

Vedanta Resources Plc

**Sustainability Governance
System**

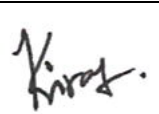
Guidance Note GN01


Incident Investigation

Guidance Note – Incident Investigation

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1. INTRODUCTION

1.1. Who is this Guidance Note aimed at?

This Guidance Note (GN) is aimed at all Vedanta subsidiaries, operations and managed sites, including new acquisitions, corporate offices and research facilities and to all new and existing employees and contractor employees. This GN is applicable to the entire operation lifecycle (including exploration and planning, evaluation, operation and closure). This GN is applicable to all incidents resulting into a fatality or High Potential Incident.

1.2 What is the aim of this Guidance Note?

Effective incident investigation should identify the underlying causes and the associated systems, process and leadership weaknesses. This aim of this Guidance Note is to outline the company requirements which Vedanta implements in order to provide a consistent approach for the internal investigation of HSE incidents.

1.3 When must this Guidance Note be used?

This Guidance Note presents the framework for the effective incident investigation within Vedanta operations. It is the mandatory method for any Category 5 or potential Category 5 incident, including fatalities and High Potential (HIPO) incidents.

1.4 How should this Guidance Note be used?

This Guidance Note is mandatory (as per instructions in Section 1.3 above) and is intended to provide a standard baseline and reflect good practice whilst providing the basis for continual improvement of sustainability issues across the Vedanta business. The need for flexibility at a site depending upon specific circumstances or regulatory specific requirements is also recognised. This Guidance Note is not designed to be definitive text, nor is it designed to provide prescriptive methods and procedures for undertaking tasks.

In certain cases there will be national and/or local regulatory requirements which address incident investigation process sites shall ensure that these requirements are identified and complied with.

The successful implementation of this Guidance Note is expected to require dedicated commitment from all of the Vedanta sites.

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The remainder of this Guidance Note is structured as follows:

- Section 2 – Definitions
- Section 3 – Roles and Responsibilities
- Section 4 – Organising the Incident Investigation
- Section 5 – Reporting

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2. DEFINITIONS

Term	Definition
Event	Time line of occurrences / incidents with or without the participation of victim. It may be a part of a chain of occurrences as an effect of a preceding occurrence and as the cause of a succeeding occurrence. The symbol used is Event
Condition	Any relevant factor that existed at the time of an event. The symbol used is Condition
Cause	Event or condition without which the outcome / incident could not have occurred. The symbol used is Cause
Contributing Factor	Event or condition that is partly responsible for an incident / outcome but without which the outcome / incident could still have occurred. The symbol used is Contributing Factor
Evidence	The available facts or information indicating the event which could have happened. Evidence can be anything that can be used to support cause (s) or contributing factors. The symbol used is Evidence
Incident	An event or chain of events which caused or could have caused injury, illness, loss of assets or potential or actual damage to relationships or reputation.
High Potential Incident (HIPO)	An actual Health, Safety, Environment or Community event or a near miss with the realistic potential to result in: <ul style="list-style-type: none"> • A fatality or permanent disability • A category 5 environment, social, labour or security event
Fatality	A death resulting from a work-related incident or exposure; in general, from an injury or an illness caused by or related to a workplace hazard.
Disability	A physical or mental impairment that limits the life activities of an injured person. A condition that makes engaging in physical, social and work activities difficult.
Permanent Disability	Any lasting disability that results in a reduced earning capacity after maximum medical improvement is reached.
Operation(s)	A location or activity that is operated by a Vedanta Company and is part of the Vedanta Group. Locations could include mines, refineries, ports or transportation activities, wind farms, oil and gas development sites, offices including corporate head offices and research and development facilities.

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3. ROLES AND RESPONSIBILITIES

Business Unit Head are responsible for

- Implementing this guidance note;
- Ensuring that adequate arrangements are in place for investigating all Category 5 incidents, including fatal and High Potential incidents;
- Ensuring formation of investigation team.
- Implementing the recommendations and deciding any associated actions from the investigation report.

Lead Investigator is responsible for

- Advising the BU head in the formation of investigation team;
- Convening the investigation team;
- Reviewing the appropriateness;
- Assigning specific tasks to individuals in the cross functional team based on the skill set;
- Preparing and Submitting the report after cross functional team provides its recommendations; and
- Co-ordinating the activities of individuals to ensure that all activities are undertaken and integrated.

Business Unit HSE Head is responsible for

- Participating and supporting the cross functional team in the investigation process.
- Providing the team with all the necessary information related to operation and safety management systems at the operations.

Group Head/GM - Safety & Occupational Health is responsible for providing

- Advise the BU Head in making the necessary administrative and technical arrangements for the application of this incident investigation Guideline.
- Facilitation and participation in the incident investigation process as and when required;
- Assistance in monitoring the incident investigation process to ensure Causes and Contributing Factors are identified and recommendations are in line with the gaps determined.

Cross Functional Team is responsible for

- Active participation in the investigation process
- Collecting and gathering physical and documentary evidence;
- Conducting interviews;
- Brainstorming and constructing the Events & Conditions chart
- Reviewing and Analysing the Events & Conditions chart
- Brainstorming and Identifying the Cause(s) and Contributing Factors

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- Determining the Systems Gaps
- Providing the Recommendations
- Assisting the Lead Investigator in completing the investigation report

All **employees and contractors** are responsible for co operating with the investigation team and providing the relevant information to the best of their recollection.

4. ORGANISING THE INCIDENT INVESTIGATION

The incident investigation is a complex process that involves a significant workload, time constraints, sensitive issues, cooperation between team members, and dependence on others. In order to complete the investigation within a timeframe and in a consistent manner the following stages should be adopted –



4.1 Preparation

This stage involves the following steps –

- Formation of investigation team;
- Gathering evidence and
- Conducting interviews.

4.1.1 Formation of Investigation Team

The investigation team should comprise of cross functional team members representing various functions within the operation. The lead investigator should be a competent person, trained in conducting incident investigations.

This team should conduct a walk-through of the incident scene or, work location.

4.1.2 Gather Evidence

Immediately following any incident, much of the available information may be conflicting and erroneous. The volume of data expands rapidly as witness statements are taken, emergency response actions are completed, evidence is collected, and the incident scene is observed by more individuals. The method for gathering the evidence are as follows

- Make personal observations;
- Get Initial Statements;

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- Take photos of the incident scene;
- Collect documentary evidence to determine “work-as-done”; and
- Collect physical evidence.

4.1.2.1 ***Make personal observations:***

While conducting the site walk through each team member should be using the following questions, but not limited, to

- What do you see?
- What equipment, tools, materials, machines, structures appear to be broken, damaged, struck or involved in the incident?
- What about the environment? Were there any distractions, adverse conditions caused by weather?
- What is the activity occurring around the incident scene?

4.1.2.2 ***Get Initial Statements:***

Speak to eye witnesses to the incident around to get the initial statement describing the incident. Collect information on

1. Names of witnesses for subsequent interviews;
2. Names of rescuers; and
3. Materials, equipment that may have been moved during rescue.

4.1.2.3 ***Take Photos of the Incident scene:***

Photography can be used in a variety of ways to emphasize areas or items of interest and display them for better understanding. Photographic coverage should be detailed and complete, including standard references to help establish perspective.

4.1.2.4 ***Collect documentary evidence to determine “work-as-done”:***

1. Records that indicate past and present performance and status of the work activities, as well as the people, equipment, and materials involved (examples include log books, security access logs, calls to the operations centre, etc.);
2. Reports that identify the content and results of special studies, analyses, audits, appraisals, inspections, inquiries, and investigations related to work activities (examples include occurrence reports, metrics, management and self-assessments, etc.);
3. Documentation related to operating procedures and standards.

4.1.2.5 ***Collect physical evidence from the site:***

The team should also gather physical evidence from all sources as soon as it becomes available. The most obvious physical evidence related to an incident or incident scene often includes solids such as:

- Equipment
- Tools

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- Materials
- Hardware
- Operation facilities
- Pre- and post-incident positions of incident-related elements
- Scattered debris
- Patterns, parts, and properties of physical items associated with the incident.

4.1.3 Conduct Interviews

The purpose of the investigation interview is to obtain an accurate and comprehensive picture of what happened and gain additional information about the hazardous conditions, unsafe work practices, and related system weaknesses that contributed to the incident. The team should demonstrate personal leadership and skill in conducting the interview.

The first task is to determine who needs to be interviewed. Some of the people who should be considered for interviewing are –

- Victim (for nonfatal incidents) – To determine the immediate events leading up to and including the incident.
- Co-workers – To establish what actual versus appropriate procedures are being used.
- Direct Supervisor – To get information on the victim, task that was being performed, training provided to the victim, scheduling, work load, deviations taken during the task being performed.
- Department Head – To get information on operational and safety management systems.
- Personnel – To get information on victim's history, appraisals, training.
- Maintenance – To determine information on the equipment involved.
- Rescuers – To understand what they saw when responding to the incident.
- Contractors – If involved in the incident, establish what actual versus appropriate procedures are being used.
- Contractor's agency head – To get information on the involved contractor's history.
- Any other personnel who may provide information that may aid the investigation process.

The second task is to develop an effective interviewing technique. Some effective techniques that can assist are as follows –

- Put the person at ease.
- Be polite, patient, and friendly.
- Describe the investigation's purpose: to prevent incidents, not to assign blame.
- Get the background information from the person
- Establish a line of questioning and stay on track during the interview.
- Keep an open mind; ask questions that explore what has already been stated by others in addition to probing for missing information.
- Ask several persons similar questions to corroborate facts.
- Use the gathered evidence such as visual aids, photos, drawings, maps, and graphs to assist witnesses.
- Be an active listener, and give the witness feedback; restate and rephrase key points.
- End on a positive note; thank the witness for his/her time and effort.

4.2 Events and Conditions Chart

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Careful and complete analysis of the evidence, data collected following an incident, is critical to the accurate determination of an incident's causes and contributing factors. The results of comprehensive analyses provide the basis for recommendation. The analytical tool that shall be used and described here to analyse the information collected and to identify conditions and events that occurred before and immediately following an incident is Event and Conditions (E&C) Chart.

The E&C chart is a graphically displayed flow chart of the event with the events and decisions plotted on a timeline. As the event timeline is established, the related conditions or information and worker knowledge or focus are linked to the events and decisions. Understanding why workers did what they did and why their decisions and actions made sense to them is an essential goal of the incident investigation.

The following steps summarize the construction of the E&C Chart. In practice, this is an iterative process with constant changes and expansion of the chart as information, including context becomes available during the investigation.

4.2.1 Sequence of Events

The team should construct the events and conditions chart using a manual method. The manual method should employ removable adhesive notes to chronologically depict the events and the conditions affecting the events. The chart should be constructed on a large conference room wall. Events and conditions are recorded on removable adhesive notes and affixed sequentially to the wall in conference room. Different coloured notes as mentioned under section 2.0 can be used to distinguish between events and conditions in this manual construction.

Many events and conditions will be discovered in a short amount of time, and therefore the chart should be updated almost daily throughout the investigative data collection phase. Keeping the chart up-to-date helps ensure that the investigation proceeds smoothly, that gaps in information are identified, and that the team has a clear representation of incident chronology for use in evidence collection and interviewing.

First, to initiate the E&C Chart, the team begins with a chronological sequence of events, leading up to the incident, then the events immediately after the incident of relevance, such as how the emergency response proceeded. If the team is not aware of the sequence, they may start by putting the events that they know irrespective of the sequence. Based on the interviews and evidence that gets collected the relation and chronology is established. The sequence of events forms the starting point for reconstructing the incident. The events include observations, actions, decisions and changes in the process or system. While identifying the events and conditions, the Lead Investigator should ensure there is enough brainstorming and the team arrives at a consensus before putting into the chart. While noting the events mention the details as shown in the figure. If there are multiple events, put all in a single event box with different bullet points.

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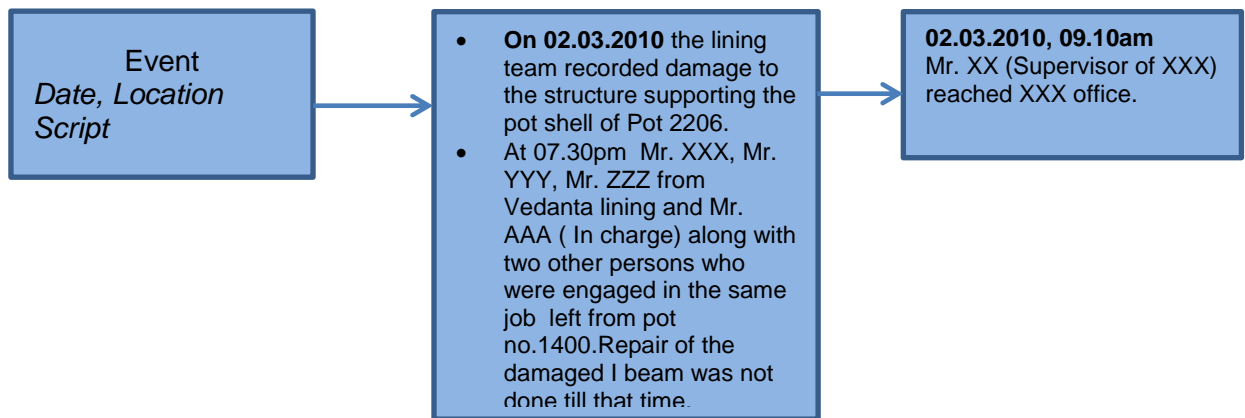


Figure 1

4.2.2 Conditions and Context of Safety Management Systems

For each event, determine the conditions that existed from the context of the actions by individuals, the safety management system, the work environment, and the physical conditions that existed at that specific point of time. This step is about reconstructing the world as it unfolded around the victim. Use the evidence gathered under section 5.1.2 to construct the chart. The purpose is to:

- Determine how work was actually being performed;
- Determine what information was available to the victim and decisions that were made; and
- Determine how work was expected to be performed, e.g., procedures, plans, permits.
- Determine the context by which victim formulated the decisions that lead to their actions at the point of time in the event – conflicting goals. These can include, but are not limited to:
 - Economic considerations, such as safety versus schedule;
 - Certain decisions (organisation systems versus practices enforced);
 - Response to previous situations (successes OR failures);
 - Management of Change processes.

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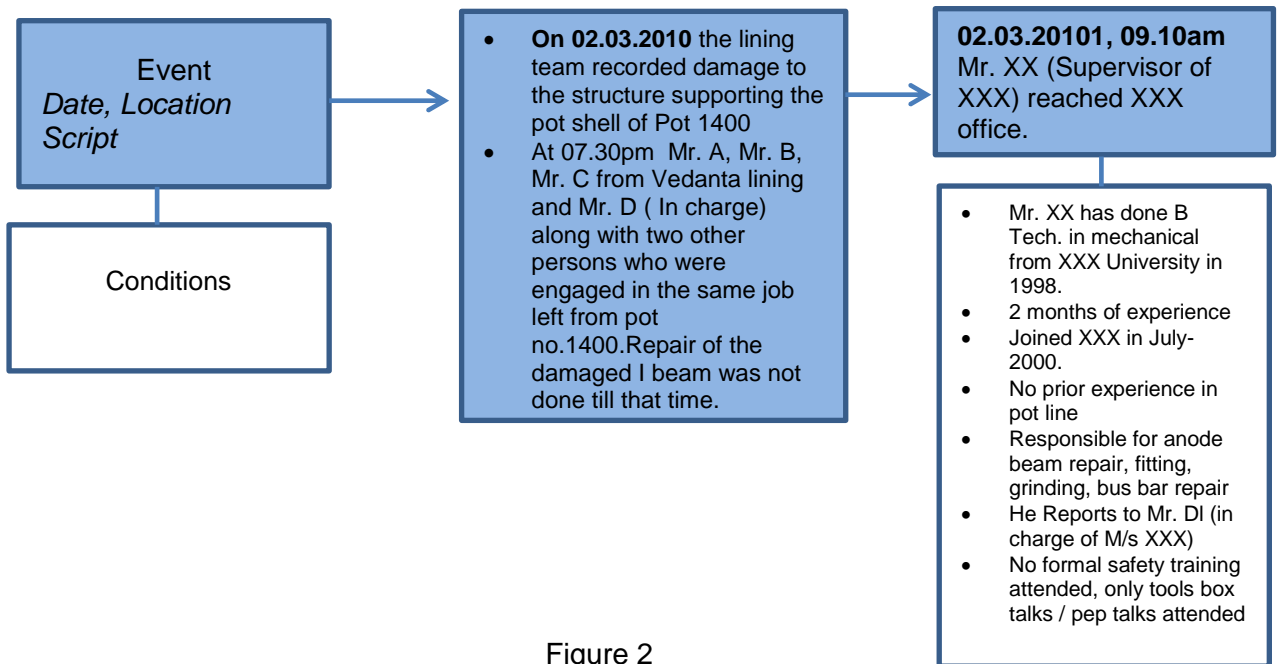


Figure 2

E&C charting provides a graphical display of the event and guides the logic flow on trying to understand the event. The output however is not the chart, but the explanation that of the event which results from the construction of the chart. In particular, it provides an explanation of what the victim did and why they did it.

4.2.2.1 Suggested Criteria for Event Descriptions and Conditions

- Each event should describe an occurrence or happening and not a condition, state, circumstance, issue, conclusion, or result; i.e., “pipe wall ruptured”, not “the pipe wall had a crack in it”.
- Each event should be described by a short sentence.
- Conditions differ from events insofar as they (a) describe states or circumstances rather than happenings or occurrences and (b) are passive rather than active.

4.2.3 Event Analysis

Analyse and categorize the events and conditions into – Cause(s) and Contributing Factors. The team has to look at the E&C chart (which by now will be displayed on a wall) and critically assess each event and condition to see if it is actually a “Cause” or a “Contributing Factor”. In doing so, the team may refer to the definitions given in Section 2.

- Once the team has determined an event or a condition as being a Cause, it shall be written over an appropriately color-coded flash card (Cause) and the same shall be used to replace the corresponding flash card in the E&C chart.

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- Similarly, the team shall replace the appropriate flash cards in the E&C chart using cards with the following color-coding (Contributing Factor) when Contributing Factors are identified.

All physical/ material evidence collected and verified during the investigation shall be noted down on separate flash cards with the following color-coding (Evidence) and placed at appropriate positions (timelines) on the E&C chart.

4.3 Gap Analysis

For each Cause and Contributing Factor determine the gaps expected in the following –

1. Leadership and management oversight
2. Skills and competencies of people;
3. Behaviours of people and the work culture;
4. Processes, procedures and practices;
5. Equipment used and whether it was fit for purpose and well maintained

4.4 Recommendations

Develop recommendations that are specific to the incident to address the contributing factors and gaps identified under section 4.3. For this the team first develops a list of possible solutions that will address the identified gaps, in order to prevent the recurrence of similar incidents in future. From the list, the team needs to identify the most *practical, feasible* and *effective* solutions using the “Hierarchy of Hazard Controls” as given below.

Hierarchy of Hazard Control: Hierarchy of hazard control is a system used in industry to minimize or eliminate exposure to hazards. The hazard controls in the hierarchy are, in order of decreasing effectiveness:

- **Elimination:** *Eliminating the hazard—physically removing it—is the most effective hazard control*
- **Substitution:** *The second most effective hazard control, involves replacing something that produces a hazard with something that does not produce a hazard.*
- **Engineering:** *The third most effective means of controlling hazards, it does not eliminate hazards, but rather isolate people from hazards. They are physical barriers or engineered systems to isolate/ shield hazards from people.*
- **Administrative:** *Administrative controls are changes to the way people work. Administrative controls do not remove hazards, but limit or prevent people's exposure to the hazards.*
- **Personal protective Equipment:** *It is the least effective means of controlling hazards. It means equipment donned by workers to protect their body parts/ organs from getting exposed to the hazards and includes, gloves, respirators, hard hats, safety glasses, high-visibility clothing, body protection, and safety footwear.*

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5. REPORTING

An incident investigation is not complete until a report is prepared. The following outline should be used in developing the formal report:

1. *Executive Summary*

This section will summarize the outcome of the events and conditions sections and highlight the direct and contributing factors.

2. *Events and Conditions Chart*

Under this section transfer the events and conditions chart developed on the walls of the conference room.

3. *Causes and Contributing Factors of Incident*

List the Causes and Contributing Factors as analysed and identified under section 4.2.3

4. *System Analysis*

This section should tabulate the Causes, contributing factors and identify gaps with respect to optimal system requirements. Use the template provided in Annexure 1.

5. *Recommendations*

Mention the recommendations to address the identified gaps.

6. *Investigation Team*

7. *Appendices*

Attach photos, sketches, drawings relevant and mentioned as evidence in the E&C chart.

Annexure A – Template for System Gap Analysis

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REFERENCES

Doc. Ref.	Description
SCIE-DOE-01-TRAC-14-95	Events and Causal Factors Analysis; Prepared by: J.R. Buys, INEL J.L. Clark, INEL. Technical Research and Analysis Center SCIENTECH, Inc. August 1995.
DOE-NE-STD-1004-92	DOE Guideline - ROOT CAUSE ANALYSIS GUIDANCE DOCUMENT, U.S. Department of Energy
Events and Conditions Charting	Accident Prevention Technique, Second Edition, Charles D. Reese

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Annexure A

System Gap Analysis

Causes	Contributing Factors	Gaps Identified

