

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. Figure 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

| Unit | | Event Classifications | | | |
|---|-----------|-----------------------|----------|------------------|----------------|
| Type | 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 |
| Diesel | 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 Assess 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.

A. Event Identification

There are seven data elements, referred to as “fields,” in this section (see Figure 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

Table III-2: Record Layout of Section A – Event Identification

| All Records | | |
|-----------------------------------|-------------------|-------------------|
| Column ID | Number of Columns | Starting Position |
| 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 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

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 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.

An event that continues through multiple months during the same year keeps the originally assigned event number. Assign an event that continues from one year into the next with a new event number in the new year. 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 insure 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 762: Inactive and Active. Inactive States are shown on Page III-5-6; Active States on Pages III-6-9 and Pages III-12-13. 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 (or can be postponed) of the event.

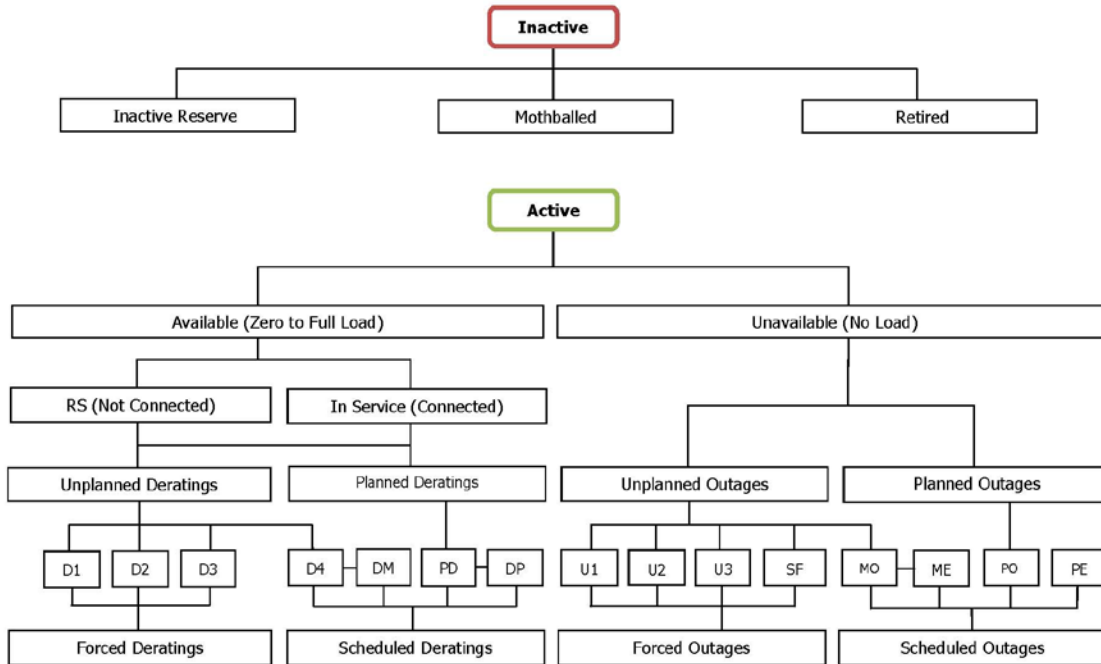


Figure III-1: Unit States Diagram

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 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 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. This does not include units that may be idle because of a failure and dispatch did not call for operation. 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 **must be** on RS a minimum of 60 days before it can move to IR status. Use Cause Code “0002” (three zeros plus 2) for these events.

MB – Mothballed (MB)

MB is defined by IEEE 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 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 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 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.” 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.

1. Outages

An outage exists whenever a unit is not synchronized to the grid system and not in a reserve shutdown state. The general outage event classification is divided into seven distinct event types. Special instructions for reporting testing during and following outages can be found on Page III-11.

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 unit 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 be put back in service.

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. 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).

***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 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 (hot, cold, standby, etc.). A startup period begins with the command to start and ends when the unit is synchronized. 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.

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 immediate mechanical/electrical/hydraulic control system trips and operator-initiated trips in response to unit alarms.

There is a need by a number of the NERC Planning Committee working groups and subcommittees 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 complete, 100% 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 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 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 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 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 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 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 not 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 or not 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 completed 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 in appendix F will allow calculations of events with and without OMC events. The use of equations without OMC events is left to the decision of plant and corporate management.

Special Comment Regarding the Reporting 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 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 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 can report the problem in either one of two ways: 1) report the non-generating mode equipment failure as a non-curtailing (NC) event, or 2) don't report the problem to GADS. NERC prefers option #1, but it is up to the reporter to choose to report the NC events or not.

If the case where the pumped storage unit cannot operate in the generating mode but either can or cannot operating 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.

2. 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. The reporter chooses the order of reporting. Events are sorted on the date and time the event starts.

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-14).

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).

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.

***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 a 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.

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 capacity and dependable capacity. The difference between these two values reflect losses due to ambient conditions only (see Page IV-4). 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 are 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-curtailling event (NC). See Page III-18 for details.

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.

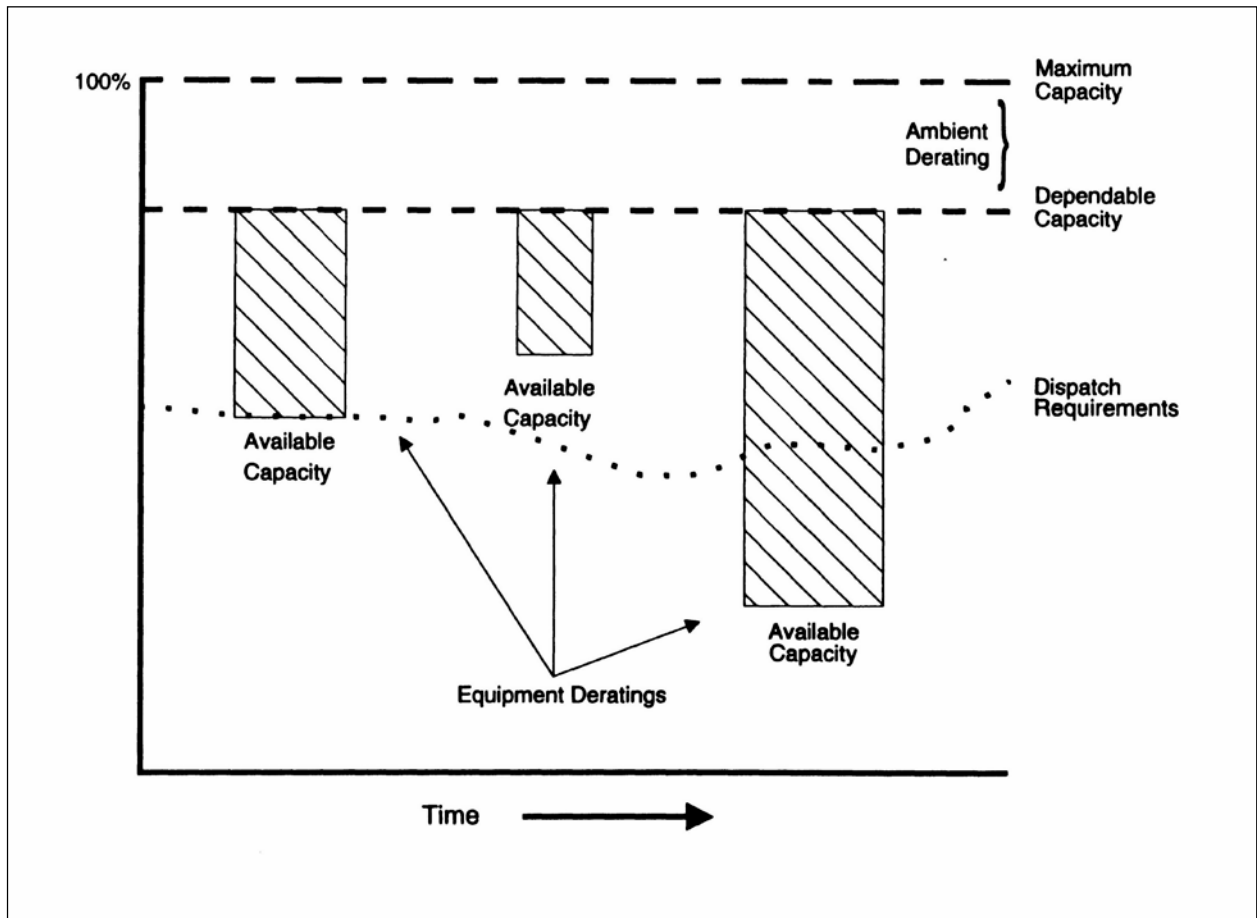


Figure III-2: Possible Derating Situations

Overlapping Deratings

Deratings often overlap each other in duration. GADS considers all deratings additive except those which are masked (shadowed) by an outage or a larger derating for their entire duration. This means the derating that started first is assumed to be the primary cause of the load reduction until it terminates or a full outage begins. Follow the criteria described below when reporting overlapping deratings:

- a) Deratings that are masked (shadowed) for their full duration by outages or larger deratings are considered non-curtailling in nature; meaning they do not affect the available capacity of the unit. Report these situations using one of the two options shown below:

Report deratings of this type as derating events. If you choose this option, you must estimate the available capacity resulting from the derating (see below) since it cannot be readily observed. The calculation of equivalent derated hours will not be affected if shadowed deratings are reported in this manner.

Instead of reporting these kinds of deratings as events, you may report them on Section D of the Event Report that describes the outage or larger derating. See *Appendix G, Example 4, Pages G-18 to G-19*.

- b) Report deratings that are masked (shadowed) due to operation in a load-following mode as individual events. You must estimate the available capacity (see below and Page III-17) because it cannot be readily observed.
- c) Because of the additive assumption, GADS computer programs automatically increase the available capacity of a unit when one derating ends while another is still in progress. See *Appendix G, Example 3C, Pages G-12 to G-14*. If the available capacity of the unit cannot be increased because of the severity of the derating still in progress, you must indicate this by “artificially” ending the derating in progress and reporting a “new” derating. For further discussion, see *Appendix G, Example 3D, Pages G-15 to G-17*.

Occasionally, two or more individual components will fail at the same time month/day/hour/minute). There are two ways to report occurrences like these:

1. Report each component failure as a separate derating. Use engineering judgment to determine the available capacity as a result of each. NERC processes the data first sorting by start date and time then event number. This means that when start dates are identical, the GADS will process the derating with the lower event number first.
2. Report one derating, but show one component as the primary cause of 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 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-20).

The following example demonstrates this averaging technique:

A 1000 MW unit experienced a derating caused by a stack emission limitation over a ten 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 50 MW;
- 3) 110 hours at 20 MW; and 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:

$(40 \text{ hours} \times 30 \text{ MW}) + (10 \text{ hours} \times 50 \text{ MW}) + (110 \text{ hours} \times 20 \text{ MW}) + (80 \text{ hours} \times 40 \text{ MW}) = 7100 \text{ total MWh lost.}$

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:

$$7100/240 = 30 \text{ average MW lost}$$

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.

$$1000 \text{ MW} - 30 \text{ MW} = 970 \text{ MW available capacity}$$

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-22 for details)

3. Reserve Shutdown - 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 or not 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:

- a) Synchronizing after a normal startup cycle, and
- b) Reaching its available capacity after a normal loading cycle.

This 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.

4. Non-curtailing Event - 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:

- a) The available capacity of the unit is not reduced below what is required by system dispatch, and
- b) 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.

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 *Figure III-5*.

| Table III-3: Record Layout of Section B – Event Magnitude | | |
|--|-------------------|-------------------|
| All Records | | |
| Column ID | Number of Columns | Starting Position |
| B – Event Magnitude | | |
| Start of Event (required) | 8 | 20 |
| (Blank Columns) | 20 | 28 |
| End of Event (required) | 8 | 48 |
| Gross Available Capacity (voluntary) | 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.

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

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.

Note: Effective January 1, 2005, the section “When to Adjust for Startups” (formally Figure III-7) was removed from the GADS DRI. The rule for artificially adding start up times to events moving from one event type to another was untestable and unenforceable. The mass majority of reporters were not following the rules and only a few (as surveyed at annual workshops) were. Therefore, to allow equal reporting rules, the section was dropped.

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

For events that extend through multiple 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.

For events that continue into the new year, enter the end date as **12312400**. Restart the event in the new year with a start date of **01010000**.

Take care to change the Year (Section A, columns 9-12) to reflect the current year, and assign a new event number (Section A, columns 13-16).

In addition to the year, event number, and start date, the “new” event being carried into the new year must:

- have a revision code of zero (0);
- have the same event type as the previous year’s report;
- include all the system/component cause codes used in the previous year, except for those components that were repaired within the previous year;

Gross Available Capacity (GAC) as a Result of the Event

(Record 01, columns 56-61) – Voluntary; and

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 the GAC, the 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*, Pages III-14 to III-17, 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 more than two 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 not hide part of the impact credited to other derates. Unit

performance statistics will not be affected. Cause code statistics will be more accurate by recording the true frequency and impact of the dominant derate.

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

See Appendix G, Example 3D for an example 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*.

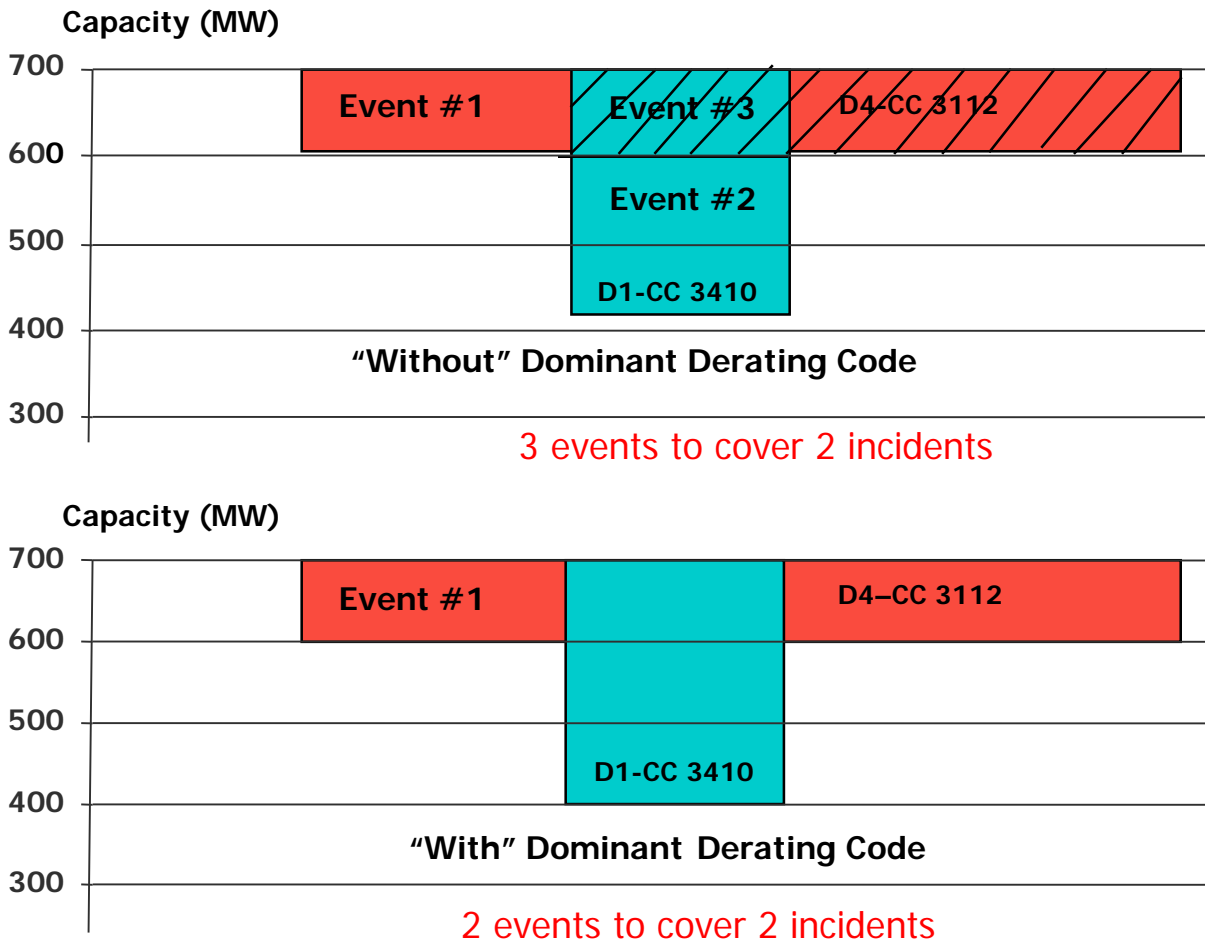


Figure III-4: Example of Dominant Derating Code Reporting

- C. Primary Cause of Event; and
- 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* on Page III-23). 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* on Page III-24).

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.

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 (02-99) 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)

| Record 02 | | |
|--|-------------------|-------------------|
| Column ID | Number of Columns | Starting Position |
| 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 |

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| | | |
|--|----|----|
| Problem Alert (voluntary) | 1 | 45 |
| Man-hours Worked (voluntary) | 4 | 46 |
| Verbal Description (voluntary but strongly recommended.) | 31 | 50 |
| Record Number (required) | 2 | 81 |

Table III-5: Record Layout of Section D – Additional Work During Event (Records 4+ and 5+)

| Records 04+ (Even Numbered) | | |
|--|-------------------|-------------------|
| Column ID | Number of Columns | Starting Position |
| 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 |
| Column ID | Number of Columns | Starting Position |
| 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 |
| (Blank Columns) | 2 | 42 |
| Event Contribution Code (voluntary) | 1 | 44 |
| Problem Alert (voluntary) | 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) | | |
| Column ID | Number of Columns | Starting Position |
| 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 |

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| | | |
|--|----|----|
| 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 |

Table III-6 – Allowable Cause Codes

| Fossil | Fluidized Bed | Nuclear | Diesel | Hydro/ Pumped Storage | Gas Turbine | Combine Cycle/Co-Gen | Geothermal |
|-----------|---------------|-----------|-----------|-----------------------------|-------------|-------------------------|---------------|
| 0010-0129 | 0010-0129 | 2010-2090 | 3600-3690 | 3600-3689 | 3600-3690 | 0358-0480 | 0500-0620 |
| 0200-0480 | 0130-0156 | 2110-2160 | 3700-3730 | 3700-3730 | 3700-3730 | 0540-0570 | 3110-3199 |
| 0500-0920 | 0160-0174 | 2170-2799 | 4500-4899 | 3810-3899 | 3810-3899 | 0670-0859 | 3210-3299 |
| 1000-1090 | 0200-0480 | 2805-2890 | 5700-5880 | 3950-3999 | 3950-3999 | 1300-1599 | 3300-3399 |
| 1100-1210 | 0500-0920 | 2900-2999 | 5890-5999 | 4500-4899 | 4500-4899 | 1700-1820 | 3600-3690 |
| 1300-1360 | 0930-1090 | 3110-3199 | 9000-9040 | 7000-7299 | 5000-5039 | 1850 & | 3700-3730 |
| 1400-1599 | 1100-1200 | 3210-3299 | 9130-9160 | 9000-9040 | 5040-5190 | 1900-1910 | 3810-3899 |
| 1700-1820 | 1300-1360 | 3300-3399 | 9180-9199 | 9135-9160 | 5200-5299 | 1980-1999 | 3950-3999 |
| 1850 | 1400-1599 | 3401-3499 | 9220-9291 | 9180-9199 | 7800-7960 | 3110-3199 | 4200-4250 |
| 1900-1910 | 1700-1820 | 3501-3509 | 9300-9340 | 9300-9340 | 8656 | 3210-3285 | 4260-4314 |
| 1980-1999 | 1850 | 3520-3529 | 9504-9590 | 9504-9590 | 8700-8790 | 3290-3295 | 4400-4580 |
| 3110-3199 | 1900-1910 | 3600-3690 | 9605-9655 | 9676-9696 | 8800-8835 | 3299 & | 4600-4650 |
| 3210-3299 | 1980-1999 | 3700-3730 | 9665-9695 | 9700-9720 | 8840-8845 | 3300-3399 | 4700-4750 |
| 3300-3399 | 3110-3199 | 3800-3899 | 9700-9720 | 9900-9999 | 9000-9040 | 3401-3499 | 4800-4899 |
| 3401-3499 | 3210-3299 | 3950-3999 | 9900-9999 | | 9130-9160 | 3501-3509 | 6410-6499 |
| 3501-3509 | 3300-3399 | 4000-4899 | | | 9180-9291 | 3520-3549 | 8000-8499 |
| 3520-3549 | 3401-3499 | 9000-9040 | | | 9300-9340 | 3600-3690 | 8700-8790 |
| 3600-3690 | 3501-3509 | 9110-9160 | | | 9504-9590 | 3700-3730 | 9000-9040 |
| 3700-3730 | 3520-3549 | 9180-9199 | | | 9603-9653 | 3800-3899 | 9130-9160 |
| 3800-3899 | 3600-3690 | 9300-9340 | | | 9663-9693 | 3950-3999 | 9180-9199 |
| 3950-3999 | 3700-3730 | 9500-9590 | | | 9700-9720 | 4000-4899 | 9300-9340 |
| 4000-4899 | 3800-3899 | 9660-9690 | | | 9900-9999 | 5000-5299 | 9504-9590 |
| 8000-8590 | 3950-3999 | 9700-9720 | | | | 5400-5699 | 9700-9720 |
| 8600-8790 | 4000-4899 | 9900-9999 | | | | 6000 & | 9900-9999 |
| 8800-8845 | 8000-8590 | | | | | 6005-6090 | |
| 9000-9040 | 8600-8790 | | | | | 6100 & | |
| 9130-9160 | 8800-8845 | | | | | 6110-6183 | |
| 9180-9291 | 9000-9040 | | | | | 6299 & 6399 | |
| 9300-9340 | 9130-9160 | | | | | 7800-7960 | |
| 9504-9590 | 9180-9291 | | | | | 8700-8790 | |
| 9600-9656 | 9300-9340 | | | | | 8800-8835 | |
| 9660-9690 | 9504-9590 | | | | | 8840-8845 | |
| 9700-9720 | 9600-9656 | | | | | 9000-9040 | |
| | | | | | Jet Engine | | Miscellaneous |

| | | | | | | | |
|-----------|-------------------------------------|--|--|--|---|---|---|
| 9900-9999 | 9660-9690 9700-9720 9900-9999 | | | | 3600-3690 3700-3730 3810-3899 3950-3999 4500-4899 5400-5439 5440-5590 5600-5699 7800-7960 8656 8700-8790 8800-8835 8840-8845 9000-9040 9130-9160 9180-9291 9300-9340 9504-9590 9604-9658 9664-9694 9700-9720 9900-9999 | 9130-9160 9180-9199 9200-9291 9300-9340 9504-9590 9600-9658 9660-9694 9700-9720 9900-9999 | 0000-1999 3110-3999 4000-4899 5000-5299 5400-5699 7800-7960 8000-9999 |
|-----------|-------------------------------------|--|--|--|---|---|---|

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 several sections for easily locating the appropriate cause codes for each unit type. Figure III-6 on Page III-25, 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. It is 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 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:

Codes

- 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.

Problem Alert (Record 02, column 45) - Voluntary

Enter an “X” in this field if you believe the problem with the system or component is generic to its design or operation practices. Because this information may be helpful to others using similar equipment, an “X” alerts the NERC staff to initiate an investigation.

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-29. 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) failure description and appearance, 2) cause of immediate failure and contributing factors, and 3)

corrective actions. You have limited space available for your description, so NERC suggests using common abbreviations as much as possible. Following the guidelines below will help you to develop a complete and concise description encompassing the key areas noted below.

1. 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 |

2. 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 |

3. 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, a 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: “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 *Figure III-7* on Page III-30). If you choose not to supply the additional data, report the verbal description as described on Page III-27.

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 cards 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 cards 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 cards containing a contribution code of 1 in column 44.

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

| Record 02 | | |
|---|-------------------|-------------------|
| Column ID | Number of Columns | Starting Position |
| 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 |
| Problem Alert (voluntary) | 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 | | |
| Column ID | Number of Columns | Starting Position |
| A – Event Identification | | |
| Repeat columns 1-19 from record numbers 01 and 02 | | |
| 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 |

*Gas turbine and jet engine units only.