Hydrogen Sulfide or even Sulfur Dioxide if the PTE would be below the significance levels.

- The AOS cannot be used for the permanent replacement of an entire turbine at any source where facility-wide PTE for CO<sub>2e</sub> is greater than or equal to 100,000 tpy unless the turbine has emission limits below 75,000 tpy CO<sub>2e</sub> (or potential to emit of CO<sub>2e</sub> below 75,000 tpy based 8760 hours per year of operation). Since many older permits that predate the GHG tailoring rule will not have CO<sub>2e</sub> limits, the engineer should consider adding limits when updating permits with permanent AOS provisions.
- For any turbine located at a source described in one of the two bullets above, only the Temporary Replacement provisions can be used, but in those cases the definition of temporary for purposes of the AOS is changed from 90 days to 270 days in order to allow the Division the time required to process the request for a permanent turbine replacement.
- There are a few instances where the Operating Permit language is different than the Construction Permit language. There is also some language that is only included for major stationary sources, and some language that is only included for facilities in attainment/maintenance or non-attainment areas. The instructional language in *italic text* provides guidance for these situations.
- Please put the version date at the top of the AOS language in the permit.
- The permit language begins on the following page. For Operating Permits, the permit language should be included in Section I of the permit. Instructional text is denoted by *italic text* and should be deleted once the specified edits are completed.

## 1. Routine Turbine Component Replacements

The following physical or operational changes to the turbines in this permit are not considered a modification for purposes of NSPS GG, major stationary source NSR/PSD, or Regulation No. 3, Part B. Note that the component replacement provisions apply ONLY to those turbines subject to NSPS GG. Neither pre-GG turbines nor post GG turbines (i.e. KKKK turbines) can use those provisions. In the event that EPA promulgates amendments to Subparts GG and/or KKKK that further define or alter the definition of component replacements that will not trigger modifications, the provisions of those rules shall supersede the component replacement provisions listed below.

- 1) Replacement of stator blades, turbine nozzles, turbine buckets, fuel nozzles, combustion chambers, seals, and shaft packings, provided that they are of the same design as the original.
- 2) Changes in the type or grade of fuel used, if the original gas turbine installation, fuel nozzles, etc. were designed for its use.
- 3) An increase in the hours of operation (unless limited by a permit condition)
- 4) Variations in operating loads within the engine design specification.
- 5) Any physical change constituting routine maintenance, repair, or replacement.

Turbines undergoing any of the above changes are subject to all federally applicable and state-only requirements set forth in this permit (including monitoring and record keeping), **and shall be subject to any shield afforded by this permit** (*include bold text only in Operating Permits*). If replacement of any of the components listed in (1) or (5) above results in a change in serial number for the turbine, a letter explaining the action as well as a revised APEN and appropriate filing fee shall be submitted to the Division within 30 days of the replacement.

Note that the repair or replacement of components must be of genuinely the same design. Except in accordance with the Alternate Operating Scenario set forth below, the Division does not consider that this allows for the entire replacement (or reconstruction) of an existing turbine with an identical new one or one similar in design or function. Rather, the Division considers the repair or replacements to encompass the repair or replacement of components at a turbine with the same (or functionally similar) components.

## 2. Alternative Operating Scenarios

The following Alternative Operating Scenario (AOS) for the temporary and permanent replacement of combustion turbines and turbine components has been reviewed in accordance with the requirements of Regulation No. 3., Part A, Section IV.A, Operational Flexibility-Alternative Operating Scenarios, Regulation No. 3, Part B, Construction Permits, and Regulation No. 3, Part D, Major Stationary Source New Source Review and Prevention of Significant Deterioration, and it has been found to meet all applicable substantive and procedural requirements. This permit incorporates and shall be considered a Construction Permit for any turbine or turbine component replacement performed in accordance with this AOS, and the permittee shall be allowed to perform such turbine or turbine component replacement without applying for a revision to this permit or obtaining a new Construction Permit.

### 2.1. General Requirements for Turbine Replacements

The following AOS is incorporated into this permit in order to deal with a turbine breakdown or periodic routine maintenance and repair of an existing onsite turbine that requires the use of a temporary or permanent replacement turbine. The definitions of "Temporary" and "Permanent" for each permitted unit are defined in Condition 2.7. The compliance demonstrations required by this AOS are in addition to any compliance demonstrations or periodic monitoring required by this permit.

All replacement turbines are subject to all federally applicable and state-only requirements set forth in this permit (including monitoring and record keeping), **and shall be subject to any shield afforded by this permit.** *(include bold text only in Operating Permits).*

The results of all tests and the associated calculations required by this AOS shall be submitted to the Division within 30 calendar days of the test or within 60 days of the test if such testing is required to demonstrate compliance with the NSPS requirements. Results of all tests shall be kept on site for five (5) years and made available to the Division upon request.

## 2.2. Portable Analyzer Testing

Note: In some cases there may be conflicting and/or duplicative testing requirements due to overlapping Applicable Requirements. In those instances, please contact the Division Field Services Unit to discuss streamlining the testing requirements.

Note that the testing required by this Condition may be used to satisfy the periodic testing requirements specified by the permit for the relevant time period (i.e. if the permit requires quarterly portable analyzer testing, this test conducted under the AOS will serve as the quarterly test and an additional portable analyzer test is not required for another three months).

The permittee may conduct a reference method test, in lieu of the portable analyzer test required by this Condition, if approved in advance by the Division.

The permittee shall measure nitrogen oxide (NO<sub>x</sub>) and carbon monoxide (CO) emissions in the exhaust from the replacement turbine using a portable flue gas analyzer within seven (7) calendar days of commencing operation of the replacement turbine.

All portable analyzer testing required by this permit shall be conducted using the most current version of the Division's Portable Analyzer Monitoring Protocol as found on the Division's website. Results of the portable analyzer tests shall be used to monitor the compliance status of this unit.

For comparison with an annual (tons/year) or short term (lbs/unit of time) emission limit, the results of the tests shall be converted to a lb/hr basis and multiplied by the allowable operating hours in the month or year (whichever applies) in order to monitor compliance. If a source is not limited in its hours of operation the test results will be multiplied by the maximum number of hours in the month or year (8760), whichever applies.

For comparison with a short-term limit that is either input based (lb/mmBtu), output based (g/hp-hr) or concentration based (ppmvd @ 15% O<sub>2</sub>) that the existing unit is currently subject to or the replacement turbine will be subject to, the results of the test shall be converted to the appropriate units as described in the above-mentioned Portable Analyzer Monitoring Protocol document.

If the portable analyzer results indicate compliance with both the NO<sub>x</sub> and CO emission limitations, in the absence of credible evidence to the contrary, the source may certify that the turbine is in compliance with both the NO<sub>x</sub> and CO emission limitations for the relevant time period.

Subject to the provisions of C.R.S. 25-7-123.1 and in the absence of credible evidence to the contrary, if the portable analyzer results fail to demonstrate compliance with either the NO<sub>x</sub> or CO emission limitations, the turbine will be considered to be out of compliance from the date of the portable analyzer test until a portable analyzer test indicates compliance with both the NO<sub>x</sub> and CO emission limitations or until the turbine is taken offline.

### 2.3. Recordkeeping Requirements for Turbine Replacements

The permittee shall maintain a log on-site to contemporaneously record the start and stop date of any turbine replacement, the manufacturer and serial number of the turbine(s) that are replaced during the term of this permit, and the manufacturer and serial number of the replacement turbine.

### 2.4. Specific Requirements for Temporary Replacements

The permittee may temporarily replace an existing turbine covered by this permit as specified in Condition 2.7 with the exact make and model turbine without modifying this permit so long as the replacement turbine complies with the emission limitations and other requirements applicable to the original turbine as well as any new applicable requirements for the replacement turbine. Measurement of emissions from the temporary replacement turbine shall be made as set forth in Condition 2.2.

*Include this paragraph only in Operating Permits:* The permittee may temporarily replace a grandfathered or permit exempt turbine or a turbine that is not subject to emission limits without modifying this permit. In this circumstance, potential annual emissions of NO<sub>x</sub> and CO from the temporary replacement turbine must be less than or equal to the potential annual emissions of NO<sub>x</sub> and CO from the original grandfathered or permit exempt turbine or for the turbine that is not subject to emission limits, as determined by applying appropriate emission factors (e.g. AP-42 or manufacturer's emission factors)

### 2.5. Specific Requirements for Permanent Replacements

The permittee may permanently replace an existing turbine covered by this permit as specified in Condition 2.7 with the exact make and model turbine without modifying this permit so long as the replacement turbine complies with the emission limitations and other requirements applicable to the original turbine as well as any new applicable requirements for the replacement turbine. Measurement of emissions from the temporary replacement turbine shall be made as set forth in Condition 2.2.

This AOS cannot be used for permanent turbine replacement of a grandfathered or permit exempt turbine or a turbine that is not subject to emission limits.

This AOS cannot be used in areas designated as non-attainment or attainment/maintenance for VOC, CO, NO<sub>x</sub> SO<sub>2</sub> and PM<sub>10</sub>.

The AOS cannot be used for the permanent replacement of an entire turbine at any source that is an existing major stationary source for a regulated NSR Pollutant unless the existing turbine has federally enforceable emission limits that are below the significance levels in Reg 3, Part D, II.A.42.

This AOS cannot be used for the permanent replacement of an entire turbine at any source where: (1) the facility-wide potential to emit of CO<sub>2e</sub> is equal to or greater than 100,000 tpy of CO<sub>2e</sub>, and (2) the originally permitted turbine does not have a CO<sub>2e</sub> emission limit below 75,000 tpy CO<sub>2e</sub>. In the absence of a numerical CO<sub>2e</sub> limit, the PTE of CO<sub>2e</sub> should be based on 8760 hours per year of operation and emission factors from AP-42 Chapter 3.1, 40 CFR Part 75, and/or other factors approved by the Division.

Nothing in this AOS shall preclude the Division from taking an action, based on any permanent turbine replacement(s), for circumvention of any state or federal PSD/NANSR requirement. Additionally, in the event that any permanent turbine replacement(s) constitute(s) a circumvention of applicable PSD/NANSR requirements, nothing in this AOS shall excuse the permittee from complying with PSD/NANSR and applicable permitting requirements.

#### 2.5.1. Turbines Relocated into Colorado from Outside of Colorado

Note that under the provisions of Regulation No. 6, Part B, Section I.B., as referenced in Part A, the following turbines that are exempt from federal NSPS requirements based on dates of construction, reconstruction or relocation that occurred outside of the State of Colorado will become subject to NSPS requirements after relocation into the State as follows:

##### 2.5.1.1. Replacement Units previously exempt from NSPS Subpart GG

This condition applies to units that originally commenced construction outside of Colorado prior to October 3, 1977 and have not been reconstructed or modified after October 3, 1977.

If these units were previously installed within the State of Colorado during the applicability dates of NSPS Subpart GG (October 3, 1977 – February 18, 2005), they will be subject to Subpart GG upon relocation into the State of Colorado. The applicable requirements of Subpart GG shall be determined based on the date on which the unit was previously installed within the State of Colorado.

If these units were not previously installed within the State of Colorado during the applicability dates of NSPS Subpart GG, they will be subject to the requirements for new units under Subpart KKKK upon commencement of construction in Colorado.

##### 2.5.1.2. Units subject to NSPS Subpart GG

This condition applies to units that originally commenced construction outside of Colorado after October 3, 1977 but prior to February 18, 2005 and have not been reconstructed or modified after February 18, 2005. These units will remain subject to NSPS Subpart GG upon relocation into Colorado, and the applicable

requirements under Subpart GG shall not be changed or re-determined based on the date of relocation into Colorado.

#### 2.5.1.3. Units subject to NSPS Subpart KKKK

This condition applies to units that originally commenced construction outside of Colorado after February 18, 2005. These units will remain subject to NSPS Subpart KKKK upon relocation into Colorado, and the applicable requirements under Subpart KKKK shall not be changed or re-determined based on the date of relocation into Colorado.

#### 2.5.2. Air Pollutant Emission Notice (APEN) Submittals

An APEN that includes the specific manufacturer, model, and serial number of any permanent replacement turbine shall be filed with the Division for the permanent replacement turbine within 14 calendar days of commencing operation of the replacement turbine. The APEN shall be accompanied by the appropriate APEN filing fee and a cover letter explaining that the permittee is exercising an alternative operating scenario and is installing a permanent replacement turbine.

The permittee shall agree to pay fees based on the normal permit processing rate for review of information submitted to the Division in regard to any permanent turbine replacement.

The owner or operator shall include, with the APEN, a regulatory applicability analysis to address the requirements of the replacement unit. At a minimum, the applicability analysis shall include:

- An analysis of any requirements applicable to the replacement turbine that differ from those applicable to the permitted unit. Applicable requirements include, but are not limited to, Federal NSPS, MACT and/or Colorado Air Quality Control Commission regulations. For example, if an original unit that qualifies as a reconstructed gas turbine subject to an NSPS KKKK NO<sub>x</sub> limit of 150 ppm is replaced with a Subpart KKKK unit that has not been modified or reconstructed, the NO<sub>x</sub> limit of the replacement unit will be 42 ppm. The analysis should also address any testing, monitoring, recordkeeping and reporting differences between the original and replacement units.
- The applicability determination shall list the most recent date that the turbine was modified or reconstructed as per the definitions in 40 CFR §§60.2 and 60.14. If the turbine has never been modified or reconstructed, the applicability determination shall include a statement to verify that no modifications or reconstructions have occurred.
- The applicability determination shall also list the most recent date that the turbine was overhauled, and an explanation of whether the overhaul qualifies or does not qualify as a modification or reconstruction. Supporting documentation, including cost estimates shall be submitted for those that do not qualify as reconstructions.

- The applicability analysis must be certified by either 1) for Operating Permits, a Responsible Official as defined in Colorado Regulation No. 3, Part A, Section I.B.38, or 2) for Construction and General Permits, the person legally authorized to act on behalf of the source. This signed certification document must be packaged with the documents being submitted. The certification shall include the following statement:

I have reviewed this certification in its entirety and, based on information and belief formed after reasonable inquiry, I certify that the statements and information contained in this certification are true, accurate and complete.

2.6. Additional Sources

The replacement of an existing turbine with a new turbine is viewed by the Division as the installation of a new emissions unit, not “routine replacement” of an existing unit. The AOS is therefore essentially an advanced construction permit review. The AOS cannot be used for additional new emission points for any site; a turbine that is being installed as an entirely new emission point and not as part of an AOS-approved replacement of an existing onsite turbine has to go through the appropriate Construction/Operating permitting process prior to installation.

2.7. Allowable Replacements

*Instructions: Include the Following Table 1 only if the replacement turbines are subject to RACT due to location in attainment/maintenance or non-attainment area (delete Tables 1 and 2 on the following page). Update the Point and Make/Model columns to address all turbines covered by the AOS.*

**Table 1 – Turbine Replacements Allowed by the AOS for Facilities Located in a Designated Attainment/Maintenance or Non-Attainment Area**

Permitted Turbine		Allowable Replacements <sup>1</sup>
Point	Make/Model	
CT-XX	Westinghouse Model 501FD	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup>  <u>Permanent</u> replacement units: not allowed (new permit or permit modification required)
CT-XX	GM 6000LE	
CT-XX	GM6000LE	

Note 1: Replacement unit must be of the same make and model as the permitted unit

Note 2: The temporary replacement period is the total number of operating days that the replacement unit may operate in the same service. If the temporary replacement turbine operates only part of a day, that day counts toward the total. Temporary replacement units shall comply with all requirements in Conditions 2.1, 2.2 and 2.3, and with the specific requirements for temporary replacements in Condition 2.4.

*Instructions: If the replacement turbines are subject to RACT, delete the following Tables 1 and 2 below. Otherwise, add a row for each turbine into Table 1 and Table 2 (use one of the three examples shown below depending on the NSPS applicability of the original unit: pre-NSPS GG, Subpart GG or Subpart KKKK). Exception: if the facility is a major stationary source, for each turbine that does not have permitted emission limits below the significance levels, use the following text in the Allowable Replacement column:*

*Status/Type: All*

*Restrictions: Temporary replacement units may operate up to 270 days in any 12 month period<sup>2</sup> Permanent replacement units: not allowed (new permit or modification required)*

**Table 1 – Turbine Replacements Allowed by the AOS – Units Relocated from Outside the State of Colorado**

Permitted Turbine		Allowable Replacements <sup>1</sup>	
Point Make/Model	Applicable NSPS Requirement	Status/Type	Restrictions
CT-01 Westinghouse Model 501FD	N/A (unit predates NSPS Subpart GG)	All	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)
CT-01 Westinghouse Model 501FD	Subpart GG	Units that predate NSPS Subpart GG but were previously installed within the state of Colorado during the Subpart GG applicability period (Oct 4, 1977 – Feb 18, 2005) <b>-OR-</b> Units subject to Subpart GG	<u>Temporary</u> replacement units may operate up to 90 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units may operate more than 90 days in any 12 month period <sup>3</sup>
		All Others	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)
CT-01 Westinghouse Model 501FD	Subpart KKKK	Units that predate Subpart GG, and have not been previously located in Colorado <b>-OR-</b> Units subject to Subpart KKKK	<u>Temporary</u> replacement units may operate up to 90 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units may operate more than 90 days in any 12 month period <sup>3</sup>
		All Others	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)

Note 1: Replacement unit must be of the same make and model as the permitted unit

Note 2: The temporary replacement period is the total number of operating days that the replacement unit may operate in the same service. If the temporary replacement turbine operates only part of a day, that day counts toward

the total. Temporary replacement units shall comply with all requirements in Conditions 2.1, 2.2 and 2.3, and with the specific requirements for temporary replacements in Condition 2.4.

Note 3: Permanent replacement units shall comply with all requirements in Conditions 2.1, 2.2 and 2.3, and with the specific requirements for permanent replacements in Condition 2.5.

**Table 2 – Turbine Replacements Allowed by the AOS – Units Relocated from Within the State of Colorado**

Permitted Turbine		Allowable Replacements <sup>1</sup>	
Point Make/Model	Applicable NSPS Requirement	Status/Type	Restrictions
CT-01 Westinghouse Model 501FD	N/A (unit predates NSPS Subpart GG)	Units that predate NSPS Subpart GG	<u>Temporary</u> replacement units may operate up to 90 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units may operate more than 90 days in any 12 month period <sup>3</sup>
		All Others	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)
CT-01 Westinghouse Model 501FD	Subpart GG	Units subject to Subpart GG	<u>Temporary</u> replacement units may operate up to 90 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units may operate more than 90 days in any 12 month period <sup>3</sup>
		All Others	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)
CT-01 Westinghouse Model 501FD	Subpart KKKK	Units subject to Subpart KKKK	<u>Temporary</u> replacement units may operate up to 90 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units may operate more than 90 days in any 12 month period <sup>3</sup>
		All Others	<u>Temporary</u> replacement units may operate up to 270 days in any 12 month period <sup>2</sup> <u>Permanent</u> replacement units: not allowed (new permit or modification required)

Note 1: Replacement unit must be of the same make and model as the permitted unit

Note 2: The temporary replacement period is the total number of operating days that the replacement unit may operate in the same service. If the temporary replacement turbine operates only part of a day, that day counts toward the total. Temporary replacement units shall comply with all requirements in Conditions 2.1, 2.2 and 2.3, and with the specific requirements for temporary replacements in Condition 2.4.

Note 3: Permanent replacement units shall comply with all requirements in Conditions 2.1, 2.2 and 2.3, and with the specific requirements for permanent replacements in Condition 2.5.