NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Generating Availability Data System

Data Reporting Instructions

Effective January 1, 2024

RELIABILITY | RESILIENCE | SECURITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Section I: Introduction

NERC developed the *GADS Data Reporting Instructions* to assist utility personnel in reporting information to the Generating Availability Data System (GADS). This reporting system, initiated by the electric utility industry in 1982, expands and extends the data collection procedures begun by the industry in 1963. NERC-GADS is recognized today as a valuable source of reliability, availability, and maintainability (RAM) information. This information, collected for both total-unit and major equipment groups, is used by analysts industry-wide in numerous applications (Table I.1). GADS maintains complete operating histories on more than 8,000 generating units, representing over 90% of the installed generating capacity of the United States and Canada. As of January 1, 2013, GADS became a mandatory industry program for conventional generating units 20 MW and larger. GADS remains open to all non-required participants in the Regional Entities (shown in Table I.2) and any other organization, domestic or international,[1] that operate electric generating facilities willing to follow the GADS mandatory requirements as presented in the document *Final GADSTF Recommendations Report* dated July 20, 2011.

Table I.1: Applications of GADS Data

New Plants	**Plant Strategies**	**Maintenance Strategies**
Design	Load following	Preventive/Predictive
Procurement	Power reductions	Inspection Scheduling
Construction	Goals/benchmarking	Surveillance
	High-impact outages	
System Strategies	**Plant Modifications**	**Outage Planning**
Dispatch	Replacement	Critical Items
Maintenance	Reconfiguration	Resource allocation

Utility designers, operating engineers, and system planners developed GADS to meet the information needs of the electric utility industry. For this purpose, they established specific objectives for the GADS program: compilation and maintenance of an accurate, dependable, and comprehensive database capable of monitoring the performance of electric generating units and major pieces of equipment. GADS is not a substitute for the detailed and often unique data systems typically found at power plants or for maintenance data programs that record detailed equipment failures and repair techniques. The objectives of the GADS program can be met through the collective effort of participating GADS members, the cooperation in reporting to GADS, and sharing information with the industry.

With the GADS mandatory program, participating organizations must be prepared to commit the necessary effort needed to provide timely, accurate, and complete data. The *GADS Data Reporting Instructions* detail the data elements collected by GADS, data identified by the industry as being vital to the understanding and interpretation of generating unit and major equipment performance. By following the strict guidelines set forth in these instructions, we have found that the industry analysts can best apply the data in the most beneficial manner.

Industry Development of GADS

Before any data element was included in GADS, an industry committee determined its applicability to utility operation and RAM analyses scrutinized it. A series of industry meetings were held to discuss the analytical usefulness of each

[1] NERC management reserves final approval authority for GADS data with international organizations on a case-by-case basis.

element and to determine if utilities could reasonably provide that data to GADS. Consequently, the only data requested in the *GADS Data Reporting Instructions* meet industry-prescribed needs. In reviewing this document, you will find that most, if not all, of the requested data elements are already being collected in your utility's plant-specific data system.

The industry also realized a need to include standardized terminology in the GADS program if it were to function on an international scale. As a result, the definitions promulgated by the Institute of Electrical and Electronic Engineers' (IEEE) Standard 762, "Definitions for Reporting Electric Generating Unit Reliability, Availability and Productivity" were incorporated.

Utilities started their reporting using the GADS guidelines on January 1, 1982. GADS superseded the earlier data collection procedures begun by the Edison Electric Institute (EEI), a program started in the mid-1960s. GADS contains many of the same elements previously collected by EEI in addition to the many new data items. This seeming duplication of data was created intentionally: the EEI information can be derived from GADS so analyses that include data from earlier than 1982 can be completed.

Unit Boundaries and Problems Outside Plant Control

A number of generating companies have been deregulated over the last several years. As a result, part of the GADS database contains deregulated units and regulated units. As more and more electric utilities divide into owners and/or operators of generating, transmission, and distribution companies, GADS must also make changes to accommodate industry needs. To do so, we must determine where the GENCO responsibilities end, and the TRANSCO take over.

Based on research by the IEEE Standard 762 committee, the boundary between the GO and TO is as follows: "A generating unit includes all equipment up to (in preferred order) (1) the high-voltage terminals of the generator step-up (GSU) transformer and the station service transformers; (2) the GSU transformer (load) side of the generator-voltage circuit breakers; or (3) at such equipment boundary as may be reasonable considering the design and configuration of the generating unit."

Not all plants have the high-voltage terminals of the generator step-up (GSU) transformer and the station service transformers as shown in (1) above. Therefore, the boundaries are shown in preferred order based on unit design. If (1) is not applicable, then (2); if not (2) then (3).

GADS will continue to collect all problems that prevent the generating facility from providing electrical power to the customer. However, there are additional guidelines provided by IEEE Standard 762. In Appendix K of this manual "Outside Plant Management Control" are guidelines to determine what is and is not within the plant management responsibilities. As a result, new equations are introduced for measuring plant performance. For further details, refer to Appendix F of this manual.

Table I.2: Regional Entities	
MRO Midwest Reliability Organization	SERC SERC Reliability Corporation
RF Reliability*First*	WECC WECC
NPCC Northeast Power Coordinating Council	TRE Texas Regional Entity

Arrangement of Data Reporting Instructions

The *GADS Data Reporting Instructions* document details the procedures, format, and frequency to follow when reporting data to GADS.

This document has several sections, and each section treats a particular area of data to report to GADS. Section II describes the three general types of data to be reported to GADS: event, performance, and design. Sections III and IV provides the details for the event and performance reporting requirements, respectively. Section V describes the format and procedure to follow when reporting design data to GADS.

Section II: Data Scope and Transmittal

Scope

There are three types of data reported to GADS:

1. Event (07 format)
2. Performance (05 format)
3. Design

The GADS Data Reporting Instructions document describes the event and performance data in detail in Sections III and IV. The nine mandatory design data fields described in Section V must be submitted before reporting any event or performance data to NERC. All other design appendices in Appendix E are voluntary but encouraged for GADS work.

For the purposes of data reporting, the term “unit” is defined as follows:

Nuclear and fossil (steam) units — units consisting of a single reactor or boiler and a single turbine generator. In cases where multiple boilers and/or multiple turbine-generators are headed together, the entire group is considered a single unit and reported using the “Miscellaneous Unit” design data forms found in Appendix E, pages E-MS-1 to E-MS-5.

Hydro, pumped storage, gas turbine, jet engine, and diesel units — units consisting of the unique prime mover and a single generator. In cases where multiple combinations of turbines/engines and generators exist, either physically or because of operating philosophy, the entire group may be considered as a single unit or reported as individual units. You should note your specific reporting criteria on the design data forms.

Combined-Cycle units (or blocks) — By definition, a combined-cycle is a process for generating energy (either electricity or steam) constituted by the marriage of a Rankine Cycle (use heat to boil water to make steam to turn a steam turbine) and a Brayton Cycle (expand hot gas to turn a gas turbine). The combined-cycle consists of one or more gas turbines/jet engines and one or more heat recovery boilers. The heat recovery boiler sends steam to a steam turbine for generating electricity. Each gas turbine/jet engine and each steam turbine is a “unit”. The entire group is considered a “block”. Units where the gas turbines/jet engines can generate independent of the heat recovery boilers and steam turbine are also combined-cycle blocks. Report design data using the “Combined-Cycle Block” design data forms found in Appendix E, pages E-CC-1 to E-CC-25.

Co-generation units — units consisting of one or more gas turbines/jet engines and one or more heat recovery boilers. Co-generation is similar to the combined-cycle block except part of the steam from the heat recovery boiler is used for other purposes (process steam), not generating electricity. The entire ensemble is considered a single block. Report design data using the “Combined-Cycle Block” design data forms found in Appendix E, E-CC-1 to E-CC-25.

Fluidized bed combustion units — units consist of one or more bubbling, circulating, or pressurized bed boilers or steam turbines. Consider the entire group as a single unit.

Miscellaneous units — Miscellaneous conventional generating units are all other units (including variable fuel – biomass, landfill gases, etc.) used to generate electric power for the grid. Groups of units using the same electric meter are also categorized in the miscellaneous units group. For example, if you have five hydro units of 5 MW each and they all have the same common revenue meter (measuring the electric output of the five units combined), then this block of hydro units would be considered a 25 MW miscellaneous unit.

Reporting data to NERC-GADS begins when either one of the two following conditions is met:

1. The unit first enters the active state. This is termed the “service date” and occurs when the unit is first declared available for the dispatch of power at some level of its capability.
2. The unit first operates at 50% of its generator nameplate megawatt capability. For purposes of determining reporting requirements, the generator nameplate capability can be calculated by multiplying the MVA (megavolt amperes) by the rated power factor found on the nameplate affixed to the generator (nameplates in the case of multiple generator units).

The nine required design fields must be reported to GADS prior to reporting event and performance data. Your generating company is required to report to GADS if your organization owns generating facilities and is listed on the NERC Compliance Registry (NCR). This requirement applies to generators within North America that have a nameplate capacity of 20MW or greater. All other generating units by non-registered generating companies or units smaller than the required MW size are invited to participate in GADS on a voluntary basis.

We encourage all generating organizations to report all data elements currently collected for their units and any additional information they can reasonably provide.

Transmittal and Format

Submit event and performance data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of every calendar quarter** throughout the life of each unit. If a unit is deactivated (retired) or sold, continue to report that unit for the remainder of the calendar year using the instructions shown on Page III-6 of these reporting instructions. In addition, please complete the “Change in Unit Status” form found in Appendix A. The completed “Change in Unit Status” form should be submitted to NERC at gads@nerc.net.

Section III: Event Reporting

An "event" occurs any time a generating unit's operating status or capability changes. GADS receives reports on four general classifications of events: outages, derates, reserve shutdowns, and non-curtailing events. Reporting event data, in addition to performance and design data, provides all the information needed to evaluate generating unit availability. Event data are especially useful since they are often used to do specialized unit and equipment operation and design analyses.

As of January 1, 2013, reporting to the GADS program is mandatory for all conventional units that have a nameplate capacity of 20 MW and larger. Reporting the level of detail requested in these *GADS Data Reporting Instructions* enables you and other industry analysts to perform detailed, useful analyses. Table III-1 below presents the classes of events generating companies must report for different types and sizes of conventional, non-renewable generating units.

Table III-1: Event Reporting Requirements vs Unit Type/Size Starting January 1, 2013

Units		Event Classifications			
Types	**Size (MW)**	**Outage**	**Derates**	**Reserve Shutdown**	**Non-Curtailing**
Fossil (Steam)	20+	Required	Required	Required	Voluntary
Nuclear	20+	Required	Required	Required	Voluntary
Hydro & Pumped Storage (with automatic data recording equipment)	20+	Required	Required	Required	Voluntary
Hydro & Pumped Storage (without automatic data recording equipment)	20+	Required	Required	Voluntary	Voluntary
Gas Turbines/Jet Engines	20+	Required	Required	Required	Voluntary
Combined Cycle/Co-generators	20+	Required	Required	Required	Voluntary
Internal Combustion/Reciprocating Engines	20+	Required	Required	Required	Voluntary
Fluidized Bed Combustion	20+	Required	Required	Required	Voluntary
Miscellaneous – including multi-boiler/multi-turbine, geothermal, other miscellaneous conventional generating units (such as variable fuel – biomass, landfill gases, etc.) used to generate electric power for the grid and similar in design and operation as the units shown above	20+	Required	Required	Required	Voluntary

Detailed event data reporting for all units is mandatory and is indicated by the term "required." The term "voluntary" implies that each operating company must determine if it can reasonably provide detailed data. NERC encourages all electric generating organizations to report all event data information and any additional information they can reasonably provide.

You are required to report reserve shutdown events on all units except hydro and pumped storage units without automatic data recording equipment. All other events (forced, maintenance, and planned) must be reported.

Event Report (07 Format)

Report event data to GADS in the event report (07) format, described in this section. Submit the data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of each calendar quarter.**

There are four distinct sections of the event report: A) event identification; B) event magnitude; C) primary cause of event; and, D) additional cause of event or components worked during event. Together, these sections provide a complete description of each event experienced by a unit.

A description of each section and the data elements within it follows. Included are detailed instructions for reporting each event data element.

Section A: Event Identification

There are seven data elements, referred to as "fields," in this section (see Table III-2). These elements form a "key" — an identifier that makes each event card unique from all others in the database. This key is referenced at the beginning of every event record.

Record Code (columns 1-2) - Required
The "07" code uniquely identifies this data as an event report.

Utility (Company) Code (columns 3-5) - Required
Enter the three-character (alpha-numeric) code NERC assigned to your operating company. Appendix C contains a complete list of the operating companies participating in GADS and their assigned (operating company) codes.

Unit Code (columns 6-8) - Required
Enter the three-digit code your operating company assigned to the unit that you are reporting. This code distinguishes one unit from another in your operating company. Appendix C, Page C-1, contains a guide for selecting unit codes.

Year (columns 9-12) – Required

Table III-2: Record Layout of Section A – Event Identification		
Column ID	**Number of Columns**	**Starting Position**
All Records		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18

Enter the four-digit year in which the event occurred. Please note that this is not necessarily the year you reported the event to GADS, demonstrated in the following example:

> An event occurred on December 2, 2012 and was reported to GADS on January 31, 2013. Complete columns 9-12 as 2012. (Refer to Page III-21 for instructions on reporting events that begin in one year and continue into the next.)

Event Number (columns 13-16) - Required
Each time a unit experiences an event, assign it a unique "event number" and enter it in this field. Two events occurring on the same unit in the same year cannot have the same event number.

You do not have to assign event numbers sequentially, although it is preferred. If you find you have omitted one after gathering all the events to submit for a quarter, do not renumber all the events for the year; simply assign the next available event number to the omitted event.

All events start when they start and end when they end. Never create new events to continue an event from month to month or year to year. Events that continue from one year into the next should be programmatically truncated for inclusion in the input file submitted to webE-GADS with a new end/start date; webE-GADS will combine the pieces back into one long event. They should always remain as one long year crossing event in your in-house GADS system. Refer to Page III-21 for further instructions.

Report Revision Code (column 17) - Voluntary
This one-character data field signals that a change must be made to an event already submitted to GADS. Changes can be corrections, additions, or deletions of existing events.

The first time you submit an event to GADS it is called an "original" event. All original events have a revision code of zero (0).

Use the following codes when making changes to an original event:

1, 2 … 9
Use these codes when making **corrections or additions** to original events. Each time you make a change, you must increase the revision code by one. Up to nine corrections and additions to an original event can be made.

When making **corrections or additions** to an original event, you need to send NERC all records relating to that event on which the changes are to be made. On the record:

1. Complete columns 1-16, repeating the information from the original event; and
2. Increase the revision code in column 17 by one; and,
3. Make sure the same record number used in the original report is in columns 81-82. DO NOT LEAVE THE RECORD NUMBER BLANK; and,
4. Enter the correct or additional information in the appropriate field.

To delete data from one or more data fields, GADS RECOMMENDS that you resubmit the entire data set — year-to-date — for that unit (or all units you report) to GADS. This procedure will ensure that both you and the GADS database have the same records on file. You have the option to find the record that has the highest revision code and then increase this number by one or set all revision codes back to zero.

Event Type (columns 18-19) - Required

There are two "Unit States" defined by IEEE Standard 762: Inactive and Active. Inactive States are shown on Page III-4-5; Active States on Pages III-5-17. Enter the two-character code which best describes the event (inactive, outage, derates, reserve shutdown, or non-curtailing) experienced by the unit. For outages and deratings, the event type codes also define the urgency of the event (i.e. how long can you live with the problem?).

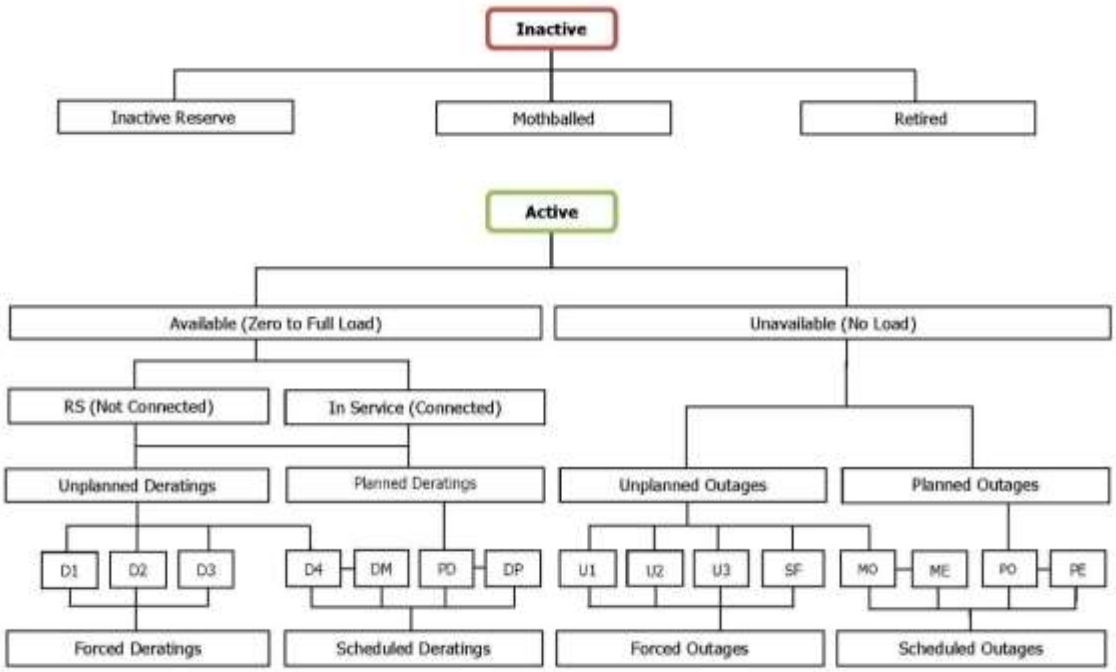

Figure III-1: Unit States Diagram

Inactive States

The two most general unit states are shown at the top of Figure III-1: active and inactive. Inactive state is called "Deactivated Shutdown" in IEEE Standard 762 and is defined as "the state in which a unit is unavailable for service for an extended period of time for reasons not related to the equipment." GADS interprets this to include:

IR **Inactive Reserve**

IR is defined by IEEE Standard 762 and GADS as "the state in which a unit is unavailable for service but can be brought back into service after some repairs in a relatively short duration of time, typically measured in days." GADS added "after some repairs" and defines the phrase "after some repairs" to mean that some action may be needed to prepare the unit for service because it had been sitting idle for a period of time, and some equipment parts have deteriorated or need replacing before the unit can be operated. The unit should be operable at the time the IR begins. <u>This does not include units that may be idle because of a failure and dispatch did not call for operation</u>. A unit that is not operable or is not capable of operation at a moment's notice should be on a forced maintenance or planned outage and remain on that outage until the proper repairs are completed and the unit can operate. The unit <u>must be</u> on RS a minimum of 60 days before it can move to IR status. <u>Use Cause Code "0002" (three zeros plus 2) for these events</u>.

MB **Mothballed (MB)**

MB is defined by IEEE Standard 762 and GADS as "the state in which a unit is unavailable for service but can be brought back into service after some repairs with appropriate amount of notification, typically weeks or months." GADS added "after some repairs" and defines the phrase "after some repairs" to mean that some action may be needed because the unit had been idle for a period of time and some equipment, systems or parts may have deteriorated and should be replaced or repaired prior to the units return to service. The unit may have also experienced a series of mechanical problems, prior to the MB event, for which management may wish to wait for a period of time to determine if the unit should be returned to service or retired. Granted IEEE Standard 762 states that the unit must be capable of operation prior to being placed in the deactivated state; however, in actual practice management may want to delay a decision to fix the generator and 'suspend' it in a deactivated state until a decision to repair or retire is rendered. If this option is chosen the unit must enter the MB event no earlier than 60 days after the preceding outage event (In other words, the unit must incur a forced outage of a minimum 60 days prior to the start of an MB event if the unit is inoperable). If the choice is to retire the generator after a decision is made, then the generator can be immediately retired coincident with the end of the MB event; If the decision is to repair, all repairs to make the unit operable must be completed under an outage of same type that preceded the MB event (in other words, if the generator entered the MB event on the heels of a forced outage, it must return to a forced outage for repairs to make the generator operable). If repairs are being made on the unit in order to restore it to operating status once the MB event has started, the MB event must end prior to the commencement of those repairs and the appropriate outage type started until those repairs have been completed and the outage ended. Also, if there are long lead-time item(s) that are ordered (such as a GSU, a generator rotor or the like) the MB event should end when the initial order has been placed, since a decision at that time has been rendered to repair the generating unit. Again, once a decision is rendered to repair the unit, whether or not orders are placed and/or work is started, the mothball event must end, and the appropriate outage type started. Repair work cannot be conducted on a unit in the mothball state. Use Cause Code "9991" for these events.

RU Retired

RU is defined by IEEE Standard 762 and GADS as "the State in which a unit is unavailable for service and not expected to return to service in the future." RU should be the last event for the remainder of the year (up through December 31 at 2400). The unit must not be reported to GADS in any future submittals. Use Cause Code "9990" for these events.

Active States

The lower part of Figure III-1 more precisely describes the operating state of a unit at any given time. The fourth level shows the most detailed operating states; this is the level of detail incorporated into the GADS program. The codes in the blocks are the GADS event types.

Notice on the diagram that D4 (maintenance derating) and MO (maintenance outage) are classified as both "unplanned" and "scheduled." IEEE Standard 762 classifies these types of events as "unplanned." GADS recognizes that, historically, many operating companies referred to these events as "scheduled" and continue to do so. Both classifications are shown here to illustrate the relationship between unplanned and scheduled events. The evaluation of unit availability is not affected by the difference in terminology.

Outages

An outage exists whenever an active unit is not synchronized to the grid system and not in a reserve shutdown state. The general outage event classification is divided into eight distinct event types. Special instructions for reporting testing during and following outages can be found on Page III-10.

An outage starts when the unit is either desynchronized from the grid or when it moves from one unit state to another (for example, goes from a reserve shutdown to a maintenance outage.) The outage ends when the unit is synchronized to the grid or moves to another unit state.

When a unit moves from one outage state to another, the exact date and time that the first outage ends will be the same as when the second outage starts. The unit state can only be changed if the first outage ends. For example, if the unit is forced off-line due to a water wall tube leak (just before it was to come off-line for a planned outage), then the forced outage leak repair must be completed before the unit state can be changed from a U1 to a PO. The maintenance crew can start the PO work, but it will not be a PO until the U1 outage work is complete and the unit could have been put back in service if not scheduled to go on PO.

PO Planned Outage

An outage that is scheduled well in advance and is of a predetermined duration, can last for several weeks, and occurs only once or twice a year. Typically, these events are specifically listed in the plant budget. Turbine and boiler overhauls or inspections, testing, and nuclear refueling are typical planned outages. For a planned outage, all of the specific individual maintenance and operational tasks to be performed are determined in advance and are referred to as the "original scope of work." The general task of repairing turbines, boilers, pumps, etc. is not considered a work scope because it does not define the individual tasks to be performed. For example, if a general task such as repair boiler is considered the work scope, it is impossible to conclude that any boiler work falls outside of the original scope of work. Discovery work and re-work which render the unit out of service beyond the estimated PO end date are not considered part of the original scope of work. A planned extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the planned outage takes longer than scheduled, the extra time should be coded as an extension (PE). However, if damage found during the inspection results in an extension of the outage, the extra time required to make repairs should be coded as a forced outage.

MO Maintenance Outage

An outage that can be deferred beyond the end of the next weekend (defined as Sunday at 2400 hours or as Sunday turns into Monday), but requires that the unit be removed from service, another outage state, or Reserve Shutdown state before the next Planned Outage (PO). Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration, and is usually much shorter than a PO. Discovery work and re-work which render the unit out of service beyond the estimated MO end date are not considered part of the original scope of work. A maintenance extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the outage takes longer than scheduled, the extra time should be coded as an extension (ME). If the damage found during the inspection is of a nature that the unit could be put back on-line and be operational past the end of the upcoming weekend, the work could be considered MO. If the inspection reveals damage that prevents the unit from operating past the upcoming weekend, the extended work time should be Forced Outage (U1).

There are cases when there are equipment issues and a unit could theoretically run past the next weekend, but the unit would not be run because of high risk for unit damage. If the risk is too high to run the unit, management is unwilling to run the unit, running the unit violates sound engineering practice or running the unit would invalidate your insurance, the outage is forced not maintenance. Examples are DC emergency equipment out of service or one ground on the generator.

Note: If an outage occurs before Friday at 2400 hours (or before Friday turns into Saturday), the above definition applies. But if the outage occurs after Friday at 2400 hours and before Sunday at 2400 hours (the 48 hours of Saturday and Sunday), the MO will only apply if the outage can be delayed past the next, not current, weekend. If the outage cannot be deferred, the outage shall be a forced event.

PE Planned Outage Extension

GADS defines a planned outage extension as an extension of a Planned Outage (PO) beyond its estimated completion date. This means that at the start of the PO, the outage had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the PO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

For more information on PE rules and regulations see below.

ME Maintenance Outage Extension

GADS defines a maintenance outage extension as an extension of a maintenance outage (MO) beyond its estimated completion date. This means that at the start of an MO, the outage had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the MO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

For more information on ME rules and regulations see below.

PE and ME Rules and Regulations

The "predetermined duration" of an outage also determines the "estimated completion date" of the PO or MO. If the unit is scheduled for four weeks of repairs, then the unit is expected back in service at a certain date four weeks after the start of the outage. In cases where the outage is moved up or back according to the needs of the operating company, ISO, or power pool, then the start of the outage plus duration of the outage determines the new completion date. As long as the outage is no longer than planned, the expected completion date is moved to coincide with the predetermined duration period.

If the unit is on outage (for example, U1 outage due to a boiler tube leak) at the time the unit is scheduled to start the PO or MO work, then the work on the cause of the outage (tube repairs) must be completed before changing from the U1 outage to the PO or MO outage. PO and MO work can start but is not counted as PO or MO work until the U1 repairs are complete.

All work during PO and MO events is determined in advance and is referred to as the "original scope of work." Use ME and PE only in instances where the original scope of work requires more time to complete than originally scheduled. Where applicable, the extension of the planned or maintenance outage may be required to be approved in advance by your power pool or ISO. Advance warning of an extension is very important. However, GADS is not a dispatch-orientated database but rather an equipment-orientated one. The reporting of the PE and ME is based on IEEE Standard 762-GADS rules, not ISO requirements. Therefore, if the extension meets the GADS rules, then report it as an ME or PE and not a U1 when reporting to GADS only.

Do not use ME and PE in instances where unexpected problems or conditions are discovered during the outage which render the unit out of service beyond the estimated end date of the PO or MO. Report these delays as Unplanned (Forced) Outage-Immediate (U1). Do not use ME and PE if unexpected problems occur during unit startup. If a unit completes a PO or MO before the original estimated completion date and volunteers to return to service (i.e., the unit is released to dispatch), then any problems causing outages or deratings after that date are not considered to be part of the PO or MO.

ME, PE or U1 must start at the same time (month/day/hour/minute) that the PO or MO ended. See *Appendix G*, Example 7, Pages G-26 to G-27.

SF Startup Failure

This is an outage that results when a unit is unable to synchronize within a specified startup time following an outage or reserve shutdown.

The startup period for each unit is determined by the operating company. It is unique for each unit and depends on the condition of the unit at the time of startup (cold, warm, and hot). A typical unit startup occurs in three phases: warm up, synchronization, and ramp up. NERC defines a startup period to begin with the command to start and end when the unit is synchronized. An SF begins when a problem preventing the unit from synchronizing occurs. The SF ends when the unit is synchronized, another SF occurs, or the unit enters another permissible state. Problems encountered during ramp up that force the unit offline are considered outages not SF events.

U1 Unplanned (Forced) Outage — immediate

This is an outage that requires immediate removal of a unit from service, another outage state, or a reserve shutdown state. This type of outage usually results from automatic control system trips or operator-initiated manual trips of the unit in response to unit alarms but can also occur while the unit is offline.

A number of the NERC Planning Committee working groups and subcommittees have a need to collect the various types of trips experienced by generating units. They are most interested in automatic grid separation trips caused by many things, including transmission. In order to maintain the historical meanings of the existing component trip codes 82 and 83, GADS created the two amplification codes T1 and T2 to be used for unit trips:

T1 – Tripped/shutdown grid separation — automatic. A full outage that suddenly trips the unit from some loading to zero loading without operator initiation. This is an unexpected grid separation event where the unit is in normal operation when the mechanical, electrical, or hydraulic control or protective systems automatically trip the generating unit(s). This trip is not when the unit is manually tripped, or when the unit operator assisted to lower loadings and then the unit automatically tripped. The unit must be in service (breakers closed) before a grid separation trip event is accepted by GADS. No other unit outage condition can precede this event.

T2 – Tripped/shutdown grid separation — manual. The unit is quickly removed from service with operator assistance. This type of outage includes operator-initiated trips in response to unit alarms.

If the cause of the trip is not known, then you can use amplification code 84, but it must be changed to the appropriate amplification code (T1 or T2) before the end of the year to be acceptable by GADS.

84 - Unknown – investigation underway (change this code once failure mechanism is determined)

If the U1 is not a trip but the result of a change of state (from planned outage to U1, for example), then the amplification code can be any other amplification code if the operating company chooses to report it. In other words, the amplification code under such conditions is voluntary.

Starting January 1, 2011, the need to report T1, T2 or 84 amplification codes became mandatory to pass GADS edits. For a complete list of the amplification codes see *Appendix J* of the *GADS Data Reporting Instructions.*

U2 Unplanned (Forced) Outage — Delayed

This is an outage that does not require immediate removal of a unit from the in-service state, instead requiring removal within six hours. This type of outage can only occur while the unit is in service.

U3 Unplanned (Forced) Outage — Postponed

This is an outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday). This type of outage can only occur while the unit is in service.

Interpretation of Outages and Their Reporting

The IEEE Standard 762 defines the outage types and when the appropriate outage should be reported. However, the experiences of the industry also dictate interpretations of which outage type is most appropriate for a situation. The following are interpretations of when certain full outages should be reported and the reason for the apparent difference to the IEEE Standard 762 rules. In these examples, we will illustrate the points using fictitious generating units but real-life situations.

Scenario #1: Forced Outage to Planned Outage

Riverglenn #1, a fossil unit, is four days away from its scheduled planned outage when it experiences a boiler tube leak. The unit must come off-line within 6 hours for repairs. Since the unit is scheduled for a planned outage, the dispatch (or ISO) allowed the unit to go into its outage early.

It normally takes 36 hours to repair a tube leak. Therefore, the first 36 hours of the outage would be forced (U2) outage. After the 36-hour period, the PO outage starts.

Scenario #2: Forced Outage that Can Wait for Repairs Until the End of the Next Weekend.

On a Thursday, Riverglenn #1 experiences a sudden increase in vibration in its ID Fan. The vibration is not severe enough to trip the unit, but there are signs that the unit must be removed from service soon to check the problem and make repairs. After some discussion, management decides Riverglenn can be removed from service next week without further damage to the unit or endangering the safety of the personnel. On Friday, dispatch (or ISO) allows Riverglenn to come down for repairs because another unit that had been out for maintenance is now available for operation.

Even though Riverglenn came off-line the same week as its problem started, the outage is a maintenance outage because it could have remained on-line until the end of the next weekend.

Scenario #3: Forced Outage that Cannot Wait for Repairs Until the End of the Next Weekend.

Jumbo #1, a gas turbine, began to vibrate on Friday. At first, the vibrations were not severe, but over the following 4 hours, the mils of vibration increased to where the unit needed to be removed from service. The unit continued to generate until after the peak period was over. Jumbo was not needed again until the following Monday afternoon. Shortly after the peak period, the operator tripped the unit.

Even though the unit was not needed until Monday, the unit could not have operated through the weekend because of the vibration problem. Therefore, the outage is a forced outage (U3) and is enforced until the vibration problem is solved.

Scenario #4: Forced Outage to Reserve Shutdown with Economic Repairs.

High Top #3, a small fossil unit, experienced a forced-outage failure in its boiler. However, the unit was not needed the remainder of the week. Management decided to repair the unit on standard work time with no overtime or weekend pay. Working standard 8-hour days, crews completed the repairs in 12 hours over a two-and-a-half-day period (44 hours).

Although the unit was not needed, the unit was not available due to management decision for the full 44 hours and so the forced outage is reported from the time the unit came off-line until the unit was available for operation (44 hours later). No part of the 44 hours is RS time. The RS time starts after the repairs and unit is available for operation.

Scenario #5: Extending a Planned/Maintenance Outage When Work Is Part of Original Scope of Work.

During the planned overhaul of Riverglenn #1, the planned repairs to the electrostatic precipitator were more extensive than expected. More parts were ordered to complete the repairs. However, unexpected longer repairs to the ESP delayed the return to service for 3 additional days.

Since the ESP repairs were part of the original scope of work and the unit receives the okay for extension from its ISO, the additional 3-day delay is the justification for the planned outage extension.

Scenario #6: Extending a Planned Outage when work is not part of original scope of work.
Part way through the planned outage of Riverglenn #1, the mechanics checked the packing on the boiler startup feed pump and decided it would be best to replace it. It was not part of the original scope of work but was determined important to prevent a future unit outage. As a result of the repairs and no packing on site, the PO was delayed from returning to service on time for 12 hours.

All hours of the outage except the last 12 hours are PO. The last 12 hours is a Forced Outage (U1) because it 1) delayed the startup of the unit and 2) was not part of the original work scheduled during the outage.

Scenario #7: Unexpected Repairs During Planned/Maintenance Outage But Completed Within the Scheduled Outage Time.
Riverglenn #1 was in its annual overhaul when it was discovered that several blades on its ID fan needed replacement. It was not part of the original scope of work to repair the blades, but parts were available through the OEM and repairs to the fan were completed during the allotted planned outage time. There were no delays in unit startup caused by the ID fan repairs.

Since the unit was not delayed from its scheduled startup due to the fan repairs, there was no penalty to the unit because of the "surprise" repairs. The company reported the ID Fan repair as part of the "work completed during the outage" section to GADS.

Notes on Reporting Outages

Testing Following Outages
Typically following outages, equipment that was repaired or replaced is tested. These testing periods must be reported to GADS. The reporting procedure to follow depends on whether the unit was synchronized during the testing period:

a. **On-line testing (synchronized)**
If the unit must be on-line and in service at some reduced load to perform testing following a Planned Outage (PO), Maintenance Outage (MO), or Unplanned (Forced) Outage (U1, U2, U3, SF), report the testing as a Planned Derating (PD), Maintenance Derating (D4), or Unplanned (Forced) Derating (D1), respectively. The PD, D4, or D1 starts when the testing begins, and ends when testing is completed. Report any generation produced while the unit was on-line during the testing period on the performance report (see Page IV-4).

b. **Off-line testing (not synchronized)**
In cases where the unit does not have to be synchronized after the outage to perform testing, report the testing as part of the outage event using Section D of the event report. The outage ends when the testing is complete and the unit is placed in service or enters another state.

If you wish, you may report this type of testing separate from the outage event. In this case, the testing period becomes a new event, the outage ending when the testing period begins. You must use the same event type for the testing event as you did for the original outage (a PE or ME is not considered an original outage — use the PO or MO event type, as appropriate). The testing event ends when the unit is synchronized or placed in another unit state.

Outside Management Control Outages

There are outages from outside sources that can result in restricted generating capabilities or full outages in generating units. These outages include (but are not limited to) ice storms, hurricanes, tornados, poor fuels, interruption of fuel supplies, etc. A list of causes and their cause codes are presented in Appendix K of the *GADS Data*

Reporting Instructions. Appendix K also sets special limits to the Outside Management Control (OMC) uses of the cause codes.

REPORT ALL OMC events to GADS, and they should not be classified as reserve shutdown or non-curtailing events. The GADS software performs calculations of events with and without OMC events. The calculation details are described in Appendices F and K. The use of equations without OMC events is left to the decision of plant and corporate management.

Special Comment Regarding the Reporting of Pumped Storage Units to GADS
GADS collects data on all conventional unit types, including pumped storage units. Pumped storage units provide two types of service: generating and non-generating. In the generating mode, the unit acts like a generator and turbine to provide electric power. In the non-generating mode, the pumped storage unit acts as a motor and pump to move water back into the reservoir for reuse in the future. The 2006 version of IEEE Standard 762 credits pumped storage units in several statistics whether the unit is in the generating or non-generating mode.

When reporting pumped storage units to GADS, know that NERC is more interested in the generating aspect of pumped storage units than the non-generating mode. Therefore, if the unit is prevented from generating power, then those events must be reported to GADS using the standard procedures.

In the case where the pumped storage unit cannot operate in the non-generating mode but can operate in the generating mode, then the operator should report the non-generating mode equipment failure as an NC forced outage event.

In the case where the pumped storage unit cannot operate in the generating mode but either can or cannot operate in the non-generating mode, then the event must be reported using the normal outage procedure. NC event types are not appropriate in this case. The event should describe the reason why it cannot generate electricity.

Deratings

A derating exists whenever a unit is limited to a power level that is less than the unit's net maximum capacity. Similar to outages, the general derating event classification is divided into distinct event types, based on IEEE Standard 762.

A derating starts when the unit is not capable of reaching 100% capacity. The available capacity is based on the output of the unit and not on dispatch requirements. The derating ends when the equipment that caused the derating is returned to service, whether it is used at that time by the operators or not. More than one derate can occur at one time.

If a derating is less than 2% of the unit's Net Maximum Capacity (NMC) **and** less than 30 minutes in duration, then report the derating at your discretion (optional). Otherwise, all other deratings shall be reported to GADS. For example, a derate that is 10% of the NMC but last 10 minutes should be reported to GADS, and a derate that is 1% of the NMC but last 6 hours should be reported to GADS.

Do not report deratings caused by ambient-related conditions or system dispatch requirements (see notes on reporting deratings, Page III-13).

PD Planned Derating

This is a derating that is scheduled well in advance and is of a predetermined duration.

Periodic deratings for tests, such as weekly turbine valve tests, should not be reported as PD's. Report deratings of these types as Maintenance Deratings (D4).

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on planned outage by adding a concurrent planned derate to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the planned outage and specify in the description that this is a concurrent planned derate due to the outage on the appropriate gas turbine.

D4 Maintenance Derating

This is a derating that can be deferred beyond the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday) but requires a reduction in capacity before the next Planned Outage (PO). A D4 can have a flexible start date and may or may not have a predetermined duration.

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on maintenance outage by adding a concurrent maintenance derate to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the maintenance outage and specify in the description that this is a concurrent maintenance derate due to the outage on the appropriate gas turbine.

Note: *If a derate occurs before Friday at 2400 hours (or before Friday turns into Saturday), the above definition applies. But if the derating occurs after Friday at 2400 hours and before Sunday at 2400 hours (the 48 hours of Saturday and Sunday), the D4 will only apply if the derating can be delayed passed the next, not current, weekend. If the derating cannot be deferred, the derating shall be a forced derating event.*

DP Planned Derating Extension

GADS defines a planned derating extension as an extension of a planned derate beyond its estimated completion date. This means that at the start of the PD, the derate had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the PD is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

Use a DP only in instances where the scope of work requires more time to complete than originally scheduled. Do not use a DP in instances when unexpected problems or delays outside the scope of work are encountered that render the unit incapable of full load beyond the estimated end date of the PD. The DP must start at the same time (month/day/hour/minute) that the PD ended.

DM Maintenance Derating Extension

If a maintenance derating (D4) continues beyond its estimated completion date, then it is considered maintenance derate extension (DM). This means that at the start of the D4 event, the derate has an estimated work time and a set date for the unit for returning to service. All work during the D4 is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

Use a DM only in instances where the scope of work requires more time to complete than originally scheduled. Do not use a DM in those instances where unexpected problems or delays outside the scope of work are encountered which render the unit incapable of full load beyond the estimated end date of the D4. The DM must start at the same time (month/day/hour/minute) that the D4 ended.

D1 Unplanned (Forced) Derating — Immediate

This is a derating that requires an immediate reduction in capacity.

D2 Unplanned (Forced) Derating — Delayed

This is a derating that does not require an immediate reduction in capacity, but rather within six hours.

D3 Unplanned (Forced) Derating — Postponed

This is a derating that can be postponed beyond six hours but requires a reduction in capacity before the end of the next weekend.

On combined cycle and co-generation units always account for the loss of waste heat input to the HRSG whenever a gas turbine goes on forced outage or a startup failure by adding an appropriate concurrent derate (D1, D2, or D3) to the steam turbine. Be sure to use the same start/end dates/times and the same cause code as the as the forced outage or startup failure and specify in the description that this is a concurrent derate due to the forced outage or startup failure on the appropriate gas turbine.

Notes on Reporting Deratings

Ambient-related Losses

Do not report ambient-related losses, such as those caused by high cooling water intake temperatures (other than regulatory-imposed discharge limits — cause code 9660, etc.), as derating events to GADS. There are two reasons for this: first, the level of record keeping required to track these types of losses as events is excessive; second, ambient-related losses are easily computed using the information you supply to GADS on the performance report, specifically maximum and dependable capacity. The difference between these two values reflects losses due to ambient conditions only. To determine ambient losses in megawatt hours (MWh), simply multiply the difference between maximum capacity and dependable capacity by the total number of hours in the study period.

System Dispatch Requirements

Sometimes units operate at less than full capacity for reasons other than ambient-related conditions or equipment failures. This operating mode, imposed by system dispatch requirements, is referred to as "load following." Load following is not reported to GADS. That information is not relevant to unit availability and is therefore beyond the scope of the GADS program.

Although load following is not reported to GADS, any maintenance, testing, etc. done during the load following period should be reported as an event. Under certain conditions, this work can be reported as a non-curtailing event (NC).

Figure III-2 describes the relationships between maximum capacity, dependable capacity, and available capacity as a result of deratings, and system dispatch requirements.

Ramping Up at Unit Startup and Down at Unit Shutdown

Each unit has a "standard" or "normal" time for reaching full load capabilities after a full outage or ramping down (coming off-line) to a full outage state. GADS doesn't set time periods for each unit; the operators know the units and can judge if a unit is taking longer than normal to ramp up after an outage or coast down for removal from service.

If a unit ramps up to the full load level OR up to the level of required load within the "normal" time period — set by the operators of the unit — following a full outage, there is no derating on the unit from the time of synchronization to the load point.

If the unit takes longer than normal ramp up time to the full load level OR up to the required load, then there is a derating. The generating capacity of the unit at the end of the normal period will be the level of the derate and the derate will last until the unit can either reach full load capability or level of required load.

FOR ALL UNITS EXCEPT NUCLEAR: There is no derating for unit shutdown. Each unit must be shut down safely, without damaging equipment or posing a safety hazard to personnel. Some shutdowns are quick as a unit trip; others are slower such as coast down to unit planned outages. In either case, the unit is not derated.

FOR NUCLEAR UNITS: Coast down to refueling may take weeks, depending on the operation of the unit. If the unit can recover from coast down and can still produce 100% capability during coast down, there is no derating. If the unit is not capable of 100% capacity, the derate is at the level of capability until the unit is taken off-line.

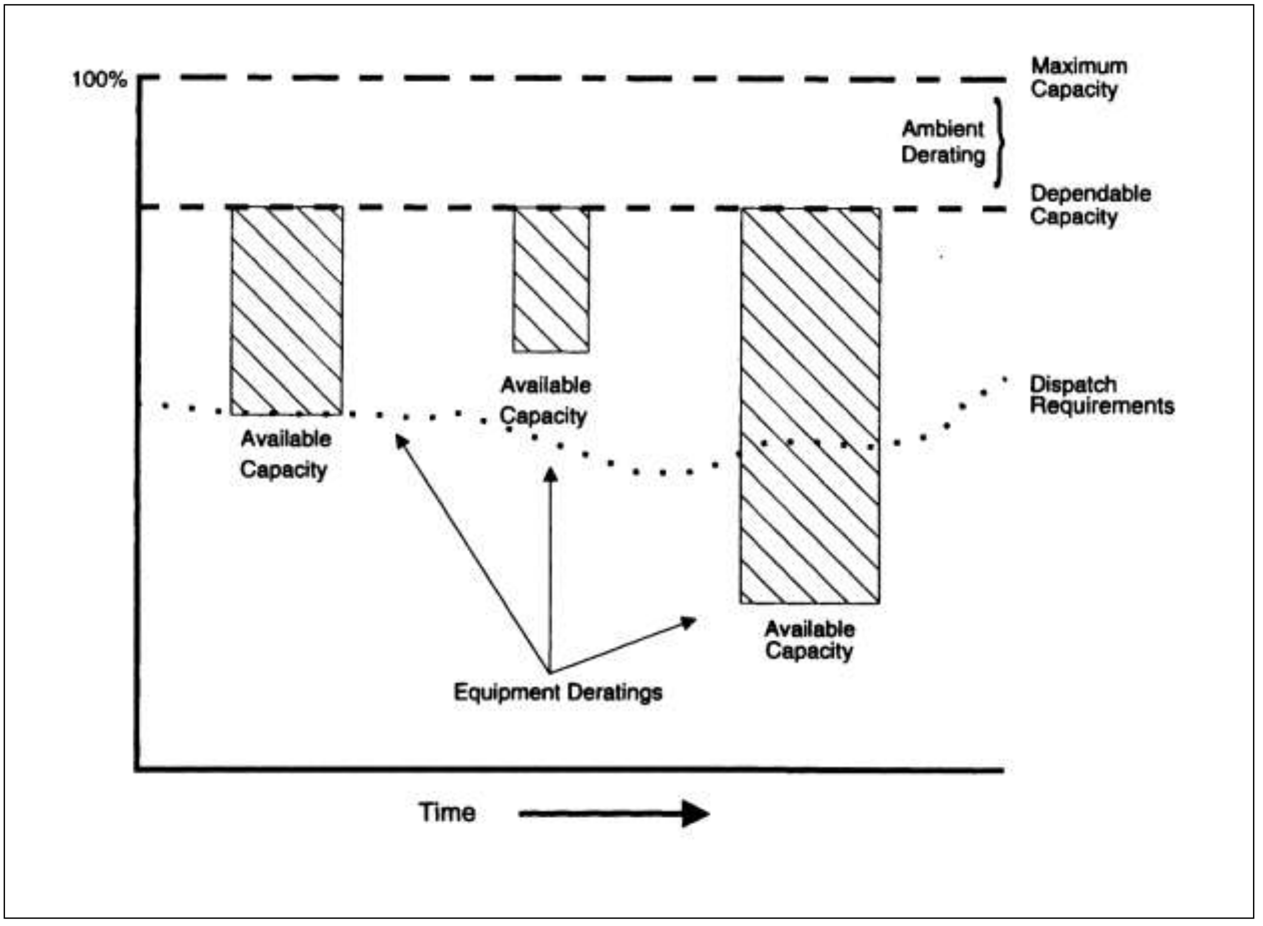

Figure III-2: Possible Derating Situations

Overlapping Deratings

Deratings often overlap with each other in duration. GADS considers all deratings additive except the parts which are shadowed by an outage or a dominant derating. Additive simply means that the total capacity reduction on the unit is the sum of the individual overlapping derating reductions. Shadowed means that all or a portion of a derating occurs during another outage or dominant derate, during which the non-dominant derate does not affect the available capacity of the unit. While the shadowed derate is not used in equivalent hour calculations, the equipment unavailability should still be reported using one of the following methods:

1. Report each component failure as a separate derating. Use engineering judgement to determine the available capacity as a result of each. NERC processes the data first by sorting by start date and time, then derated capacity, and lastly event number. This means that when start dates are identical, the GADS will process the derating with the lower available capacity first. In instances where both the start dates and the derated capacities of the events are the same the system will process the derating with the lower event number first.
2. Report as one derating event, indicating one component as the primary cause of the event and the other(s) using Section D of the event report.

Deratings that Vary in Magnitude with Time

Certain deratings vary in magnitude over time, such as those caused by stack emission, thermal discharge, and fuel limitations. You may use one of two methods to report these types of deratings to GADS:

1. Report a new derating to GADS each time the available capacity of the unit changes.
2. Determine the unit's average available capacity during the entire restricted period and report only one continuous averaged derating event to GADS. The start and end dates of the averaged derating event would be the start and end of the overall restricted period.

The averaging technique used to determine the unit's available capacity involves first calculating the megawatt hours (MWh) lost at each level of the derating, summing them, and then dividing them by the number of hours in the overall derating period. This calculation yields the average megawatts (MW) lost during the period, from which the average available capacity of the unit during the period is determined. This is the only number you report in Section B of the event report (see Page III-28).

The following example demonstrates this averaging technique:

A 1000 MW unit experienced a derating caused by a stack emission limitation over a 10-day period (240 hours). During this period, the magnitude of the derating varied as follows:

1. 40 hours at 30 MW
2. 10 hours at 60 MW
3. 110 hours at 20 MW
4. 80 hours at 40 MW.

During this time, the unit also experienced an Unplanned (Forced) Outage – Immediate (U1) event for 90 hours and a Reserve Shutdown (RS) event for 20 hours.

First, the total megawatt hours (MWh) lost at each derating level are calculated and summed:

(40 hours x 30 MW) + (10 hours x 60 MW) + (110 hours x 20 MW) + (80 hours x 40 MW) = 7200 total MWh lost.

Next, the average megawatts (MW) lost over the 10-day period is calculated by dividing the total MWh lost by the number of hours in the entire derating period:

7200/240 = 30 average MW lost

Finally, the available capacity for the unit over the 10-day derating period is calculated by subtracting the average MW lost from the unit's dependable capacity.

1000 MW - 30 MW = 970 MW available capacity

Again, the start and end dates of this derating would be the start and end dates of the entire period. The available capacity as a result of the event to be reported on the event report is 970.

Notice in the example that one outage and one reserve shutdown event also occurred during the period of the stack emission limitation. It is important to note that deratings of the type described above exist even if the unit is shut down, limited by a more severe derating, or masked by a reserve shutdown. For this reason, the average megawatts lost over the 10-day period in the example is calculated based on the total number of hours in the period (240), not just the number of hours the unit was synchronized. NERC computer programs recognize any full power outages that occur during a continuous derating period and do not double-count the overlapping periods when calculating performance indexes.

Dominant Derating Reporting
(See Page III-19 for details)

Reserve Shutdowns - RS

This is an event where a unit is available for load but is not synchronized due to lack of demand. This type of event is sometimes referred to as an economy outage or economy shutdown. If a unit is shut down due to any equipment-related problems, whether the unit was needed by the system, report an Unplanned (Forced) Outage, Maintenance Outage, or Planned Outage. **Do not** report a Reserve Shutdown.

While a unit is on RS, maintenance work is often performed that would have resulted in a unit outage or derating had the unit been on-line. This work can be reported as part of the RS event if, at any time, the work can be stopped or completed without preventing the unit from:

1. Synchronizing after a normal startup cycle, and
2. Reaching its available capacity after a normal loading cycle.

The criteria above remain the same whether or not the system needed the unit.

If the above criterion is met, report maintenance work done during the RS on the event report, section D (beginning with record 04), using an event contribution code 3 – other components worked during event.

If maintenance work cannot be stopped or completed, the reserve shutdown condition of the unit changes and an outage or derating must be reported. If the unit cannot be synchronized while the work is being performed, an outage exists, and the RS must end. If the unit cannot attain its available capacity while the work is being performed, a derating exists. The RS event does not end but report the derating as well. Estimate the available capacity as a result of the derating.

Non-curtailing Events - NC

This is an event that occurs whenever equipment or a major component is removed from service for maintenance, testing, or other purposes that do not result in a unit outage or derating.

An NC also can exist when a generating unit is operating at less than full capacity due to system dispatch requirements. During this period, equipment can be removed from service for maintenance, testing, or other reasons and be reported as an NC if both the following conditions are met:

1. The available capacity of the unit is not reduced below what is required by system dispatch, and
2. Maintenance work can be stopped or completed, and the unit can reach its net dependable capacity (NDC) level within its normal ramp-up time if and when the system needs the unit.

If the conditions cannot be met, report an outage or derating event rather than an NC.

Section B: Event Magnitude

GADS uses the information in this section to determine the impact of the event identified in Section A on the unit. This section is located on record 01 of the event report. See *Table III-3*.

Table III-3: Record Layout of Section B – Event Magnitude		
Column ID	**Number of Columns**	**Starting Position**
Record 01		
B – Event Magnitude		
Start of Event (required)	8	20
(Blank Columns)	20	28
End of Event (required)	8	48
Gross Available Capacity (voluntary but recommended)	4 + 2 decimals	56
Net Available Capacity (required)	4 + 2 decimals	62
(Blank Columns)	1	68
Dominant Derating Code (voluntary but highly recommended)	1	69
(Blank Columns)	11	70
Record Number (required)	2	81

Start of Event (Record 01, columns 20-27) - Required
Enter the time (month/day/hour/minute) the event began:

Outages — time the unit was desynchronized (either operator or equipment initiated) or entered the outage state from another state.

Deratings — time the system, major component, or piece of equipment became unavailable for service affecting an actual or potential loss of unit capacity.

Reserve Shutdowns — time the unit was desynchronized or entered the reserve shutdown state from another state.

Non-curtailing Events — time the system, major component, or piece of equipment became unavailable for service (either operator or equipment initiated).

Use a 24-hour clock to record time. Record midnight as **2400** and the beginning of a new day as **0000**. For an event that began on July 31 at 3:26 p.m., the start of event is recorded as:

07	31	15	26

Event Transitions
Sometimes events occur in succession with no intervening unit synchronization. These events are considered “related,” even though they must be reported separately. The matrix below describes the relationships between events, and it details permissible event type changes. See Example 9 in Appendix G.

<table>
<tr><th>TO
FROM</th><th>U1</th><th>U2</th><th>U3</th><th>SF</th><th>MO</th><th>PO</th><th>ME</th><th>PE</th><th>RS</th><th>DM</th><th>DP</th></tr>
<tr><td>U1 – Immediate</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td rowspan="9"></td><td rowspan="9"></td></tr>
<tr><td>U2 – Delayed</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>U3 – Postponed</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>SF - Startup Failure</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>MO – Maintenance</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td></tr>
<tr><td>PO – Planned</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td>ME – Maintenance Extension</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>PE – Planned Extension</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>RS – Reserve Shutdown</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>Yes</td></tr>
<tr><td>D1 – Immediate</td><td colspan="9" rowspan="7">IEEE Standard 762 does not recognize transition to/of deratings from/to other event types except as shown.</td><td>No</td><td>No</td></tr>
<tr><td>D2 – Delayed</td><td>No</td><td>No</td></tr>
<tr><td>D3 – Postponed</td><td>No</td><td>No</td></tr>
<tr><td>D4 – Maintenance</td><td>Yes</td><td>No</td></tr>
<tr><td>PD – Planned</td><td>No</td><td>Yes</td></tr>
<tr><td>DM – Maintenance Derating Extension</td><td>No</td><td>No</td></tr>
<tr><td>DP – Planned Derating Extension</td><td>No</td><td>No</td></tr>
</table>

Figure III-3: Allowable Event Type Changes

“YES” denotes that a change from one event type to another without intervening synchronization is permissible, and the end date of the first event can be the same as the start date of the successive event. “NO” indicates that there is no relationship between the event types and individual events separated by some period of time must be reported.

When there is no intervening synchronization between events, the start time of one event is the same as the end time of the immediately preceding event.

End of Event (Record 01, columns 48-55) - Required
Enter the time (month/day/hour/minute) the event ended:

Outages — time the unit was synchronized or placed in another appropriate unit state.

Deratings — time the system, major component, or piece of equipment became available for service affecting an actual or potential increase in unit capacity.

Reserve Shutdowns — time the unit was synchronized or placed in another appropriate unit state.

Non-curtailing Events — time the system, major component, or piece of equipment became available for service.

For events that extend through multiple months or quarters within the same year, do not wait until the event is over before reporting it to GADS. Instead, report the event and leave the end date blank. When the event does end, submit the end date as a revision, following the instructions on Pages III-3. Every event must have an end date at the end of every year.

All events start when they start and end when they end. Events that continue from one year into the next should be programmatically truncated for inclusion in the input file submitted to webE-GADS with a new end/start date; webE-

GADS will combine the pieces back into one long event. They should always remain as one long year crossing event in your in-house GADS system. For events that continue into the next year, report the end date as **12312400**. Report the event in the next year with a start date of **01010000**.

Take care to change the Year (Section A, columns 9-12) to reflect the current year for the end date and the next year for the start date.

In addition to the year and start date, the event being carried into the next year must have a revision code of zero (0). All other details remain the same.

Gross Available Capacity (GAC) as a Result of the Event
(Record 01, columns 56-61) – Voluntary (but recommended)

Net Available Capacity (NAC) as a Result of the Event
(Record 01, columns 62-67) – Required

Enter the capacity that is available from the unit given the restriction imposed by the derating event being reported. This is the capacity after the reduction has been taken into account. *Complete these fields only when the event type is a derating.*

The GAC is the greatest capacity at which the unit can operate during the period of restriction caused by the derating. The NAC is the GAC less any capacity utilized for station service or auxiliary loads.

Either GAC or NAC or both must be completed when the event type is a derating. Net data is required. If you voluntarily report the gross available capacity (GAC) then you must report, gross maximum capacity (GMC), gross dependable capacity (GDC), and gross actual generation (GAG) on the performance report (95). Data consistency is necessary to calculate availability statistics.

See *Notes on Reporting Deratings*, for more information concerning the reporting of deratings.

Dominant Derating Code (Record 01, column 69) – Voluntary but strongly recommended.

The purpose of the dominant derating code is to mark the dominate derating if two or more deratings are occurring at the same time. By marking the dominate derate, the computer program will process the cause code for that dominate derating for its full impact and hide part of the impact credited to other derates. In other words, the computer program will not treat the dominant derate as additive and it will shadow any derates it overlaps like an outage. Unit performance statistics will not be affected. Cause code statistics will be more accurate by recording the true frequency and impact of the dominate derate.

Use the Dominant Derating Code in column 69 of record 01. Identify a dominant derate with a “D”.

See Appendix G, Examples 3B and 3D for examples of dominant derates.

One example of how two derates should be reported to GADS – one without the Dominant Derating Code and one with the Dominant Derating Code – is shown in *Figure III-4*.

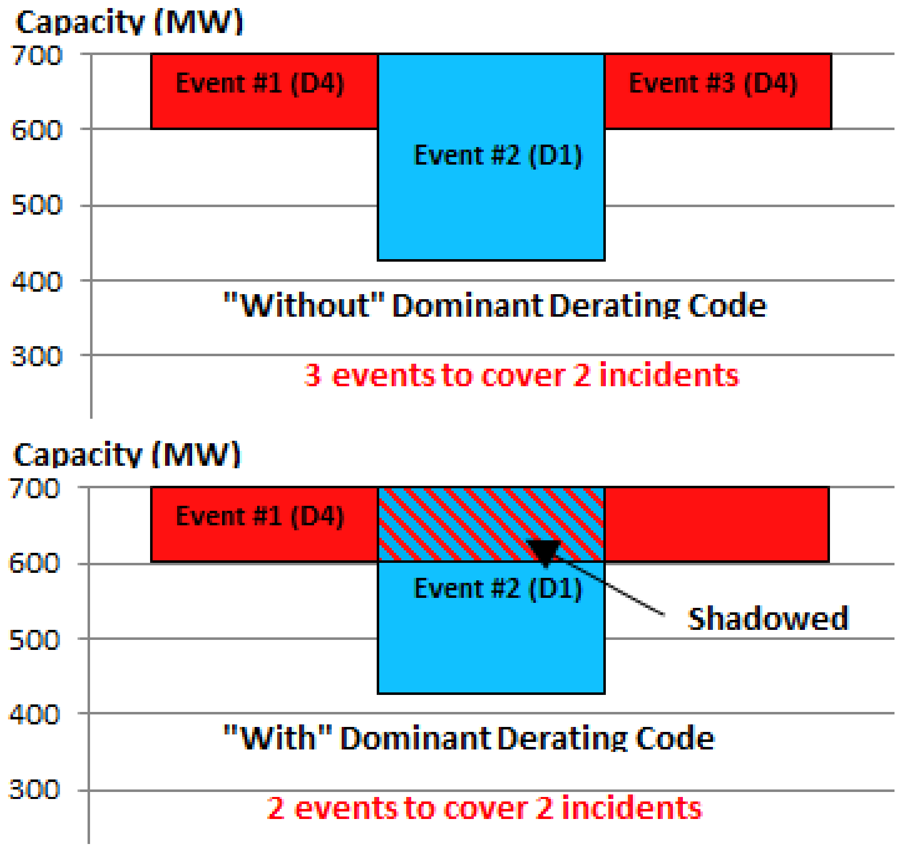

Figure III-4: Example of Dominant Derating Code Reporting

Section C: Primary Cause of Event
Section D: Additional Cause of Event or Components Worked during Event

The *GADS Data Reporting Instructions* describes the data elements reported in Sections C and D together because they are the same.

Use Section C to detail the system, major component, or piece of equipment primarily responsible for causing the event. You can find Section C on records 02 and 03 of the event report (refer to *Table III-4*). You must complete one Section C for every event submitted to GADS with the exception of reserve shutdown events. Because the only "cause" of a reserve shutdown is economic, reporting Section C is optional. **Only one Section C may be reported for each event.**

Use Section D to report factors contributing to the cause of the event that are not primarily responsible; additional components worked on while the event was in progress; factors significantly affecting the startup/ramping of the unit; or problems that extended the event. Section D begins with records 04 and 05 of the event report (refer to *Table III-5*).

Since you can use Section D for several different reasons, multiple Section D cards are allowed. Use only one Section D for each system, component, or piece of equipment you are describing. Up to 46 sets of Section D records (numbers 04-99) are allowed, so you can describe up to 46 different items. See question in change list.

Both Sections C and D consist of two cards each, one even-numbered and one odd-numbered. Use the even-numbered record, which contains information like man-hours worked, to begin the description of the causes or contributing factors of the event. The odd-numbered record is used *only* to continue the description begun on the even-numbered card. If additional space is not needed for a description, omit the odd-numbered record rather than submit a blank one to GADS.

The first 19 characters (A – Event Identification) of each record (04-99) are identical to that of Record 01. These 19 characters link the records together.

Note: *Never begin describing a new system, major component, or piece of equipment on an odd-numbered card.*

Table III-4: Record Layout of Section C – Primary Cause of Event (Records 02 and 03)		
Column ID	**Number of Columns**	**Starting Position**
Record 02		
A – Event Identification		
Record Code (required)	2	1
Utility (company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20
Cause Code Amplification Code – (required for U1 events coming from in service only; strongly recommended for all other events.)	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Verbal Description (voluntary but strongly recommended.)	31	50
Record Number (required)	2	81
Record 03		
A – Event Identification		
Record Code (required)	2	1

Table III-4: Record Layout of Section C – Primary Cause of Event (Records 02 and 03)		
Column ID	**Number of Columns**	**Starting Position**
Utility (company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

Table III-5: Record Layout of Section D – Additional Work During Event (Records 4+ and 5+)		
Column ID	**Number of Columns**	**Starting Position**
Record 04+ (Even Numbered)		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
D – Additional Work During Event		
System/Component Cause Code (required)	4	20
Cause Code Amplification Code (Required for U1 events coming from in service only; strongly recommended for all other events.)	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34

Table III-5: Record Layout of Section D – Additional Work During Event (Records 4+ and 5+)		
Column ID	**Number of Columns**	**Starting Position**
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Verbal Description (voluntary but strongly recommended.)	31	50
Record Number (required)	2	81
Records 05+ (Odd Numbered)		
A – Event Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
D – Additional Work During Event		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (Voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

System/Component Cause Code (Record 02, columns 20-23) – Required
Enter the four-digit code from Appendix B that best identifies the system, major component, or piece of equipment you are describing. Appendix B is divided into sections for easily locating the appropriate cause codes for each unit type. Appendix D – Cause Code Cross Reference, identifies the allowable range of system/component cause codes for each type of unit.

Cause Code Amplification Code (Record 02, columns 24-25) **-** Required for Unplanned (Forced) Outages – Immediate (U1) events coming from in service to U1 only. No other amplification codes are required for U1 or any other event type. Amplification codes are strongly recommended for all other events but on a voluntary basis only.

The purpose of the amplification code is to further identify the cause of an outage by describing the failure mode. The amplification code is two alpha-numeric characters following the cause code. Failure modes are leaks, corrosion, personnel error, fire, etc. They are almost identical to the GADS failure mechanism codes (see Appendix H), except the amplification code is just two characters. Some existing cause codes already contain these amplification codes as part of their description. The amplification code allows all cause codes to be described with the set of failure modes without increasing the number of cause codes. It will also allow analysts to further explore the common causes of outages.

You can find a list of the cause code amplification codes in Appendix J.

Time: Work Started (Record 02, columns 26-33) - Voluntary
Enter the date (month/day/hour/minute) the system or component became unavailable for service. This time can be before the start of the event but should not factor into time spent during preparatory work before the system or component was physically taken out of service. You may leave this field blank, but if you do not provide this information, GADS assumes that the work started when the event began.

Time: Work Ended (Record 02, columns 34-41) - Voluntary
Enter the date (month/day/hour/minute) the system or component became available for service. You can leave this field blank, but if you do not provide this information, GADS assumes that the work ended when the event ended.

Event Contribution Code (Record 02, column 44) - Voluntary
Enter the one-digit code that best describes how the system, major component, or piece of equipment identified in columns 20-23 contributed to the event. Choose the appropriate code from the following list:

<u>**Codes**</u>

1 **Primary cause of event**
The contribution code (1) must always appear in Section C: Primary Cause of Event. A (1) can only be used on Section D -Additional Cause of Event for a Planned Outage (PO) or a Maintenance Outage (MO) when work on multiple components is scheduled.

2 **Contributed to primary cause of event**
Use this code to describe other systems, components, external conditions, or human factors that contributed to cause the event but were not primarily responsible for the event.

3 **Work done during the event**
Use this code to identify systems or components that were worked on during the event but did not contribute to the initiation of the event or cause a delay in startup.

5 **After startup, delayed unit from reaching load point**

Note: *Event Contribution Codes 2, 3, and 5 can be reported on Section D cards, and may be used more than once.*

Contributing Operating Condition (Record 02, column 45) - Required
The Contributing Operating Condition provides context for the conditions which led to the Event. The Contributing Operating Condition field distinguishes the failure mode (“what failed”) from the failure mechanism (“conditions under which it failed”). NERC uses the contributing Operating Condition to differentiate between generating units that go out during large scale environmental impacts such as hurricanes, intense cold, or similar events. If the event had happened even if the extreme conditions did not exist, then you would report No Contributing Condition. Most reported events will occur during normal operating conditions and will report No Contributing Condition.

Table III-6: Contributing Operating Condition (Required)		
Contributing Operating Condition	**Code**	**Description**
No Contributing Condition*	0	Outage, derate, or damage that occurred during normal operating ("blue-sky") conditions without external influence.
Flood or High Water	1	Outage, derate, or damage occurred that are determined to be outside of design considerations due to due to flooding or high-water that occurs due to a natural or man-made event. This includes pre-emptive actions as well.
Drought or Low Water	2	Outage, derate, or damage occurred due to drought or low-water conditions that are determined to be outside of design considerations and that occurs due to a natural or man-made event.
Fire, including wildfires	3	Outage, derate, or damage occurred due to fire that occurs due to a natural or man-made event or equipment that gets involved from a fire initiated from another system in the plant. This includes pre-emptive actions as well.
Lightning	4	Outage, derate, or damage occurred due to lightning striking the equipment during a thunder and lightning storm.
Geomagnetic Disturbance	5	Outage, derate, or damage occurred due to a geomagnetic disturbance. This includes pre-emptive actions as well.
Earthquake	6	Outage, derate, or damage occurred due to an earthquake.
Tornado	7	Outage, derate, or damage occurred due to a tornado. This includes pre-emptive actions as well.
Hurricane	8	Outage, derate, or damage occurred due to a hurricane. This includes pre-emptive actions as well.
Cold Weather Conditions	9	Outage, derate, or damage occurred due to cold.
Hot Weather Conditions	A	Outage, derate, or damage occurred due to heat.
Ice, Hail, and/or Snow	B	Outage, derate, or damage occurred due to ice, hail, and/or snow accumulation.
Turbulent Wind	C	Outage, derate, or damage occurred due to abnormally turbulent winds.
Avalanche or Landslide	D	Outage, derate, or damage occurred due to an avalanche or landslide.
Wildlife	E	Outages or damage due to preservation or intrusion of wildlife.
State of Emergency declared by applicable authority or Other External Disturbance	Z	Outage, derate, or damage occurred due to state of emergency declared by applicable authority or other external disturbance.

When more than one Contributing Operating Condition can be assigned for a single cause, report the most impactful Contributing Operating Condition. If multiple causes are reported, the most impactful Contributing Operating Condition for each cause should be selected.

Examples of each Contributing Operating Condition Code

No Contributing Condition (Code 0)

- During normal operations on a fair-weather day, the generator experiences a spontaneous failure due to excessive wear and tear.
- The unit experiences a spontaneous failure in a temperature-controlled environment when it happens to be -30 degrees outside. Since the failure is not driven by the cold weather the Contributing Operating Condition would be reported as 0 (No Contributing Condition).
- A hydro unit is unable to run at maximum capacity due to normal changes in water availability.
- A coal site experiences a bearing failure on a conveyor belt pulley. The overheating bearing starts a fire that damages the conveyor structure. The repairs to the structure impact the unit's ability to move coal to the unit forcing the unit into a derate condition until the repairs can be made.
  - This scenario would use the "No Contributing Condition". Even though there was a fire as the result of the equipment failure, the failure was not dependent on the fire.

Flood or High Water (Code 1)

- Desert storm summer flood exposed high voltage cabling and undermined several pad mount transformers.
- At a hydro plant, high stream flows caused by normal spring freshets causes the tailwater level to rise to an elevation where there is no longer enough operating head for the unit to run and make power. The unit must be shut down.
- The make up water intake for a power plant needs to be shut down due to debris accumulation on its intake screen from a flood or freshet condition. The water intake shutdown requires that the plant be derated (or shut down) to allow for time for the condition to pass and the intake to be cleared.
- Due to flood or extreme rain conditions, a settling pond at a power plant is threatening to spill over and the plant must be derated (or shut down) to prevent a pond failure.
- The intake to a hydro unit has built up a layer of debris due to a flood (or freshet) transporting and depositing excessive debris on the trash rack. The unit needs to be de-rated or shutdown until the debris is cleared.
- A system delivers excessive rain that causes containment systems (such as transformer oil containment basins, plant drain systems, emission management chemical, etc.) to exceed their capacity and the output of a unit is impacted until the containment system can be safely managed again.

Drought or Low Water (Code 2)

- Due to unusual drought conditions, dust clouds cause problems of filter plugging that cause a unit to be derated or shut down for cleaning.
- The river that a power plant receives its water supply from is below minimum levels due to a river basin wide drought or an upstream "take" from another source. The plant must be derated or shut down to avoid running out of water.

- At a hydro plant, the river flows are so low such that there is not enough water to run any units of the plant for more than twenty-four consecutive hours due to the river flow level being too low to supply at least one individual unit at its minimum load.
    - Most all hydro plants are sized such that for a majority of the year, units will be shutdown due to low water flows. This is considered normal operation and Drought or Low Water Contribution Code should not be applied. As long as at least one unit is capable of producing some minor amount of energy during the 24- hour period, it is considered to be within normal design.
    - If dispatch or the operator intentionally draw down the reservoir to provide peaking power and then must shut down the plant for 24 hours or more for the reservoir to refill, this is not considered a Drought or Low Water condition.
- An upstream system (dam or irrigator) shuts off flows due to abnormal water demand and the cooling system of a power plant must be shut down.
    - If this is a normal, periodic occurrence, then this would not require the Contribution Code.

Fire, including wildfires (Code 3)

- Preemptive shutdown of a plant to prevent damage due to approaching wildfire.
- Plant shut down due to fire prevention during high wind / low humidity conditions in forested areas
- Due to a thunder storm in the area, dispatch directs that the plant be removed from service so a transmission line can be de-energized to proactively address possible fire ignition from the transmission lines. (The root cause of the shutdown is to prevent a fire.)
- A unit synchronizing breaker fails. As part of the failure, it catches fire and soon involves additional buss work that requires an adjacent unit to be tripped off (either automatically (U1) or manually (U2)).
    - The original breaker failure that causes the first unit to trip is NOT fire related. The fire is a consequence of the breaker failure. Subsequent impacts to the output of units due to the breaker fire, would be due to Fire Contributing Condition.

Lightning (Code 4)

- During a thunder and lightning storm, a unit is tripped offline due to a relay operation. The unit is cleared for return to service relatively quickly as no damage to the unit or to other plant equipment had occurred.
- During a thunder and lightning storm, a pole fire is started on a structure within the plant switchyard. The pole fire causes the plant to be taken offline.
- Outdoor circulating water pumps are experiencing operational concerns that require technicians to immediately troubleshoot on site. However, at the same time lightning alerts are in the area that prevent any work from taking place outdoors. The circulating water pumps cannot be addressed and must be taken offline to prevent further damage. The unit is removed from service due to the lack of operational circulating water pumps.

Geomagnetic Disturbance (Code 5)

- Preemptive shutdown of generating units due to a large X class earth directed solar flare. These types of flares can cause large current excursions on transmission lines burning out connected equipment
- A geomagnetic disturbance occurs and can cause the generator field to collapse likely causing severe overloads and possible winding damage to the generator. To prevent possible damage to the equipment, the generator is taken offline pre-emptively.

- Generator step up transformers are also susceptible to this magnetic field collapse and subsequent overloads.

Earthquake (Code 6)

- Substation and pad mount transformers moved off of their concrete pads. Some high voltage connections damaged.
- After the earthquake event, vibration levels in rotating machinery reach levels of concern (i.e. hit an alarm state) and require the unit load to be backed off or to be removed from service to correct the high vibration condition.

Tornado (Code 7)

- Tornado takes out overhead feeder lines to a plant
- Equipment at a plant is damaged by the tornado or by debris from the tornado.

Hurricane (Code 8)

- Hurricane tidal surge damages 2 of 5 underwater power cables causing a 40% derating
- Heavy rains from a hurricane residual cause flooding or other damage that floods the area and damages plant equipment and requires a derate or shutdown

Cold Weather Conditions (Code 9)

- Cold weather at a plant in a generally mild-climate area cause most of the units to fault. The units in this area are usually not equipped for extreme cold.
- A unit outage during -35F temperatures prevents startup when power is restored due to cold electronic components. Large load on system to heat up the equipment.
- Temperatures drop to the point that the fuel source freezes and can no longer be input into the generator.
- Temperature drops result in weather conditions which make transportation of fuel infeasible or unsafe, forcing the plant to shutdown.
- Because the temperature is below freezing, a control valve fails to operate due to moisture in the air system.
- Because the temperature is below freezing, a control valve fails to operate due to the heat tracing not functioning. The problem was not caught by inspection or procedure.

Hot Weather Conditions (Code A)

- The ambient temperatures at a plant exceed the design limits resulting in unit shutdowns.
- High ambient temperatures and high generation result in derated output in order to prevent GSU overheating.
- High ambient conditions are beyond the capacity of the cooling system to keep up and a derate or shutdown must take place to not exceed temperature limits of equipment.
- At a power plant, the ambient water temperature of a river goes above a threshold established by a regulatory agency and the discharge from the plant into the river must be shut off to avoid further heating of the river.

Ice, Hail, or Snow (Code B)

- Freezing rain causes overhead gen tie lines to gallop causing line slaps. Due to a large amount of snow, it took several weeks to manually reset all the units.
- An outage occurs and due to road conditions, the workers are unable to arrive for two days to perform corrective actions and return the unit to service.
- Icicle buildup at a roof drain breaks free and drops onto an external electrical breaker room causing the trip of several pieces of equipment and the unit.
- Leakage through a spillgate on a dam causes a buildup of ice. At a point, the ice releases and comes down on a generator causing the generator to shutdown.
- Due to large snowfall, operators are unable to make normal inspections and an oil leak goes undetected. The leak causes the oil level to go below alarm levels and trips a unit.

Turbulent Wind (Code C)

- High wind takes the roof off an external motor control center leading to the trip of several breakers, loss of key equipment, and immediate load reduction.
- During severe winds, a trampoline from a nearby house is picked up and blown onto the plant switchyard bus causing a fault and prohibiting a unit from connecting to the grid.

Avalanche or Landslide (Code D)

- An avalanche from a nearby hill or mountain damages the GSU forcing the plant offline until the debris is cleared and repairs are made.

Wildlife (Code E)

- Birds or small animals climb or land on electrical equipment and inadvertently cause outages by shorting transformers or tripping circuit breakers.
- Aquatic/fishery species, such as zebra or quagga mussels, obstruct plant intakes or cooling water systems, causing derates and outages.
    - Note: Plant operational impacts due to fishery requirements fall under this category and are not considered OMC if it is a condition of the plant's license/permit.
- This should not apply to animals eating through wiring in enclosed cabinets or other equipment enclosures on premises. In this case, code as Human Error (for not securing substation or other equipment on premises).

State of Emergency declared by applicable authority or Other External Disturbance (Code Z)

- Any event where a governing authority intervenes with orders that require a unit or a plant to be shutdown.
- A multiple vehicle accident occurs on a highway where transmission lines are involved. Governmental authorities require the transmission lines be de-energized and that requires the plant to be shut down as well.
- During an epidemic, plant staffing is impacted such that a minimal staff can no longer be maintained, and a plant must be shutdown.
- A transportation labor strike occurs impacting the company's ability to acquire fuel or equipment.

Man-hours Worked (Record 02, columns 46-49) - Voluntary
Enter the number of man-hours spent correcting the cause of the event or making repairs. Include hours expended for on-site repairs as well as any off-site work. If man-hours exceed four digits, enter 9999 in this field, and describe the actual number of man-hours expended in the verbal description. If this situation occurs, consider reporting more detailed cause codes, and subdividing the man-hours into segments associated with each system or component.

Verbal Description (Record 02, columns 50-80; Record 03, columns 26-80) - Voluntary but strongly recommended.
GADS provides this space to allow you to give a more detailed explanation of the event and the cause(s) you identified by system/component cause code(s). You can also use it to report the expanded data format as described, beginning on Page III-27. Use only two sequential records (02-03, 04-05, etc.) to provide the description for each cause code you report.

Your narrative should include a balanced description of the major aspects of the event, focusing on these key areas: 1) System/Component Cause Code, 2) Failure Description and Appearance, 3) Cause of Immediate Failure and Contributing Factors, and 4) Corrective Actions. You have limited space available for your description, so NERC suggests using common abbreviations as much as possible. Be brief as only the first 86 characters of what is written is recorded by web-EGADS. Following the guidelines below will help you to develop a complete and concise description encompassing the key areas noted below.

1. **System/Component Cause Code** (Record 02, columns 20-23) – Required

   Enter the four-digit code from Appendix B that best identifies the system, major component, or piece of equipment. Appendix B is divided into sections for easily locating the appropriate cause codes for each unit type.

2. **Failure Description and Appearance**

   Describe the manner in which the failure occurred. Identify the failure mode in generic terms, not in terms of the failure mechanism or failure effect(s). The following key words may be useful in describing the type and mode of the failure, but these lists are by no means comprehensive. You may use these words as well as any others you feel are appropriate.

Types of Failure	**Typical Failure Modes**
Erosion	Leak
Corrosion	Crack
Electrical	Breach
Electronic	Physical Distortion
Mechanical	Physical Displacement
Hydraulic	Collapse
Instruments	Fracture/Break
Operational	Not Start/Move
	Not Stop
	Not Close
	Not Open
	Not Hold
	Not Release
	Out of Limits
	Out of Adjustment
	Spurious Operation, False Response

3. **Cause of Immediate Failure and Contributing Factors**

   The cause code already specifically identifies the primary system/component that caused the failure. However, it is advantageous to describe other observed factors which contributed to the failure such as non-operational or physical factors (e.g., engineering, design, human error, etc.). You may find the key words listed below useful in describing immediate and contributing factors, but this list is by no means comprehensive. You may use these words as well as any others you feel are appropriate.

   Typical Contributing Factors

Foreign/Wrong Part	Instrument/Switch Miscalibration
Foreign/Incorrect Material	Insulation Breakdown
Particulate Contamination	Short/Grounded
Normal Wear	Open Circuit
Abnormal Wear	Contacts Burned/Pitted/Corroded
Lubrication Problem	Connection Defective
Weld Related	Circuit Defective
Abnormal Load	Burned/Burned Out
Abnormal Temperature	Electrical Overload
Abnormal Pressure	Material Defect
Abnormal Flow	Excess Vibration
Set Point Drift	Fire/Explosion
Improper Previous Repair	Natural Catastrophe
Incorrect Procedure/Instruction	Cyclic Fatigue

4. **Corrective Actions**

   Record the actions taken to repair and correct the failure problem. If tests or recalibration are made to verify that repairs are successful, note them as well. You may find the key words listed below useful to describe corrective actions, but this list is by no means comprehensive. You may use these words as well as any others you feel are appropriate.

   Typical Corrective Actions

Recalibrate	Replace Part(s)
Adjust	Repair Component(s)
Temporary Repair	Replace Component(s)
Temporary Bypass	Reseal
Redesign	Repack
Modify	Request License Revision
Repair Part(s)	

   As an example, 1A relay coil wire burns open because of electrical overload and has to be replaced. The failure description would be “relay coil wire,” the appearance would be “burned open” and the cause would be “electrical overload.” Corrective action would be “replaced.” The verbal description would be completed as follows: “1A RELAY COIL WIRE BURNED OPEN-ELECTRICAL OVERLOAD REPLACED WIRE”

Expanded Data Reporting

Some operating companies have expressed an interest in reporting more detailed operating and maintenance data that will allow them to perform more detailed reliability analyses. Also, by including these new data elements, they can eliminate duplicate reporting to other industry databases. To accommodate this request, NERC has added several new data elements to GADS.

Reporting of this additional information is optional, although strongly encouraged. We believe the reporting of this information will enhance the usefulness of our database and benefit the entire electric power industry. If you choose to report this information to GADS, follow the instructions below (see *Table III-7*). If you choose not to supply the additional data, report the verbal description.

Failure Mechanism Code* (Record 02, columns 50-53) - Voluntary
From the list provided in *Appendix H*, enter the code that best describes the manner in which the component failed. Report the failure mechanism code in columns 50-53 on all even-numbered records containing a system/component cause code.

Trip Mechanism (manual or automatic)* (Record 02 column 54) - Voluntary
Enter the code that describes how the unit was shut down. Use "A" for automatically (control system initiated), or "M" for manually (operator initiated). Report the trip mechanism in column 54 of all even-numbered records containing a contribution code of 1 in column 44.

Cumulative Fired Hours at Time of Event* (Record 02, columns 55-60) - Voluntary
Enter the cumulative number of fired hours the unit experienced at the time the event began. This data is taken directly from the fired-hours meter typically located on the unit's control panel. This meter clocks cumulative operating hours since unit start-up. Report the fired hours in columns 55-60 of all even-numbered records containing a contribution code of 1 in column 44.

Cumulative Engine Starts at Time of Event* (Record 02, columns 61-65) - Voluntary
Enter the cumulative number of engine starts the unit experienced at the time the event began. This data is taken directly from the engine starts counter, typically located on the unit's control panel. This counter clocks cumulative engine starts since unit start-up. The engine starts must be reported in columns 61-65 of all even-numbered records containing a contribution code of 1 in column 44.

Table III-7: Record Layout of Event Records Using Failure Codes

Column ID	Number of Columns	Starting Position
Record 02		
A – Event Identification		
Record Code (required)	2	1
Utility (Company)Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Event		
System/Component Cause Code (required)	4	20

Table III-7: Record Layout of Event Records Using Failure Codes		
Column ID	**Number of Columns**	**Starting Position**
Cause Code Amplification Code (Required for U1 events coming from in service only; strongly recommended for all other events.	2	24
Time Work Started (voluntary)	8	26
Time Work Ended (voluntary)	8	34
(Blank Columns)	2	42
Event Contribution Code (voluntary)	1	44
Contributing Operating Condition (required)	1	45
Man-hours Worked (voluntary)	4	46
Failure Mechanism Code* (voluntary)	4	50
Trip Mechanism* (voluntary)	1	54
Cumulative Fired Hours at Time of Event* (voluntary)	6	55
Cumulative Engine Starts at Time of Event* (voluntary)	5	61
Verbal Description (Voluntary but strongly recommended.)	15	66
Record Number (required)	2	81
Record 03		
A – Event Identification		
Record Code (required)	2	1
Utility (Company)Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Event Number (required)	4	13
Report Revision Code (voluntary)	1	17
Event Type (required)	2	18
C – Primary Cause of Events		
System/Component Cause Code (required)	4	20
(Blank Columns)	2	24
Verbal Description (Voluntary but strongly recommended.)	55	26
Record Number (required)	2	81

*Gas turbine and jet engine units only.

Section IV: Performance Reporting

Performance data provide information, in a summarized format, pertaining to overall unit operation during a particular month in a given year. These data are needed to calculate unit performance, reliability, and availability statistics. NERC requires performance data for all unit types and sizes reported to the GADS program.

Reporting to the GADS program is mandatory for all conventional units 20 MW and larger, starting January 1, 2013. Reporting the level of detail *GADS Data Reporting Instructions* requests enables you and other industry analysts to perform detailed and useful analyses. Figure III-1 presents the classes of events generating companies must report for different types and sizes of conventional, non-renewable generating units.

Performance Report (05 Format)

Report performance data to GADS in the Performance Report (05) format, as described in this section. Submit the data to Open Access Technology International, Inc. (OATI) using the webE-GADS data collection system **within 45 days after the end of each quarter**. You must submit performance data for a unit even if it was off-line during the entire quarter. It is preferred to report year-to-date information each quarter rather than four, single quarterly submittals.

There are six distinct sections of the performance report: A) unit identification; B) unit generation performance; C) unit starting characteristics; D) unit time information; E) primary fuel; and F) secondary fuel. Together, these sections provide an overall summary of the operating status of a unit.

The performance report (05) is divided into several sections. The different sections of the performance report are on different records: Section A is on all records, B, and C on Record 01, section D on record 02, and sections E and F on records 03 and 04 respectively. Unless otherwise stated, do not zero fill or asterisk fill unused data fields in any section of the performance report.

NERC invites Generator Owners and Operators to report on units that have a nameplate capacity of 20MW or less on a voluntary basis.

A description of each section and the data elements within it follows. Included are detailed instructions for reporting each performance data element.

Section A: Unit Identification

There are six data elements, referred to as “fields,” in this section. See Table IV-1. These elements form a “key” — an identifier that makes each performance record unique from all others in the database. This key is referenced at the beginning of every record used to report performance data.

Table IV-1: Record Layout of Section A – Unit Identification		
Column ID	**Number of Columns**	**Starting Position**
All Records		
A – Unit Identification		
Record Code (required)	2	1
Utility (Company) Code (required)	3	3
Unit Code (required)	3	6

Table IV-1: Record Layout of Section A – Unit Identification		
Column ID	**Number of Columns**	**Starting Position**
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15

Record Code (columns 1-2) - Required
This "05" code uniquely identifies these data as a Performance Report.

Utility (Company) Code (columns 3-5) - Required
Enter the three-character (alphanumeric) code NERC assigned to your operating company. Appendix C contains a complete list of the operating companies participating in GADS and their assigned utility (operating company) codes.

Unit Code (columns 6-8) - Required
Enter the three-digit code your operating company assigned for the unit that you are reporting. This code distinguishes one unit from another in your utility. Appendix C, Page C-1, contains a guide for selecting unit codes.

Year (columns 9-12) - Required
Enter the year (YYYY) for which data are being summarized.

Report Period (columns 13-14) - Required
Enter the month of the year for which data are being summarized:

Table IV-2: Monthly Summaries		
01 - January	05 - May	09 - September
02 - February	06 - June	10 - October
03 - March	07 - July	11 - November
04 - April	08 - August	12 - December

Report Revision Code (column 15) - Voluntary
This one-character data field signals that you wish to make a change to a performance report already submitted to GADS. Changes can be corrections, additions, or deletions of existing reports.

The first time you submit a performance report to GADS it is called an "original." Give all original reports a revision code of zero (0).

Use the following codes when making changes to an original performance report:

1, 2, … 9
Use these codes when making corrections or additions to original performance reports. Each time you make a change, you must increase the revision code by one. You can make up to nine corrections and additions to an original report.

When making **corrections or additions** to an original report, you need to send GADS all records relating to the performance report you intend to change. On the record:

1. Complete columns 1-14, repeating the information from the original report;
2. Increase the revision code in column 15 by one;
3. Make sure the same record number used in the original report is in columns 124-125. Do not leave the record number blank; and
4. Enter the updated information in the appropriate field.

To delete data from one or more data fields, GADS recommends that you resubmit the entire data set–year-to-date–for that unit (or all units you report) to GADS. This procedure will ensure that both you and the GADS database have the same records on file. You also have the option to find the record that has the highest revision code and then increase this number by one or set all revision codes back to zero.

Section B. Unit Generation Performance

GADS uses the data you provide in this section to calculate performance statistics. GADS requests both gross and net values but only requires certain net values. Reporting gross data, net data, or both depends on how the unit is electrically metered. Some units are metered on a single basis (gross or net). Enter your unit's data based on how your unit is actually metered. If you meter both gross and net, enter both values. If you meter on a single basis but can estimate the other, do so and enter the estimated value in the appropriate field. Complete the elements in section B as detailed below. The value you report whether it is gross or net must be consistent with the available capacity as a result of deratings reported on the event reports (07).

Table IV-3: Record Layout of Section B – Unit Generation Performance

Column ID	Number of Columns	Starting Position
Record 01		
B – Unit Generation Performance		
Gross Maximum Capacity (voluntary)	4 + 2 decimals	16
Gross Dependable Capacity (voluntary)	4 + 2 decimals	22
Gross Actual Generation (voluntary)	7 + 2 decimals	28
Net Maximum Capacity (required)	4 + 2 decimals	37
Net Dependable Capacity (required)	4 + 2 decimals	43
Net Actual Generation (required)	7 + 2 decimals	49

Gross Maximum Capacity (GMC) (Record 01, columns 16-21) – Voluntary but recommended
Enter the maximum capacity the unit can sustain over a specified period of time when not restricted by ambient conditions or deratings. To establish this capacity, a formal demonstration is required. No standard demonstration test method or test duration exists at this time, but many of the NERC Regions have their own criteria that all operating companies in those Regions follow. If your operating company has not set demonstration test requirements, contact your regional manager listed in Appendix C.

The GMC of a unit should change only as a result of a new performance tests or permanent unit modifications. Never change the GMC due to equipment problems even if they persist for a lengthy period of time **unless** the unit is permanently modified as a result. If the unit is permanently modified, note changes in the unit's design on a new design data form and submit it to NERC-GADS for updating.

Gross Dependable Capacity (GDC) (Record 01, columns 22-27) - Voluntary but recommended
Enter the gross power level that the unit can sustain during a given period if there are no equipment, operating, or regulatory restrictions. Therefore, by definition, the GDC is the GMC modified for ambient limitations.

The GDC is the same in intent and purpose as the historically reported Maximum Dependable Capacity (MDC).

Gross Actual Generation (GAG) (Record 01, columns 28-36) - Voluntary but recommended
Enter the actual number of gross electrical megawatt-hours (MWh) generated by the unit during the month.

If you report both service hours and gross actual generation (one to 9999999), you must also report GMC or GDC. Similarly, if you report both service hours and a gross capacity value, you must also report gross actual generation. This provides consistency when calculating performance statistics.

Net Maximum Capacity (NMC) (Record 01, columns 37-42) - Required
NMC is the unit's GMC minus any capacity (MW) utilized for that unit's station service or auxiliary load.

Net Dependable Capacity (NDC) (Record 01, columns 43-48) - Required
NDC is the unit's GDC minus any capacity (MW) utilized for that unit's station service or auxiliary load.

Net Actual Generation (NAG) (Record 01, columns 49-57) - Required
NAG is the unit's GAG minus generation (MWh) utilized for that unit's station service or auxiliary load. If NAG is negative during the month being reported, enter a minus sign in the column immediately before the reported value.

For consistency in calculating statistics, if you report net actual generation (negative integer or positive integer), you must also report NMC or NDC. Similarly, if you report a net capacity value, you must also report net actual generation.

Please note: *If you only report either the gross or the net capacities, the GADS editing program will calculate any missing GAC, GAG, GMC, GDC, NAC, NAG, NMC, or NDC using the following criteria:*

Table IV-4 Unit Capacity/Generation Estimation Factors and MW Multipliers

Unit Type Name	Capacity/ Generation Estimation Factor	MW Multiplier	Unit Type Code Ranges
CC GT units	2.00	0.20	300-399, 700-799
CC steam units	5.00	0.20	100-199, 600-649
CoG GT units	2.00	0.20	300-399, 700-799
CoG steam units	5.00	0.20	100-199, 600-649
Co-generator Block	4.00	0.10	800-899
Combined Cycle Block	4.00	0.15	800-899
Fluidized Bed	5.00	0.10	650-699

Table IV-4 Unit Capacity/Generation Estimation Factors and MW Multipliers			
Unit Type Name	**Capacity/ Generation Estimation Factor**	**MW Multiplier**	**Unit Type Code Ranges**
Fossil-Steam	5.00	0.30	100-199, 600-649
Gas Turbine/Jet Engine (Simple Cycle Operation)	2.00	0.30	300-399, 700-799
Geothermal	4.00	0.10	800-899
Internal Combustion/Reciprocating Engines	0.00	0.10	400-499
Miscellaneous	4.00	0.10	800-899
Multi-boiler/Multi-turbine	4.00	0.10	800-899
Nuclear	5.00	0.10	200-299
Pumped Storage/Hydro	0.00	0.50	500-599, 900-999

Typical performance data validations where the MW Multipliers are used:
Gross Maximum Capacity MW <= Nameplate Rating * (1.00+ MW Multiplier)
NAG <= ((NMC+1) * Service Hours * (1 + MW Multiplier)

For example, if you report a fossil unit's NMC and NDC, then the program will take your NMC and multiply it by 1.05 to determine the new GMC. The same operation would occur for determining the GDC from the NDC number and the GAC from the NAC number reported on a derating.

If you report only one capacity (for example NMC), then the program will assume the NMC and NDC are equal and will record the unit as such. It will then calculate the GMC and GDC using the calculation stated above.

If you think the differences between gross and net are different than the numbers stated above, then complete all capacities (maximum and dependable) with the correct numbers. The computer will accept entered numbers and will only calculate new numbers if the fields are blank, zero-fielded, or have an asterisk (*).

The MW multipliers shown above are used in data error checking routines on your performance data. Several typical checks involving the MW multipliers are shown below Table IV-4. These types of data error checks only produce warnings which should always be investigated as an error of this type would not be normal.

Special Note on Gas Turbines and Jet Engines
Gas turbine and jet engine capacities are very sensitive to outside temperatures and their capacities are not as constant as fossil or nuclear plants. See *Figure IV-1* below as an example. Therefore, base the GMC and NMC capacities of these units on the International Organization of Standardization (ISO) charts (at standard temperatures and pressures) for each individual Gas Turbine and Jet Engine unit. Once the GMC and NMC are determined, any non-equipment restriction that lessens the capacity would be the GDC and NDC numbers. Report the monthly average GMC, GDC, NMC and NDC to GADS.

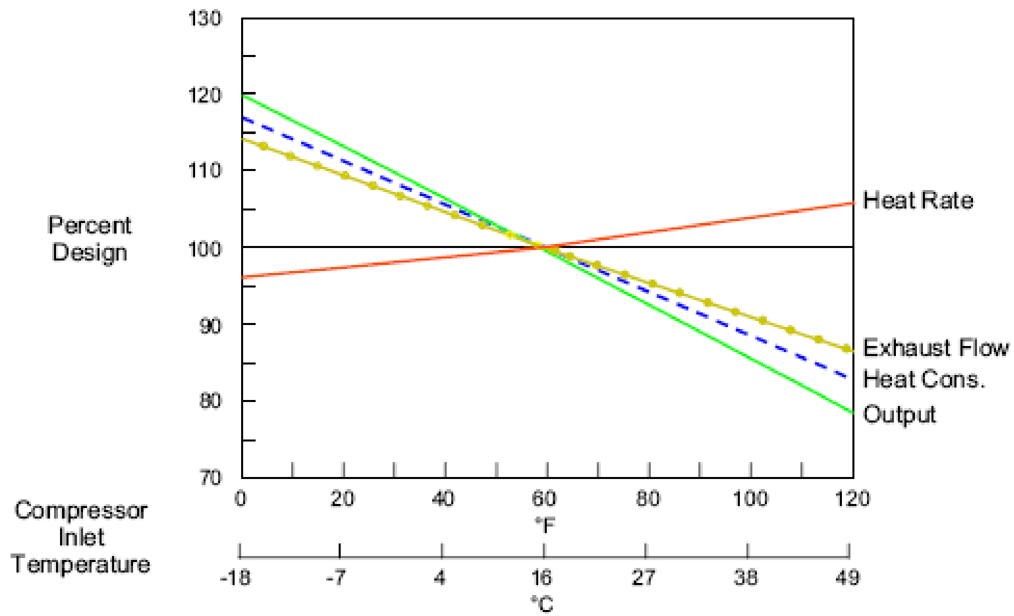

Figure IV-1: Effects of Ambient Temperature on Gas Turbines/Jet Engines

Section C: Unit Starting Characteristics

Use the data elements in this section to establish the manner in which the unit was operated during the month. This information is needed when sorting data for use in special availability and reliability applications. Section C is located on record 01; refer to *Table IV-5* below.

Table IV-5: Record Layout of Section C – Unit Starting Characteristics		
Column ID	**Number of Columns**	**Starting Position**
Record 01		
C – Unit Starting Characteristics		
Typical Unit Loading Characteristics (voluntary)	1	58
Attempted Unit Starts (required)	3	59
Actual Unit Starts (required)	3	62
(Blank Columns)	34	65
Verbal Description (voluntary)	25	99
Record Number (required)	2	124

Typical Unit Loading Characteristics (Record 01, column 58) - Voluntary

Enter the code from Table IV-6 below that best describes how the unit was operated or loaded during the month being reported. Generally, these are numbered from least starts to most starts.

Table IV-6: Unit Loading Characteristics	
Code	**Description**
1	Base loaded with minor load following at night and on weekends
2	Periodic startups with daily load-following and reduced load nightly
3	Weekly startup with daily load-following and reduced load nightly
4	Daily startup with daily load-following and taken off-line nightly
5	Startup chiefly to meet daily peaks
6	Other (describe in verbal description)
7	Seasonal Operation

If the unit was off-line during the entire period, describe how the unit typically would have been loaded had it been on-line.

Attempted Unit Starts (Record 01, columns 59-61) – Required
Enter the number of attempts made to start the unit during the month to either generate, pump, or synchronous condense where the unit goes from a stopped position to generating, pumping, or synchronously condensing mode. Please note that:

- Repeated failures for the same cause without attempted corrective actions are considered a single start.
- Repeated initiations of the starting sequence without accomplishing corrective repairs are counted as a single attempt.

If you abandon startup attempts, the unit is shut down for repairs, and then started at a future time, report two startup attempts.

Actual Unit Starts (Record 01, columns 62-64) - Required
Enter the number of times the unit actually starts during the month to generate, pump, or condense where the unit goes from a stopped position to generate, pump, or synchronous condensing mode.

The number of actual unit starts must be less than or equal to the number of attempted unit starts.

Verbal Description (Record 01, columns 99-123) - Voluntary
If you enter Code 6 (Other) for the typical unit loading characteristics, as noted in column 58 in Table IV-5, describe how the unit operated during the month.

Unlike the verbal description field on the event report (07), you must abbreviate your description to fit in columns 99-123. **You may not use additional records.**

Section D. Unit Time Information

The data reported in Section D (see *Table IV-7*) summarizes information reported on the event report (07). The technique for summarizing event data is described on page IV-9. If reserve shutdown event data are not reported for the special group of hydro and pumped storage units (see *Table III-1*, Page III-1), the data needed to complete section D must be computed from your own station records.

The first 15 characters of Record 02 (A – Unit Identification) are identical to that of record 01. These 15 characters link the records together.

Table IV-7: Record Layout of Section D – Unit Time Information		
Column ID	**Number of Columns**	**Starting Position**
Record 02		
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
D – Unit Time Information		
Unit Service Hours (required)	3 + 2 decimals	16
Reserve Shutdown Hours (required)	3 + 2 decimals	21
Pumping Hours (required)	3 + 2 decimals	26
Synchronous Condensing Hours (required)	3 + 2 decimals	31
Available Hours (required)	3 + 2 decimals	36
Planned Outage Hours (required)	3 + 2 decimals	41
Forced Outage Hours (required)	3 + 2 decimals	46
Maintenance Outage Hours (required)	3 + 2 decimals	51
Extensions of Scheduled Outages (required)	3 + 2 decimals	56
Unavailable Hours (required)	3 + 2 decimals	61
Period Hours (required)	3 + 2 decimals	66
Inactive Hours (required)	3 + 2 decimals	71
(Blank Columns)	48	76
Record Number (required)	2	124

Unit Service Hours (Record 02, columns 16-20) - Required
Enter the number of hours the unit was synchronized to the system. For units equipped with multiple generators, count only the hours when at least one of the generators was synchronized, whether one or more generators were actually in service.

Reserve Shutdown Hours (Record 02, columns 21-25) - Required
Enter the sum of all hours the unit was available to the system but not synchronized for economy reasons.

Pumping Hours (Record 02, columns 26-30) - Required
Enter the number of hours the hydro turbine/generator operated as a pump/motor.

Synchronous Condensing Hours (Record 02, columns 31-35) - Required
Enter the number of hours the unit operated in the synchronous condensing mode (applies primarily to hydro/pumped storage and some combustion turbine units). Do not report these hours as unit service hours.

Available Hours (Record 02, columns 36-40) - Required
Enter the sum of the unit service hours, reserve shutdown hours, pumping hours (if applicable), and synchronous condensing hours (if applicable), as entered in columns 16-35 above.

Planned Outage Hours (Record 02, columns 41-45) - Required
Enter the sum of all hours the unit was off-line due to planned outages (PO) as detailed in the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Unplanned (Forced) Outage Hours and Startup Failure Hours (Record 02, columns 46-50) – Required
Enter the sum of all hours the unit was off-line due to immediate, delayed, and postponed outages (U1, U2, and U3) and startup failures (SF) outages as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Maintenance Outage Hours (Record 02, columns 51-55) - Required
Enter the sum of all hours the unit was off-line due to maintenance outages (MO) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Extensions of Scheduled Outages (Record 02, columns 56-60) - Required
Enter the sum of all hours the unit was off-line due to extensions of scheduled (maintenance and planned) outages (ME and PE) as detailed on the event reports completed for this unit. The technique used to compute hours from the event reports is described below.

Unavailable Hours (Record 02, columns 61-65) - Required
Enter the sum of planned outage hours (PO), unplanned (forced) outage hours (U1, U2, U3, SF), maintenance outage hours (MO), and extensions of scheduled outages (ME, PE), as entered in columns 41-60 above.

Computing Hours from the Event Report (07)

1. Calculate the duration of each outage (PO, MO, ME, PE, U1, U2, U3, and SF) and reserve shutdown (RS) reported as an event to the GADS database by subtracting the START OF EVENT from the END OF EVENT. Convert this to hours and adjust for Daylight Savings Time (DST) as appropriate.
2. Add the total number of hours during the month spent in each outage category (PO, MO, ME, PE, U1, U2, U3, and SF) and the reserve shutdown category (RS). Round the resultant values to two decimal places and enter in the appropriate fields in Section D of the Performance Report.

Period Hours (Record 02, columns 66-70) - Required
Enter the number of hours in the month being reported that the unit was in the **active** state (see Page III-5). The sum of available hours and unavailable hours must equal period hours. The period hours in each month or year are as follows in Table IV-8:

Table IV-8: Period Hours	
Month*	**Hours**
January	744
February	672*
March	744 < 2007, 743** >= 2007
April	719** < 2007, 720 >= 2007
May	744
June	720
July	744
August	744
September	720
October	745** < 2007, 744 >=2007
November	720 < 2007, 721** >= 2007
December	744
Year	8760*

* Add 24 hours during a leap year.
** May be adjusted one hour as appropriate for daylight saving time.

Inactive Hours (Record 02, columns 71-75) - Required
Enter the number of hours in the month being reported that the unit was in the **inactive** state. (See Page III-5 for details of inactive states.)

Section E. Primary Fuel

Section F. Secondary Fuel

Sections E and F, shown in *Table IV-9*, detail the type, amount, and quality of fuels burned in the unit during the reporting period. These sections are used to report primary and secondary fuels burned and are located on Record 03 of the Performance Report. Tertiary and quaternary fuels may be reported; however, no unique sections of the Performance Report exist for this purpose. Instead, use another Section E and another Section F, changing the record number from 03 to 04. Enter the tertiary fuel data in Section E on the 04 record and the quaternary fuel data in Section F on the 04 record.

Reporting **E. Primary Fuel Code is required** for all units except hydro/pumped storage units (optional for these units only). If a unit was not operated during the reporting period, enter the type of fuel that would have been burned in the unit had it been on-line.

Secondary, tertiary, and quaternary fuel sections are not used for hydro/pumped storage units, wind- or solar-powered units, or nuclear units.

The first 15 characters of Records 03 and 04 (A – Unit Identification) are identical to that of Records 01 and 02. These 15 characters link the records together.

Table IV-9: Record Layout of Section E – Primary Fuel; and F – Secondary Fuel		
Column ID	**Number of Columns**	**Starting Position**
Record 02		
A – Unit Identification		
Record Code (required)	2	1
Utility Code (required)	3	3
Unit Code (required)	3	6
Year (required)	4	9
Report Period (required)	2	13
Report Revision Code (voluntary)	1	15
E – Primary Fuel (03); Tertiary Fuel (04)		
Fuel Code (required)	2	16
Quantity Burned (voluntary)	5 + 2 decimals	18
Average Heat Content (voluntary)	6	25
% Ash (voluntary)	2 + 1 decimal	31
% Moisture (voluntary)	2 + 1 decimal	34
% Sulfur (voluntary)	1 + 1 decimal	37
% Alkalines (voluntary)	2 + 1 decimal	39
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	42
Ash Softening Temperature (voluntary)	4	45
(Blank columns)	21	49
F – Secondary Fuel (03); Quaternary Fuel (04)		
Fuel Code (required)	2	70
Quantity Burned (voluntary)	5 + 2 decimals	72
Average Heat Content (voluntary)	6	79
% Ash (voluntary)	2 + 1 decimal	85
% Moisture (voluntary)	2 + 1 decimal	88
% Sulfur (voluntary)	1 + 1 decimal	91
% Alkalines (voluntary)	2 + 1 decimal	93

Table IV-9: Record Layout of Section E – Primary Fuel; and F – Secondary Fuel		
Column ID	**Number of Columns**	**Starting Position**
Grindability Index / % Vanadium (voluntary)	2 + 1 decimal	96
Ash Softening Temperature (voluntary)	4	99
(Blank columns)	21	103
Record Number (required)	2	124

Please Note: *Performance record 04 for the tertiary and quaternary fuels is identical to performance record 03*

Fuel Code (Records 03 & 04, columns 16-17 and 70-71) - Required
Enter the two-character code from Table IV-10 that identifies the fuels burned in the unit during the reporting period.

Table IV-10: Fuel Types and Codes			
Code	**Description**	**Code**	**Description**
BM	Biomass	**PC**	Petroleum Coke
CC	Coal	**PR**	Propane
LI	Lignite	**SL**	Sludge Gas
PE	Peat	**GE**	Geothermal
WD	Wood	**NU**	Nuclear
OO	Oil	**WM**	Wind
DI	Distillate Oil (No. 2)	**SO**	Solar
KE	Kerosene	**WH**	Waste Heat
JP	JP4 or JP5	**OS**	Other-Solid (Tons)
WA	Water	**OL**	Other-Liquid (BBL)
GG	Gas	**OG**	Other-Gas (Cu. Ft.)

Report in **E. Primary Fuel** the code for the fuel that made the greatest contribution to thermal generation during the period. In **F. Secondary Fuel,** enter the code for the fuel that made the second greatest contribution to generation. You can only report fuels used for ignition or warm-up in this section if there was no more important secondary fuel. Tertiary and quaternary fuels, reported in Sections E and F on Record 04 of the Performance Report, are those which made the third and fourth greatest contribution to generation, respectively.

Quantity Burned (Record 03 & 04, columns 18-24 and 72-78) - Voluntary
Enter the quantity of fuel consumed during the reporting period. Note, NERC-GADS computer programs recognize a decimal place indicator that appears in the performance report. Therefore, enter a factor of the actual quantity burned in this field. Use the following factors to determine the correct number to enter: 1,000 short tons (2,000 pounds) for coal; 1,000 barrels (42 gallons/barrel) for oil; and 1,000,000 cubic feet for gas. Do not attempt to manually enter a decimal place.

Example:
If coal is your primary fuel and the unit burned 900 tons of coal during the reporting period, enter 0000090 in columns 18-24 of record 03. (900/1000 = 0.90, which when assuming two decimals, becomes 0000090.)

If oil is your primary fuel and the unit burned 900,000 barrels of oil, enter 0090000 in columns 18-24 of Record 03. (900,000/1000 = 900.00, which when assuming two decimals, becomes 0090000.)

When reporting data for geothermal units, enter in this field the quantity of steam brought into the plant from the geothermal wells. The factor used to determine the number to enter is 1,000,000. Thus, 1,234,500,000 pounds of steam is entered as 0123450 in columns 18-24 of Record 03.

Leave columns 18-24 blank when reporting data for nuclear units.

If a unit didn't burn one of its fuel types in a given month enter zero (0) as its quantity burned.

Average Heat Content (Records 03 & 04, columns 25-30 and 79-84) - Voluntary
Enter the average heat content for the fuel, to the nearest Btu/lb. of coal, Btu/gal. of oil or Btu/cu. ft. of gas. Enter a weighted average if the heat content of the fuel varied.

When reporting data for geothermal units, enter the heat content calculated using the following equation:

$$\frac{\text{Steam Consumption (lbs.)} \times 1195.5 \text{ (Btu/lb.)}}{\text{Net Generation (kWh)}}$$

For nuclear units, enter the Net Plant Heat Rate (Btu/kWh) in this field.

If a unit didn't burn one of its fuel types in a given month enter zero (0) as its heat content.

% Ash (Records 03 & 04, columns 31-33 and 85-87)* - Voluntary
Enter the average ash content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Moisture (Records 03 & 04, columns 34-36 and 88-90)* - Voluntary
Enter the average moisture content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Sulfur (Records 03 & 04, columns 37-38 and 91-92)* - Voluntary
Enter the average sulfur content of the fuel to the nearest 0.1% (by weight). Obtain this factor from an ultimate analysis of the fuel.

% Alkalis (Records 03 & 04, columns 39-41 and 93-95)* - Voluntary
Enter the sum of the average sodium and potassium contents of the fuel to the nearest 0.1% (by weight), as obtained from an ash analysis.

Coal Units Only: Grindability Index (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as coal (CC) or lignite (LI), enter the weighted average grindability index of the fuel burned during the period. When entering the grindability index, disregard the decimal point.

Oil Units Only: % Vanadium and Phosphorus (Records 03 & 04, columns 42-44 and 96-98)* - Voluntary
If the fuel type has been identified as oil (OO), kerosene (KE), JP4/5 (JP), or distillate oil (DI), enter the sum of the average vanadium and phosphorus contents of the fuel to the nearest 0.1% (by weight) as obtained from an ash analysis.

Ash Softening Temperature (Records 03 & 04, columns 45-48 and 99-102)* - Voluntary
Enter the average ash softening temperature (^{o}F) of the fuel. This temperature should be determined under reducing atmosphere conditions.

** Because the average heat content (Btu), ash, moisture, sulfur, alkalis, grindability index, vanadium and phosphorus, and softening temperature values may change during a month due to new fuel supplies, etc., these values should be weighted averages.*

Example:
(15,000 Btu x 10 tons of coal + 18,000 Btu x 20 tons of coal)/30 tons of coal = Weighted Average Heat Content. The number of columns shown on these sections indicates a computer-inserted decimal point. Do not manually insert a decimal point. For example, a % Moisture value of 6.8% would be entered as 068 in columns 34-36 because the number of columns shown, 2 + 1 decimal, indicates a computer inserted decimal point one column from the right.

Section V: Design Data Reporting

In the approved recommendations by the NERC Board of Trustees, you must submit design data fields for all units you report to the GADS database. This required design data must be reported to GADS before submitting GADS event and performance data. The nine required design data fields for all unit types are:

- GADS utility code (assigned by GADS Services)
- GADS unit code (assigned by the reporting company following the guidelines in Appendix C of the *GADS Data Reporting Instructions*.)
- NERC Regional entity where the unit is located
- Name of the unit
- Commercial operating date
- Type of generating unit (fossil, combined cycle, etc.)
- MW size (nameplate)
- State or province location of the unit
- Energy Information Administration (EIA) Plant number (US units only)

Along with the historical nine required design data fields for all unit types, NERC is requiring additional design data for fossil steam, fluidized bed, gas turbine/jet engines, internal combustion reciprocating engines, hydro, and combined cycle/cogeneration units starting in 2024. The additional requirements can be found in the appropriate design data E Appendices. Data should be reviewed on an annual basis.