CAUSAL ANALYSIS PROGRAM MANUAL

LBNL/PUB-5519 (2), Rev. 5

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Office of Contractor Assurance

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Principles for Conducting Incident/Event Analyses at LBNL

In evaluating safety related incidents and other adverse events:

- We do not seek to blame individuals
- We look beyond the individual's actions to understand underlying organizational issues
- We seek to learn from both the positive as well as negative actions that occur
- We will share what we learn so that others can benefit from our analyses
- Incident analysis will follow the same collaborative, analytical approach we use in our science
- Incident analysis will be supported by senior management and take place in a timely manner
- Incident analysis results will be openly made available to the Lab community.

These principles are based on:

Berkeley Lab is a learning institution – we learn from each other, from our science, from our partners, and from our successes and mistakes. We strive for uncompromising operational and safety performance while producing outstanding science. Yet adverse events, accidents, and injuries can happen from time to time. When they do occur, they present us with a clear choice; either we can learn from them and improve our operational and safety performance, or we can regress by blaming people for errors they made and impose additional requirements. Experience teaches us that the way we handle these events can have an immense impact on our Laboratory culture, so it is critically important that we respond constructively.

Our goal then is to get the most value we can from our response to adverse events. Typically, there are strong pressures to find the simple explanations and obvious causes. But experience also shows us that these events are always more complex and are rarely attributable to just the actions of the individuals involved. Our incident analysis process must result in obtaining the most useful understanding of all of the potential lessons to be learned. To do this, incident analyses need to focus on understanding not just the direct causes, but also the context of decisions, why people did what they did, and what underlying organizational strengths and weaknesses may have been present.

Our incident analysis process must also include the goal to identify and understand positive actions of people that contributed to mitigating the adverse impacts. Some of the most significant opportunities to improve are found when we recognize and support the great value of human creativity and initiative.

When incident analyses are needed in our divisions and operating units, we must provide strong, clear and consistent direction that we expect a full account in a timely manner that includes all of the important lessons that we might learn. Only through this deeper understanding comes the ability to develop effective and sustainable solutions that really will improve operations and safety. In addition, we must demonstrate that this full explanation is in all of our interests. Our goal is to find the most effective opportunities to improve, wherever they may be in the organization – including ourselves. The purpose of the incident analysis is not to identify blame; it is to identify opportunities to improve.

To truly take advantage of these opportunities we must be willing to share what we learn in an open, constructive, and trusting manner. By demonstrating a commitment to share this information, we also reinforce our commitment towards a more positive Laboratory culture.

In our environment where learning at both the individual and organizational level is a core value, developing in-depth understanding of adverse events is simply part of our collaborative approach towards continually striving for improvement in both safety and operational excellence.

Sincerely yours,

A. Paul Alivisatos
Director, Lawrence Berkeley National Laboratory

REVISION HISTORY

Revision	Date	Revision Description
1	7/18/08	- Clarified when Root Cause Analyses may be required.
2	4/13/10	- Clarified roles and responsibilities; - Added a section for apparent cause analysis; and - Expanded the suite of causal analysis methodologies.
3	3/1/12	- Modified the causal analysis process to include the following elements: scoping and chartering the investigation and causal analysis, Division Director kick-off meeting and report briefings, factual accuracy review, revised RCA report template and guidelines for developing corrective actions.
4	11/1/12	- Aligned causal analysis requirements with DOE O 232.2 Occurrence Reporting Processing of Operations Information; and - Added the quality assurance review of apparent cause analysis.
5	4/26/13	- Incorporated the Laboratory Directors Principles for Conducting Incident/Event Analysis; - Aligned Issues Management Program Manual with the revised Price-Anderson Amendment Act Compliance Program Manual; - Refined requirements for BLI2010-Corrective Action Development Training; and - Transfered the Office of Contractor Assurance Manager responsibilities to the Office of Institutional Assurance Director.

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1.0 Program Description

The Lawrence Berkeley National Laboratory (LBNL) Causal Analysis Program sets forth the requirements for performing causal analysis of issues based on risk level and management determination. Performance of causal analysis generally results in the identification of issues and corrective actions that should be addressed in accordance with the LBNL/PUB-5519 (1), *Issues Management Program Manual*.

The Causal Analysis Program elements include:

* *Determining the level of Causal Analysis and Team Members*
  a) Scoping and Chartering the Analysis

* *Performing the Causal Analysis*
  a) Kick-off Meeting
  b) Causal Analysis Methodology
  c) Factual Accuracy Review

* *Performing Extent of Condition Review*

* *Developing the Corrective Action Plan (CAP) / Corrective Actions*

* *Documenting and Reporting the Causal Analysis*

* *Quality Assurance (QA) Review*

2.0 Persons Affected

Division management, LBNL Designated Root Cause Analysts and all LBNL personnel involved with performing causal analysis.

3.0 Exceptions

Investigations and analysis involving personnel-sensitive issues such as, but not limited to, allegations of harassment, intimidation, retaliation and discrimination, and employee/employer relationship issues are not addressed through the Causal Analysis Program.

4.0 Program Requirements

4.1 Graded Approach

Causal Analysis identifies the cause(s) of an adverse condition (issue). There are two levels of Causal Analysis performed at LBNL: Root Cause or Apparent Cause.

Causal Analysis is performed using a graded approach that is based on the risk level assigned to an issue to ensure that the appropriate levels of analysis and corrective action development are commensurate with LBNL regulations. A description of each risk level is found in PUB 5519 (1) Issues Management Program Manual, *Attachment 8, Risk Level and Significant Guidance.* The graded approach for Causal Analysis is outlined in Table 1, below.

Table 1 – Causal Analysis Graded Approach

ISSUE RISK LEVEL	CAUSAL ANALYSIS	EXTENT OF CONDITION	CORRECTIVE ACTION PLAN
HIGH	Root Cause	Required	Required
MEDIUM	Root or Apparent Cause as DBM*	DBM	DBM
LOW	Apparent Cause as DBM	N/A	N/A
DE MINIMUS	N/A	N/A	N/A

* *DBM = Determined by Management*

4.1.1 Determining the level of Causal Analysis

Root Cause Analysis (RCA)

- A Root Cause Analysis (RCA) must be performed for a High Risk level issue using a formal methodology, as prescribed in this manual's Attachment 8 – *Causal Analysis Methodologies*.

- RCA may be performed for lower Risk level issues at the discretion of management.

- Examples of issues that require a RCA include a Price Anderson Amendment Act (PAAA) Noncompliance Tracking System (NTS) reportable incident *(Refer to the Price-Anderson Amendment Act Compliance Program Manual);* Occurrence Reporting and Processing System (ORPS) Significance Category 1 and R Reportable issues *(Refer to PUB 3000, Chapter 15 Occurrence Reporting*); and Significant Adverse Condition issue or other issues as determined by management.

Apparent Cause Analysis (ACA)

- At a minimum, an ACA must be performed for Medium Risk level issues. A RCA may be performed for Medium Risk level issues at the discretion of management.

- An ACA may be performed for Low Risk level issues, as determined by management.

- Examples of issues that, at a minimum, require an ACA include findings identified in a formal assessment, a PAAA Internally-Reportable incident *(Refer to the Price-Anderson Amendment Act Compliance Program Manual)*, ORPS Significance Category 2 and 3 Reportable issues (Refer to PUB 3000, Chapter 15 *Occurrence Reporting*) or other issues as determined by management.

- Use of a prescribed causal analysis methodology is not required to perform an ACA.

Note: All PAAA NTS-reportable issues are classified as high risk level; however, a graded approach of causal analysis may be used commensurate with the significance and complexity of the issue (Refer to the *Price-Anderson Amendment Act Compliance Program Manual).*

Scoping/ Chartering

- For High Risk level issues, the investigation and analysis will be scoped and chartered to ensure that the goal(s) of the investigation and analysis are well defined, and personnel resources, time commitment and due date are established prior to beginning any activity (Refer to Attachment 4 – *Scoping and Chartering the Causal Analysis*).

- The participants of the Scoping Meeting are the Responsible Division Director (or designee) and OIA Director (or designee).

- For issues that are not owned by a single Division, the Office of Institutional Assurance (OIA) Director will serve as the Responsible Division Director and charter the Team.

- For Medium and Low Risk level issues, scoping and chartering the investigation and analysis is at the discretion of the responsible Cognizant Manager.

4.1.2 Determining the Team Members

- For High Risk level issues, the RCA team will include:
  a) a representative from the Division who owns the incident/finding, who will serve as the Team Lead
  b) a trained causal analyst, who will lead the Team through the causal analysis using one or more of the methodologies documented in Attachment 8 – *Causal Analysis Methodologies*
  c) applicable subject matter expert(s) (SMEs)

d) an independent member, who is outside of the Division where the incident/finding resides

- The trained causal analyst (Lead Causal Analyst), SME and independent team member could be the same person. The independent member shall not be an employee from the Division that owns the issue. At a minimum, the RCA team will include two members.

- For Medium and Low Risk level issues, a Causal Analyst may perform the investigation and analysis independently or within a team setting, as determined by the responsible Cognizant Manager. The Causal Analyst or Team should involve subject matter experts as appropriate.

4.1.3 Performing Causal Analysis

- A RCA must be performed using a formal methodology in accordance with this manual (Refer to this manual's Attachment – 3 – *Incident Investigation and Analysis Phases*).

- An Apparent Cause Analysis is performed in accordance with this manual, as determined by management.

Factual Accuracy

- A review of the facts is completed as appropriate, to ensure that the facts are accurate, technically sound and credible.

- The facts include a description of the incident, along with the key circumstances and causal factors embedded in the description of the incident.

- A Factual Accuracy review is completed for both RCAs and ACAs in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.

4.1.4 Performing Extent of Condition Review

- Extent of Condition (EOC) reviews are required for all High Risk level issues because of their importance.

- EOC reviews for less significant issues may be initiated at the discretion of a Cognizant Manager to ensure corrective actions are effectively developed or to identify other opportunities for improvement.

- An EOC review may be documented as part of the Causal Analysis Report or in a separate document. The detailed requirements and instructions for performing an EOC are found in LBNL/PUB 5519

(1) Issues Management Program, Attachment 3 – *Extent of Condition Review Guidance.*

4.1.5 *Developing the CAP / Corrective Actions*

- For High Risk level issues, the Team Lead, Lead Causal Analyst and appropriate Division representatives (Joint Team) will develop the CAP for all High Risk level issues in accordance with this manual's Attachment 11 – *Corrective Action Plan Development Guidelines.*
- *CAP Development Team Members should take the BLI2010-Corrective Action Development Training prior to beginning the CAP development.*
- For less significant issues, a CAP may be developed, following the RCA requirements, at the discretion of the responsible Cognizant Manager.

4.1.6 *Documenting / Reporting of the Causal Analysis*

- For a RCA, upon completion of the investigation, analysis and corrective action development, the Team must document the results in a formal report and submit it to the Responsible Division Director by the due date noted in the Charter Letter (Refer to Attachment 9 – *RCA Report Template*).
- The CAP can be documented in the Causal Analysis Report, ORPS Report (Refer to PUB 3000, Chapter 15 Occurrence Reporting) and/or PAAA NTS Report, or in a separate document, as appropriate.
- Unless requested by the Cognizant Manager, a formal written Apparent Causal Analysis Report is not required. Apparent Causes may be documented in ORPS Reports (as applicable), the CATS Database, or other methods, as appropriate.

4.1.7 *QA Review*

- A QA Review is completed by OCA for all High Risk level issues beginning with the Division Director Kick-off Meeting through the Division Close-Out Briefing, in accordance with this manual's Attachment 2 – *Quality Assurance Review*.
- OCA may perform a QA review of Medium or Low Risk level RCA or Apparent Cause Analysis at management's request.
- For issues that are ORPS Significance Category 2 and 3 Reportable issues, the Environment Health Safety Security (EHSS) ORPS office will complete a QA Review of the causal analysis and report, including the corrective actions, as part of the occurrence

reporting process, in accordance with this manual's Attachment 2 – *Quality Assurance Review*. Also, Refer to PUB 3000, Chapter 15 *Occurrence Reporting*.

- The QA Reviewer comments/feedback must be addressed throughout the process and incorporated in the Causal Analysis Report, as appropriate.

5.0 Source Requirement Documents

Baseline Documents
- Contract 31, Section H.30, Contractor Assurance
- DOE O 232.2, Occurrence Reporting Processing of Operations Information
- LBNL/PUB-3111, Operations and Quality Management Program
- LBNL/PUB-5520, UC Contractor Assurance System Description

Implementing Documents
- LBNL/PUB-3000, Chapter 15, Occurrence Reporting
- LBNL/PUB-5519(1), Issues Management Program Manual
- Regulations and Procedures Manual
- Price-Anderson Amendment Act Compliance Program Manual
- Radiation Protection Program for the Lawrence Berkeley National Laboratory

6.0 Recordkeeping Requirements

The following are records that are generated as a result of implementing the program requirements. The records shall be maintained in accordance with the requirements outlined in the Regulations and Procedures Manual (RPM):

- Root Cause Analysis Reports
- Extent of Condition Reviews (may be included in the RCA Report)

7.0 Roles and Responsibilities

- Laboratory Management is responsible for communicating and reinforcing the importance of performing thorough, credible and timely investigations and analyses, including corrective action development.

- Division Management is responsible for overseeing that investigations and analyses are performed in accordance with this Program Manual.
    a) In some cases, Division Management may determine when an RCA is to be subcontracted and will requisition the services of the appropriate subcontractor.
    b) The subcontractor must be trained and experienced in performing root cause analysis, and demonstrate to the Office of Contractor Assurance that they are capable of performing the RCA, using an acceptable methodology.

- Office of Institutional Assurance (OIA) Director is responsible for chartering the incident investigation and analysis Team for High Risk level issues that are not owned by a single Division.

- Office of Contractor Assurance (OCA) provides oversight and administration of the Causal Analysis Program, which includes maintaining and revising this program manual, ensuring that Lead Causal Analysts are trained in LBNL approved methodologies, performing a quality assurance review of the causal analysis process for High Risk level issues, and providing technical guidance and training to LBNL staff with regards to the Causal Analysis Program.

- Environment Health Safety Security (EHSS) is responsible for performing a QA Review of the apparent causal analysis, including corrective actions, for issues that are ORPS Significance Category 2 and 3 Reportable, as part of the occurrence reporting process.

- Team Lead serves as the Division representative on the incident investigation and analysis team and oversees the incident investigation and analysis process for the responsible Division. In addition, the Team Lead ensures that the Division maintains ownership of the results and expected outcomes of the causal analysis.

- Lead Causal Analyst leads the root cause analysis, including the EOC Review, for High Risk level issues and ensures the quality and integrity of the root cause analysis. In addition, the Lead Causal Analyst completes RCA training in LBNL-approved methodologies and annual refresher training.

- Incident Investigation and Analysis Team Members (the Team) must be independent of the incident, with no bias or vested interest in the results of the investigation.

- Causal Analyst performs the ACA for Medium and Low Risk level issues as determined by the Cognizant Manager. The Causal Analyst may or may not be formally trained in the LBNL-approved RCA methodologies.

Specific roles and responsibilities for the Causal Analysis Program elements

Division Director (or designee)

Program Element	Responsible Division Director Responsibility
Scoping and Chartering	• Initiates the Scoping and Chartering Meeting with the OIA Director (or designee) to scope the incident investigation and analysis for High Risk Issues in accordance with this manual's Attachment 4 – *Scoping & Chartering the Causal Analysis*. • Commits and / or secures personnel resources to complete the RCA. • Generates a Charter for the Team prior to initiating activities in accordance with this manual's Attachment 4 – *Scoping & Chartering the Causal Analysis.*
Kick-off Meeting	Schedules, plans and facilitates the Division kick-off meeting in accordance with this manual's Attachment 5 – *Division Director Kick-Off Meeting Guidelines*.
Causal Analysis	• Ensures that the investigation and analysis is performed in accordance with this manual's requirements and Attachments. • Ensures an understanding of the key facts of the issues, causal factors, root and contributing causes, and the extent of condition.
Factual Accuracy	At the request of the Team, completes a review of the facts to ensure that they are accurate, technically sound and credible in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.
CAP / Corrective Action Development	Ensures that corrective actions resulting from RCAs are developed and documented in accordance with this manual's Attachment 11 – *Corrective Action Plan Development Guidelines*.
Briefing and Reporting	• Attends the Division briefings in accordance with this manual's Attachment 10 – *Division Director Report Briefing Guidelines* and Attachment 13- *Division Close-out Briefing*, as appropriate. • Acknowledges receipt of the RCA Report and accepts responsibility for addressing the root cause(s) of an incident. • Provides a copy of the final approved RCA Report to other impacted Division Directors and Cognizant Managers, and other stakeholders, as appropriate.

Cognizant Manager (or designee)

Program Element	Responsible Cognizant Manager Responsibility
Scoping and Chartering	• Scopes the incident investigation and analysis for Medium and Low Risk Level ACAs, as appropriate. • Commits and / or secures personnel resources to complete the ACA.
Kick-off Meeting	N/A
Causal Analysis	Ensures an understanding of the key facts of the issues, causal factors, and apparent causes.
Factual Accuracy	At the request of the Team, completes a review of the facts to ensure that they are accurate, technically sound and credible in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.
CAP / Corrective Action Development	Ensures that corrective actions from ACAs are developed, documented and implemented in accordance with LBNL/PUB-5519(1), *Issues Management Program Manual and* OIA-OCA-0001, *Corrective Action Tracking System (CATS) Database User Manual*.
Briefing and Reporting	• Acknowledges receipt of the ACA Report (as applicable) and accepts responsibility for addressing the apparent cause(s) of an incident. • Provides a copy of the final approved ACA Report (as applicable) to other impacted Division Directors and Cognizant Managers, and other stakeholders, as appropriate.

Office of Contractor Assurance (OCA)

Program Element	OCA Responsibility
Scoping and Chartering	• Participates in the Scoping and Chartering Meeting with the Responsible Division Director (or designee) to scope the incident investigation and analysis for High Risk Issues in accordance with this manual's Attachment 4 – *Scoping & Chartering the Causal Analysis*.
Kick-off Meeting	• (QA Reviewer) Attends the incident investigation and analysis Division kick-off meeting in accordance with this manual's Attachment 5 – *Division Director Kick-Off Meeting Guidelines*. • Facilitates the RCA just-in-time training following the kick-off meeting, as necessary.
Causal Analysis	• Provides technical guidance to the Team throughout the incident investigation and analysis process, as needed. • Provides a QA review of the incident investigation and analysis process of all High Risk level issues in

Program Element	OCA Responsibility
	accordance with this manual's Attachment 2 – *Quality Assurance Review*.
Factual Accuracy	Provides a QA review of the Incident Summary for the factual accuracy review in accordance with this manual's Attachment 2 – *Quality Assurance Review*.
CAP / Corrective Action Development	Performs a quality assurance review of all High Risk level CAPs prior to issuance and approval in accordance with this manual's Attachment 2 – *Quality Assurance Review*.
Briefing and Reporting	Performs a quality assurance review of all High Risk level RCA Reports prior to issuance and approval in accordance with this manual's Attachment 2 – *Quality Assurance Review*.

Team Lead

Program Element	Team Lead Responsibility
Scoping and Chartering	N/A
Kick-off Meeting	• Attends the incident investigation and analysis Division kick-off meeting in accordance with this manual's Attachment 5 – *Division Director Kick-Off Meeting Guidelines*. • Attends the RCA just-in-time training following the kick-off meeting, as necessary.
Causal Analysis	• Oversees the investigation and analysis process in accordance with this manual's Attachment 2 – *Quality Assurance Review* and Attachment 3 – *Incident Investigation and Analysis Elements* and corresponding Attachments. • Elevate significant issues that arise during the investigation and analysis process to OCA for consultation and assistance with resolution. • Ensure that a common storage protocol for document control be established and a Team Member is designated as the document controller. • Following the investigation and analysis, forwards the complete data package to OCA.
Factual Accuracy	• Identifies appropriate line management, subject matter experts and/or other designated individuals that will perform the factual accuracy review in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.
CAP / Corrective Action Development	Oversees and participates in the development of the CAP in accordance with this manual's Attachment 11 – *Corrective Action Plan Development Guidelines*.
Briefing and Reporting	• Oversees that the investigation and analysis results for high risk issues are documented in a formal report and the report is signed and submitted it to the Responsible

Program Element	Team Lead Responsibility
	Division Director by the due date noted in the Charter Letter, in accordance with this manual's Attachment 9 – *RCA Report Template*. • Schedule and facilitate the Division Director Report Briefing and ensures that the Causal Analysis document is submitted to the Division Director and/or designees prior to the Briefing in accordance with this manual's Attachment 10 – *Division Director Report Briefing Guidelines*. • Work with the Division Director (or designee) to determine the need and structure for the Close-out Briefing in accordance with this manual's Attachment 13 – *Division Close-out Briefing*.

Lead Causal Analyst

Program Element	Lead Causal Analyst Responsibility
Scoping and Chartering	N/A
Kick-off Meeting	• Attends the incident investigation and analysis Division kick-off meeting in accordance with this manual's Attachment 5 – *Division Director Kick-Off Meeting Guidelines*. • Attends the RCA just-in-time training following the kick-off meeting, as necessary.
Causal Analysis	• Participates in the investigation and analysis process in accordance with this manual's Attachment 2 – *Quality Assurance Review* and Attachment 3 – *Incident Investigation and Analysis Elements* and corresponding Attachments. • Selects the RCA methodology(ies) to identify causal factors and causes (root and contributing) in accordance with Attachment 8 – *Causal Analysis Methodologies*. • Ensures that the RCA is performed in accordance with this manual's requirements.
Factual Accuracy	• Identifies appropriate line management, subject matter experts and/or other designated individuals that will perform the factual accuracy review. • Writes (or delegates responsibility to another Team Member) the Incident Summary and distributes it to appropriate individuals for the factual accuracy review in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.
CAP / Corrective Action Development	• Participates in the development of the CAP in accordance with this manual's Attachment 11 – *Corrective Action Plan Development Guidelines.*

Program Element	Lead Causal Analyst Responsibility
Briefing and Reporting	• Writes the Conclusion section of the RCA report in accordance with this manual's Attachment 9 – *RCA Report Template*. • Oversees the documentation of the causal analysis for the Division Director Report Briefing and attends the Briefing in accordance with this manual's Attachment 10 – *Division Director Report Briefing Guidelines*. • Participate in the Division Close-out Briefing in accordance with this manual's Attachment 13 – *Division Close-out Briefing*.

Team Member

Program Element	Team Member Responsibility
Scoping and Chartering	N/A
Kick-off Meeting	• Attends the incident investigation and analysis Division kick-off meeting in accordance with this manual's Attachment 5 – *Division Director Kick-Off Meeting Guidelines*. • Attends the RCA just-in-time training following the kick-off meeting, as necessary.
Causal Analysis	• Participates in the investigation and analysis process in accordance with this manual's Attachment 2 – *Quality Assurance Review* and Attachment 3 – *Incident Investigation and Analysis Elements* and corresponding Attachments. • Defers decisions with regard to the investigation and analysis, as well as the results, to the Team Lead or Lead Causal Analyst, as appropriate. • If one or more members of the Team do not agree with the outcome of the RCA, perform the following: 1. Disputing party(ies) document the issue in a formal correspondence to the Team Lead. 2. Disputing party(ies) sign and date the formal correspondence. 3. The Team Lead reviews, signs, and dates the formal correspondence to acknowledge receipt. 4. The Team Lead attaches the formal correspondence to the RCA Report, as well as discusses its contents during the Division Director Report Briefing, as appropriate.
Factual Accuracy	• Identifies appropriate line management, subject matter experts and/or other designated individuals that will perform the factual accuracy review in accordance with this manual's Attachment 7 – *Factual Accuracy Review*.
CAP /	N/A

Program Element	Team Member Responsibility
Corrective Action Development	
Briefing and Reporting	At the direction of the Team Lead, participates in the documentation of investigation and analysis results in accordance with this manual's Attachment 9 – *RCA Report Template*.

Causal Analyst

Program Element	Causal Analyst Responsibility
Scoping and Chartering	N/A
Kick-off Meeting	N/A
Causal Analysis	Performs the ACA as scoped by the Cognizant Manager in accordance to this manual's requirements and applicable Attachments.
Factual Accuracy	Completes the factual accuracy review in accordance with this manual's Attachment 7 – *Factual Accuracy Review*, as appropriate.
CAP / Corrective Action Development	Recommends corrective actions to address the apparent cause(s) (and to prevent recurrence, as possible).
Briefing and Reporting	Documents results as determined by the Cognizant Manager in accordance with section 4.1.6 in this manual.

Attachment 1 – Definitions / Acronyms

Apparent Cause Analysis: A straightforward / basic analytical approach used to identify obvious causes of an incident by reviewing the facts associated with the incident.

Apparent Cause: The most probable / reasonable cause(s) of an incident that management has the control to fix through effective corrective actions. There may be more than one apparent cause for a given incident.

Causal Factor: The mistake / failure, event or condition that led to an actual adverse incident or near-miss situation.

Cognizant Manager: The line manager responsible for ensuring that issues management is effectively implemented. This includes ensuring that issues and corrective actions are documented, managed and tracked through resolution; assigning personnel to perform or participate in causal analysis, extent of condition reviews and develop CAPs; and notifying external reporting coordinators of issues when they are identified.

Compensatory Action: A corrective action that is taken to address the condition, but not necessarily the cause of the issue.

Condition: Occurrences or circumstances associated with the incident. Conditions are the how, what, when, where, and who of the incident based on factual, precise and quantified information.

Contributing Cause: Events or conditions that contributed to an incident, but by itself would not have caused the incident.

Corrective Action: An action that eliminates a deficiency and/or the cause of an issue, and prevents or significantly reduces the likelihood of the same problem occurring again.

Direct Cause: The basic reason for the adverse incident. This includes the immediate events or conditions that caused the incident.

Extent of Condition (EOC): The extent to which an identified issue has the potential to impact other activities, projects, programs, facilities, organizations or processes or has done so in the past. The extent of condition is used to determine if corrective action development and implementation is localized or applies across multiple activities, locations and/or systems.

Incident: A real-time occurrence or anything that could adversely impact DOE or contractor personnel, the public, property, the environment, or the intended mission of LBNL.

Occurrence Reporting and Processing System (ORPS): A system that notifies and keeps Laboratory management and applicable elements of the Department of Energy (DOE) informed of abnormal occurrences that could adversely affect:

a) the health and safety of employees, guests, visitors, and the general public;
b) the environment;
c) the intended purpose of LBNL facilities; or
d) the credibility of the DOE and/or LBNL.

Attachment 1 – Definitions / Acronyms *(Continued)*

Price Anderson Amendment Act (PAAA) Non-Tracking System (NTS): A system that Laboratory management complies with to report adverse incidents to the DOE Office of Enforcement that could result in a reduction of fee or a discontinuation of a program or project.

Quality Assurance Review: A review of a Causal Analysis to ensure that the analysis and report are credible, technically sound and accurate.

Root Cause: The underlying or basic cause of an adverse condition that can reasonably be identified and management has the control to fix, and when fixed, will preclude recurrence or significantly reduce the likelihood of recurrence of the same or similar adverse conditions. The root cause is typically one level further in analysis beyond an apparent cause, the fundamental reason for the apparent cause.

Subject Matter Expert (SME): A term used for a person who is considered the technical expert or Point-of-Contact for a particular functional area. SMEs for Environmental, Safety and Health (ES&H) related subject areas are considered technical experts in a specific functional area. SMEs for non-ES&H related subject areas are considered to be technical experts and/or Points-of-Contact for a specific functional area.

Team Lead: The Division appointed representative that coordinates and facilitates the incident investigation and analysis process for the responsible Division, and ensures that the Division maintains ownership of the results and expected outcomes of the causal analysis.

Attachment 2 – Quality Assurance Review

Overview

A Quality Assurance (QA) Review is completed on all formal RCAs (High Risk level issues), by OCA personnel (or an OCA designee), to ensure that the analysis, corrective actions and the formal report are credible, technically sound and accurate.

The EHSS ORPS office will complete a QA Review of the causal analysis for issues that are ORPS Significance Category 2 and 3 Reportable issues, using the Apparent Cause Analysis Quality Assurance Review checklist. This checklist will be distributed with the notification report.

Following the Scoping / Chartering Meeting, the OIA Director will designate the QA Reviewer, who in turn will contact the Team Lead to initiate the process, for High Risk level issues.

QA Activities

The QA Review starts with the Kick-off Meeting and will be performed as follows:

- Review of the Team's lines of inquiry prior to conducting interviewers
- Review of the Team's Time Order of Events charts/outline
- Attend the Team's causal analysis meetings and provide immediate feedback to the Team on the application of the methodology, process, and conclusions (incident summary, causal factors, causes and extent of condition review)
- Review of the Team's draft RCA Report prior to the Division Director's briefing
- Attend the Division and Team's corrective action development meeting(s) and provide immediate feedback to the joint Team on the quality of corrective actions
- Review of the Team's final RCA Report prior to the Division Close-out Meeting

The criteria checklist below will be used as a guide for completing a QA Review:

QA CRITERIA		SATISFIED YES / NO
1.	**Lines of inquiry (LOIs)** • All of the individuals and witnesses pertinent to the specific incident are identified and interviewed • Straightforward, open-ended questions are used to collect information • Questions are not biased, leading or judgmental, nor appear to support a particular "hypothesis" • Conflicting / Inconsistent information is resolved through additional questioning	
2.	**Time Order of Events (TOE) Chart** • Accurate, complete and pertinent facts are gathered to clearly understand the incident (what happened when, where, how and who) • Dates and times are noted, as applicable • Timeline does not have any unexplained gaps or conflicting information	
3.	**Application of Causal Analysis Methodologies** • Sound methodology(ies) is (are) used to establish the basis for the identified causes • Causes are justified through objective evidence / facts	

	QA CRITERIA	SATISFIED YES / NO
	(documents, physical evidence, and testimony) • Speculation and assumptions are not considered in the analysis • Causal Factors (the mistakes/failures/problems) are clearly identified and documented • LOIs and responses are documented	
4.	**Causes** <u>Root Cause:</u> • Are described clearly and concisely, with an appropriate level of detail to explain the underlying reason **"why"** an event / finding occurred • Are what management has control to fix • Are valid and can be supported by objective evidence • Causal factors are not documented as Root Causes <u>Apparent Cause:</u> • Clearly stated, specific to the mistakes or failures surrounding the event / finding • Explains the most obvious reason why the event / finding occurred • Direct causes are evaluated in the development of Apparent Causes <u>General Notes</u> • Apparent Causes may be evaluated in the development of the Root Causes, but should not be stated as Root Causes. • Terminology such as "less than adequate" ("LTA") or "as intended" is avoided in favor of more precise descriptions of specific inadequacies. • Facts (immediate actions) that pertain to the response after the event / finding and other unrelated issues identified during the analysis that are not causes should be discussed in the report separate from the causes.	
5.	**Extent of Condition** • The potential for an issue to recur or has occurred elsewhere in the Laboratory is analyzed. This includes: a) Looking for the same or related problems in areas other than where originally found b) Anticipating problems based on the identified issue c) Reviewing prior activities to determine if earlier deficiencies have gone unnoticed • Analysis results of the review are documented in the RCA Report or in a separate report and included in development of corrective actions, as appropriate	
6.	**Corrective Actions** • Corrective actions align with root cause(s) and address the root cause(s) • Corrective actions address the pervasiveness of the condition (extent of condition), as applicable • Corrective actions are designed to prevent recurrence • Corrective actions are Specific, Measurable, Accountable,	

QA CRITERIA		SATISFIED YES / NO
	Reasonable and Timely • Two standard corrective actions for High Risk level issues are included in the CAP: 1. Perform an Effectiveness Review 2. Submit a Lessons Learned Briefing (*for ORPS category 1 and R reportable events*)	
7.	**Causal Analysis Report (Draft & Final)** • The event / finding is documented in a clear, logical and comprehensive manner that provides all pertinent facts associated with the event / finding to support the analysis and corrective actions • The time order of events adequately describes the sequence of events: what happened, when and where it happened, how it happened and who was involved • The Executive Summary provides a detailed, high-level explanation of the causes and corrective actions • Occurrence and/or noncompliance incident report number or assessment report title is/are noted in the Executive Summary • Jargon is omitted and abbreviations are defined and minimized • Names of individuals involved in the incident are sanitized from the report	

QA Protocol

When completing the QA Review, the Review should follow these guidelines:

Do	Don't
Ask probing questions to supplement the team's critical thinking	Lead and/or control the team discussions
Keep an open mind to different approaches as long as requirements are met and results are achieved	Be subjective on approach and expected outcomes
Provide immediate, objective feedback and guidance as issues and deviations occur	Be argumentative when providing feedback
Obtain and maintain familiarity with the subject area(s), facts, and issues associate with the incident	Result in a bottleneck, unnecessary work and/or downtime

The RCA Team Members should follow these guidelines:

Do	Don't
Adhere to the QA Review criteria and address the QA Reviewer's comments and concerns	Ignore / discard the QA Reviewer's feedback and not address outstanding issues
Provide immediate, objective documentation freely to support conclusions when necessary	Be argumentative when responding to the QA Reviewer's feedback

Attachment 3 – Incident Investigation and Analysis Elements

Elements May Not Be Sequential; They May Be Concurrent and Iterative

ELEMENT	APPLICABLE	
	RCA	ACA
INITIAL FACT FINDING	**X**	**X**
SCOPING and CHARTERING THE CAUSAL ANALYSIS *(Refer to Attachment 4 – Scoping & Chartering the Causal Analysis)*	**X**	**--**
DIVISION DIRECTOR KICK-OFF MEETING *(Refer to Attachment 5 – Division Director Kick-Off Meeting Guidelines)* *(Quality Assurance Review begin)**	**X**	**--**
SUBSEQUENT DATA COLLECTION / FACT FINDING *(Refer to Attachment 6 – Data Collection Guidelines)*	**X**	**X**
SEQUENCE OF EVENTS *(Time-order of events (TOE) including conditions and causal factors)* *(Quality Assurance Review)**	**X**	***Optional***
FACTUAL ACCURACY REVIEW *(Refer to Attachment 7 – Factual Accuracy Review)* *(Quality Assurance Review)**	**X**	**X**
CAUSAL ANALYSIS and EXTENT OF CONDITION (EOC) *(Refer to Attachment 8 – Causal Analysis Methodologies)* *(Refer to 5519(1) – Attachment 3 – Extent of Condition* *(Quality Assurance Review)**	**X** **Rigorous**	**X** **Straight forward** ***(No EOC)***
DRAFT RCA REPORT *(Refer to Attachment 9 – RCA Report Template)* *(Quality Assurance Review)**	**X**	**--**
DIVISION DIRECTOR REPORT BRIEFING *(Refer to Attachment 10 – Division Director Report Briefing Guidelines)*	**X**	**--**
CORRECTIVE ACTION DEVELOPMENT *(Refer to Attachment 11 – Corrective Action Plan Development Guidelines)* *(Refer to Attachment 12 – Corrective Action Plan Template)* *(Quality Assurance Review)**	**X**	**X** ***(Recommended Corrective Actions)***
FINAL REPORT / DIVISION CLOSE-OUT BRIEFING *(Refer to Attachment 13 – Division Close-out Briefing)* *(Quality Assurance Review ends)**	**X**	***Optional***

* *Quality Assurance Review is applicable for RCA and at management discretion for ACA that pertain to non-ORPS reportable issues.*

* *Quality Assurance Review is completed for ACA (ORPS Significant Category 2 and 3 Reportable issues) as part of the occurrence reporting process. Refer to PUB 3000, Chapter 15 Occurrence Reporting.*

Attachment 4 – Scoping & Chartering the Causal Analysis

Overview

The purpose of the scoping and chartering the Causal Analysis is to ensure that the goal(s) of the investigation and analysis are well defined, and personnel resources and time commitment are determined, agreed upon and secured to complete the investigation and analysis by the established due date.

Scoping the Causal Analysis

The Scoping Meeting should be held no later than two days following the initial fact finding and determination that a Root Cause Analysis must be performed. The Responsible Division Director (or designee) initiates the Scoping Meeting. The participants of the Scoping Meeting are the Responsible Division Director (or designee) and OIA Director (or designee). For issues that are not owned by a single Division, the OIA Director will serve as the Responsible Division Director.

During the Scoping Meeting, the participants accomplish the following tasks:

1. Define the purpose and goal(s) of the investigation and analysis
2. Identify the Division Team Lead, Lead Causal Analyst and supporting team members as prescribed in section 4.1.2 of this manual
3. Establish the commitment level of team members and duration
4. Establish the due date for completing the investigation and analysis process, which includes the development the corrective actions and completion of the final RCA Report
5. Identify the QA Reviewer

Chartering the Causal Analysis

Prior to generating and distributing the Charter Letter, the Responsible Division Director (or designee) must secure the team member's participation and commitment-level from the prospective team member's manager. The Charter Letter should be distributed to the incident investigation and analysis Team Members and other applicable individuals within one day of the Scoping Meeting.

The Charter Letter should include the following information:

1. The purpose and goal(s) of the investigation and analysis
2. The Team Members, and identification of the Team Lead and Lead Causal Analyst
3. The Team Member's commitment level and time duration
4. The due date for the final RCA Report, which includes the corrective actions

An example of a Charter Letter is on the following page.

Attachment 4 – Scoping & Chartering the Causal Analysis *(Continued)*

Charter Letter Example

To: Team Member #1
Team Member #2
Team Member #3
Team Member #4

From: Responsible Division Director

Date: [Enter applicable date]

Re: Charter for the XYZ Incident

I am charging you to perform an investigation and analysis of the incident involving XYZ on XX-XX-XXXX. Specifically, you will identify the causes of this and other recent XYZ safety deficiencies and the extent of condition. This assignment will require 50% of your time for the next 30 days. Your Manager has been instructed to re-assign your responsibilities to allow for your participation in this investigation and analysis.

XXXX will serve as the Team Lead for the Division and XXXX will serve as the Lead Causal Analyst for the root cause analysis. Your investigation and analysis shall follow the requirements of the LBNL Issues Management Program Manual, LBNL/PUB-5519(1) and the LBNL Causal Analysis Program Manual, LBNL/PUB-5519(2).

Once you have completed your investigation and analysis, the results should be documented in a draft report and discussed with me prior to the development of corrective actions. Following the development of corrective actions, the final Root Cause Analysis Report, including the official corrective actions, should be submitted to me no later than XX-XX-XXXX.

Thank you for your participation in this important endeavor.

Cc: Appropriate Laboratory Management, as necessary
Appropriate Responsible Division Personnel
Other impacted Division Management, as necessary
Team Member's Respective Management
OIA Director
BSO Representative

Attachment 5 – Division Director Kick-Off Meeting Guidelines

Overview

The Division Director Kick-off Meeting is designed to set the tone for completing a timely, rigorous and credible investigation and analysis to prevent a recurring incident. The goals of the kick-off meeting are:

- Improved ownership of the incident investigation and analysis by the Responsible Division
- Greater transparency on how the incident is analyzed and addressed
- Reinforce that the primary purpose of the investigation and analysis is learning what happened and why, not on affixing blame
- Improved communication of expectations for all key players (Responsible Division Director and line management, Team Lead, Lead Causal Analyst, Team Members, QA Reviewer, Interviewees, BSO Representative)

Kick-off Meeting Activities

- The Responsible Division Director (or designee) is responsible for scheduling, planning and facilitating the kick-off meeting.
- Meeting participants should include the following individuals
  a) Key stakeholders, such as responsible line management and other impacted Division representatives
  b) Investigation and Analysis Team members
  c) Key personnel involved in the incident, as appropriate
  d) QA Reviewer
- Below is an example of a standard agenda for the kick-off meeting

---

I. Introductions

- *Acknowledge meeting participants, as necessary*

II. Purpose of the incident investigation and analysis

Highlight

- *High-level summary of the incident*
- *To prevent similar, future issues*
- *Reiterate goals from Charter Letter*
- *Not seeking to find blame*

III. Roles, Responsibilities and Expectations

Highlight

- *Division Director – accountability and ownership of the investigation and analysis process, outcomes and resolution*
- *Line Management – cooperation, factual accuracy and corrective action development*
- *Team Member, as prescribed by LBNL PUB 5519 (2), time commitment, scheduling of activities, and RCA just-in-time training*
- *Interviewees – cooperation, honesty and confidentially*
- *QA Reviewer – as prescribed by LBNL PUB 5519 (2)*

IV. Discussion of the process phases

- *As outline in Attachment 3 – Incident Investigation and Analysis Elements*

V. Concluding thoughts and transition to RCA just-in-time training

Attachment 6 - Data Collection Guidelines

Overview

Following the initial fact finding, subsequent data collection may be needed to perform the causal analysis. The essential information that is needed to perform the causal analysis includes:

- Conditions and activities before, during, and after the incident
- Testimony from personnel involved in the incident, such as workers, supervisors, individuals on the scene to respond to the incident and witnesses to the incident
- Testimony from subject matter experts, as necessary
- Physical evidence (photographs, operating logs, correspondence, inspection/surveillance records, maintenance records, procedures and instructions, drawings, work orders, etc.), as appropriate
- Other information to validate data accuracy and to address any gaps in the information

Data Collection Completeness

The following are key questions to answer to determine if sufficient information has been collected to complete the causal analysis:

a) What do we know already?
b) What do we need to know?
c) What do we need to see (correspondence, documents, photographs, etc.)
d) What do we need to validate / corroborate?
e) Are all of the facts known to develop an accurate and comprehensive TOE and identify the causal factor(s)?
f) Are there any unexplainable gaps in the sequence of events

Data collection is iterative and will begin once the incident happens, and may continue through corrective action development.

Data Management

Supporting records and physical / objective evidence should be documented and retain with the official analysis documentation, including the final, signed RCA report. The types of information that should are considered supporting records include:

- a list of the documents and a copy of each document reviewed and used in the investigation and causal analysis
- list of personnel interviewed
- the lines of inquiry and responses for the incident scene, document review and key individuals; consolidate the responses to the line(s) of inquiry into one document
- the list of questions and/or information that needs to be clarified with the interviewees
- TOE and the causal analysis worksheet(s) used to determine the causal factors, and root and contributing causes

The Team Lead should ensure that a common storage protocol for document control be established (such as storing all documents in an e-room or Google Site, etc.), and a Team Member is designated as the document controller to ensure the integrity of data collection and archival. Following the investigation and analysis, the Team Lead should forward the complete data package to OCA (*the Issues Management Program Manager*).

Attachment 7 – Factual Accuracy Review

Overview

- A Factual Accuracy Review is completed to ensure that the data collection is thorough and the facts are accurate, technically sound and credible.
- A Factual Accuracy Review is completed by the appropriate line management who own(s) or contributed to the incident, appropriate subject matter experts and/or other persons designated by line management and/or the Causal Analyst.
- The Factual Accuracy Review includes a description of the incident (Incident Summary), along with the incident's key circumstances and causal factors embedded in the description. This Incident Summary (upon factual accuracy completion) will be included in the RCA Report.
- For a RCA, the Factual Accuracy Review should be completed prior to beginning the causal analysis, once all of the data collection has been completed and the key causal factors have been identified. Due to time constraints, the review can occur concurrently with the Causal Analysis. The Causal Analysis should not be finalized until the facts are verified by appropriate individuals.
- Additional facts may be uncovered during the Causal Analysis and will need to be validated with another Factual Accuracy Review or during the Division Director Report Briefing, at the discretion of the Team Lead and appropriate line management.
- For an ACA, it is acceptable to complete the factually accuracy review after the causal analysis is documented, including the identified corrective actions.

Factual Accuracy Review Activities

RCA

I. Causal Analyst
   1. Coordinates the development of the Incident Summary once all of the data is collected, the TOE is finalized and causal factors are identified. (Below is an example of an Incident Summary for the factual accuracy review.)
   2. In conjunction with the Team, identifies appropriate line management, subject matter experts and/or other designated individuals that will perform the factual accuracy review.
   3. Distributes (or delegates this responsibility to another Team Member) the Incident Summary to the appropriate individuals who will complete the review, indicating a reasonable due date (generally within two to three business days) to respond with concurrence or edits.
   4. Resolves any questions, comments or concerns with the Factual Accuracy Reviewers.
   5. Edits (or delegates this responsibility to another Team Member) the Incident Summary and includes the edited version in the RCA Report.
   6. Updates TOE and causal factors, as appropriate, and begins the causal analysis.

II. Factual Accuracy Reviewer(s)
   1. Completes the Factual Accuracy Review by the due date.
   2. Resolves any questions, comments or concerns with the Causal Analyst.
   3. Ensures that the data collection is thorough and the **facts** are accurate, technically sound and credible.

Attachment 7 – Factual Accuracy Review *(Continued)*

ACA

The same steps used for a RCA can be used to complete a factual accuracy review for an ACA, or the review can be completed by appropriate individuals via a review of the draft causal analysis report, which includes the causes and corrective actions.

Example of an Incident Summary for Factual Accuracy Review

The XYZ Incident
Incident Summary
Factual Accuracy Review

On June 29, 2011at approximately 10:30am, a subcontractor XYZ electrician, working on the Building 37 (B37) ABC Project, was observed by an LBNL Construction Safety Engineer to be performing work in an electrical box without having signed onto the LOTO permit or having affixed his lock and tag to the group lock-box. The electrician involved is a licensed electrician.

The XYZ electrician arrived at B37 at approximately 10:00am and received a briefing by the XYZ superintendent on the project Pre-Task Hazard Analysis (PTHA). The electrician did not receive a LOTO briefing by the XYZ superintendent and the superintendent did not have the electrician review and sign onto the LOTO permit, site Safety Checklist (SCL) or Job Hazard Analysis. Note: the daily PTHA identified the task as a hazard, but did not identify LOTO as a control. Contrary to an established work practice, the XYZ superintendent chose not to contact the LBNL LOTO Lead when the XYZ electrician arrived onsite to ensure the electrician completed the LOTO process.

After the PTHA briefing, the electrician was instructed by the XYZ superintendent to apply his lock and tag to the group lockbox that had been put in place approximately one week earlier. As he was preparing a LOTO tag, he was asked by the XYZ superintendent to change into steel toed boots. While changing into his boots, the electrician placed his LOTO lock in his pocket, and left his LOTO tag on the bumper of his truck. The electrician then returned to B37 and proceeded to work. The electrician did not attach his lock and tag to the group lock box before completing the work.

The electrician did not follow LBNL LOTO permit processes, which require a LOTO briefing and attachment of locks and tags before working near potentially energized sources. Since LBNL personnel had previously de-energized the hazardous energy (electrical box) and applied the first lock, the electrician was not exposed to hazardous electrical energy.

Attachment 8 - Causal Analysis Methodologies

There are several tools and techniques to use to perform a causal analysis. All of them have proven to be successful depending on the incident. The trained, Lead Causal Analyst will select the appropriate methodology(ies) for the RCA using the following LBNL approved methodologies:

TapRooT® Incident Investigation System

A highly tested, proven and comprehensive system for finding fixable root causes of human error and equipment-related incidents. It utilizes a seven-step investigation and analysis process to examine, analyze and develop corrective actions to solve problems. TapROOT® encompasses Safeguard Analysis, Change Analysis, and Critical Human Action Profile.

Barrier Analysis

Barrier Analysis is based on the premise that hazards are associated with all tasks. For an incident to occur there must be a hazard that comes into contact with a target because barriers or controls were not in place, not used, or less than adequate, or they failed. A hazard is an unwanted outcome or an adverse consequence. A target is a person or object that a hazard may damage, injure, or harm. A barrier is any means used to control, prevent, or impede the hazard from reaching the target. Barrier Analysis is useful to identify deficiencies that should be strengthened or added to improve safety, quality and productivity.

Change Analysis

Change Analysis evaluates planned or unplanned deviations that cause undesired outcomes. More specifically, this technique analyzes the differences between what actually occurred and what should have occurred in an ideal (expected) or incident free situation, with the goal to determine whether the differences caused or contributed to the incident. Change Analysis is most effective when work is described in procedures, the ideal situation is well defined or a prior safe and effective situation is already documented or can be reconstructed.

Critical Human Action Profile (CHAP) Analysis

CHAP is used to determine critical human actions that caused or could have prevented an incident and can be used in the TapRoot® System or as an independent analysis. CHAP compares the necessary steps, tools and information that is needed for successful performance of a critical task against the how the task was actually performed, comparing the differences and identifying what went wrong. The causal factors and root causes are identified by comparing what should have been done to what was actual done.

Events and Causal Factors Charting and Analysis

Events and Causal Factors Charting and Analysis is a graphic representation or narrative description of the accident: both the sequence of events (from the initiating event through the final loss-producing occurrence) that led to the accident and the conditions that were causal factors. It is used in conjunction with other key methodologies (such as Barrier, Change or Five Whys analysis) to achieve optimal analytical results in accident investigation.

Attachment 8 - Causal Analysis Methodologies *(Continued)*

Five Whys Analysis (5-Whys)

5-Whys is a question-asking method used to explore the cause / effect relationships underlying a particular problem by continually asking: "Why?" This question-asking sequence will be repeated over and over until the root cause of the problem becomes apparent. Because it is so elementary in nature, it can be adapted quickly and applied to most any problem, and is often used with other methodologies.

Human Performance Improvement (HPI) Analysis

Human Performance Improvement Analysis is an important management tool used to better understand human performance as it relates to an incident. The analysis is intended to help focus on what could have prevented the incident rather than simply concentrating on “who” cause an incident. It balances human and organizational contributions to the incident.

Apparent Cause Analysis

Apparent Cause Analysis is a straightforward / basic approach to problem analysis that can help to identify causes for smaller-scale, low complexity-level issues. This approach is used for those items that do not require the rigor of a root cause analysis. This type of analysis involves examining the facts associated with the incident, and based on the best available information, determining the most probable cause(s) of the incident.

Attachment 9 – RCA Report Template

Upon completion of the investigation, analysis, and corrective action development, the Team Lead ensures that the results are documented in a formal report, and the RCA Report is signed (by all Team Members) and submitted it to the Responsible Division Director by the due date noted in the Charter Letter. Below is a template to use to complete the RCA Report. *(Note: causal analysis worksheet(s) should not be attached to the Final RCA Report, but should be made available for review upon the request by responsible Division Management.)*

Root Cause Analysis Report for the XYZ Incident, date

Prepared By:

Team Member #1, Division Name, Team Lead	*(signature)*	*(date)*
Team Member #2, Division Name, Lead Causal Analyst	*(signature)*	*(date)*
Team Member #3, Division Name,	*(signature)*	*(date)*
Team Member #4, Division Name,	*(signature)*	*(date)*

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Attachment 9 – RCA Report Template *(Continued)*

EXECUTIVE SUMMARY
[Recommended wording: This report documents the Team's analysis of the XYZ incident and includes corrective actions for management to implement that address the causes of the incident, and prevent or minimize recurrence of similar issues.]

Overview of the Incident
[Document the issue in sufficient detail to understand the occurrence. This information can be taken from the Executive Summary of the Assessment, ORPS or PAAA NTS Report (as appropriate).]

Root Causes of the Incident
[Recommended wording: The Team completed the investigation in a manner that is consistent with the LBNL Issues Management Program Manual (LBNL/PUB-5519(2)). The Team used three different root cause methodologies to determine the root causes of the incident. All of the analyses are prescribed in the LBNL/PUB-5519(2). As a result of the analyses, the Team identified the following causal factor(s), root cause(s) and corresponding corrective action(s) to prevent recurrence:]

- Causal Factor #1:
- Root Cause #1: ***[Document the root cause statement / description]***

  Key Facts
  [Provide a high level overview to support the root cause statement – detail follows in Conclusion section]
- Corrective Action #1

[Recommended wording: The Team also identified the following contributing causes (if applicable):]

- Contributing Cause #1

[Recommended wording: As proactive measures, the following corrective actions will minimize the possibility of the contributing cause recurring in further issues:]

- Corrective Action CC #1

INVESTIGATION BACKGROUND
[Recommended wording: The purpose of this investigation was to review and analyze the circumstances surrounding the XYZ incident that was reported on XX-XX-XXXX. The Team conducted this investigation and analysis by taking the following actions:

- *Gathering facts relevant to the incident through interviews, document reviews, and a walk-through of the new XYZ automated system. Parties interviewed are listed in Appendix A. The documents reviewed are listed in Appendix B.*
- *Completing a Barrier Analysis, Change Analysis and TapRoot® analysis to analyze the facts, and identify the causal factors and root causes of this incident. Refer to page ? for more information on the analytical methods.*
- *Developing corrective actions to address the causes of the incident and prevent recurrence, based on the analysis of the facts gathered.]*

INCIDENT FACTS
[Should be the validated narrative used for the Factual Accuracy Review]

ANALYTICAL METHODS
[Recommended wording: The Team used three different root cause methodologies (Barrier Analysis, Change Analysis, and TapRooT®) to determine the root causes of the recurring issue. Each of these methodologies and the results are discussed below.]

Attachment 9 – RCA Report Template *(Continued)*

CONCLUSIONS

[Recommended wording: Based on interviews with XYZ Division personnel, and a review of pertinent documents (refer to Appendix A & B), the Team identified the following causal factors, root and contributing causes of the incident, along with corresponding corrective actions to address the causes and prevent recurrence.]

ROOT CAUSES

Causal Factor#1: ***[Document the causal factor statement / description]***

Root Cause 1: ***[Document the root cause statement / description]***

Key Facts

[Include the key facts related to the root causes that allowed those events to occur, such as physical hazards, and controls and management systems failures.]

Compensatory Actions

[Identify any immediate actions that were taken to mitigate the situation / circumstances.]

Corrective Actions

[Document the corrective action(s) to address the cause and prevent recurrence.]

*****[Repeat for each causal factor and root cause as necessary]****

CONTRIBUTING CAUSES

Contributing Cause 1: ***[Document the contributing cause statement / description]***

Key Facts

[Include the key facts related to the contributing cause.]

Corrective Action CC #1 (optional)

[Recommended wording: As proactive measures, the Team recommends the following corrective actions to minimize the possibility of the contributing cause recurring in further issues:]

EXTENT OF CONDITION REVIEW

[Identify the extent and impact of the condition, such as other incidents, activities, processes or programs failures that are similar to this one, or the potential for the condition to exist elsewhere in the Laboratory.] Refer to PUB 5519(1), Issues Management Program Manual for additional guidance. Note: Depending on the incident and analysis, the Extent of Condition Review could be placed in the following manner, as applicable: 1) At the end of the Conclusion section (similar to this example) 2) Before the Conclusion Section or 3) At the end of each root cause

APPENDIX A: PERSONNEL INTERVIEWED

- Interviewee's Name, Position Title, Division Name
  [Repeat for each interviewee]

APPENDIX B: DOCUMENTS REVIEWED

- Document title, document date (as applicable)
  [Repeat for each document]

Attachment 10 – Division Director Report Briefing Guidelines

Overview

The purpose of the Division Director Report Briefing is to provide Division management with clear and concise information on what happened, how it happened and why it happened, so that effective corrective actions can be developed to prevent recurrence. This translates into discussing the key facts of the incident, causal factors, root and contributing causes, and the extent of condition.

The Briefing is provided for all formal RCAs (High Risk level issues), subsequent to the documentation of the causal analysis and before the CAP development. The Lead Causal Analyst will oversee the documentation of the causal analysis for the Briefing, which should follow the same format of the RCA Report Conclusion section, excluding the corrective actions, (Refer to Attachment 9 – *RCA Report Template).* However, the Team should be prepared to discuss recommended corrective actions for management consideration. The Team Lead will schedule and facilitate the Briefing, as well as ensure that the causal analysis document is submitted to the Division Director and/or designees prior to the Briefing.

Report Briefing Activities

The Briefing should include the following elements:

- Introduction: the purpose of the Briefing, as described in the Charter, and introduction of team members, as necessary
- Definitions: a discussion of common terminology that the Team uses to describe the incident, causal factors and causes, as necessary. Standard terms may include causal factors, root and contributing causes and extent of condition. (*Refer to Attachment 1 – Definitions / Acronyms)*
- Investigation and Analysis Results (report out and discussion of the following items, as documented in the draft report):
  a) Incident Summary
  b) Causal Factors, Root & Contributing Causes and Key Facts (follow the RCA Report Conclusion format – *Attachment 9 – RCA Report Template*)
  c) Extent of Condition: description of the issue(s) pervasiveness, the existence in other activities, processes, programs, or organizations
- CAP Development Suggestions:
  a) Highlight areas to address the causes of the incident and/or corrective actions for management consideration
  b) Discuss CAP development team composition and potential members, if requested by management
  c) Require CAP development team members take the BLI2010 Corrective Action Development Training prior to beginning the CAP development.

Attachment 11 – Corrective Action Plan Development Guidelines

Overview

- A CAP can be documented in the RCA, ORPS and/or PAAA NTS Reports or in a separate document, using the template included in this manual.
- The Assessment Report and/or the Causal Analysis include a clear description of the findings and/or causes that provide the base for developing the CAP.
- The CAP must be approved by the Responsible Division Director(s) that will provide the resources (funding, personnel and time) required to successfully implement the corrective action(s). This may involve coordination among various Divisions to complete a single, comprehensive CAP.
- OCA personnel (or an OCA designee) will perform the QA Review of the CAP through attending the Joint Team's corrective action development meeting(s) and providing immediate feedback on the quality of the developed corrective actions.
- The CAP Development process may be iterative and as such, may require that the Team Lead and Lead Causal Analysis communicate with responsible Division personnel throughout the process to ensure expectations and outcomes are aligned prior to completing the CAP.

CAP Development Activities

1. Following the Causal Analysis and the Director's Briefing, a Joint Team comprised of the Team Lead, Lead Causal Analyst and Division Director appointed representatives will develop the CAP for all High Risk level issues. This may involve coordination among various Divisions to complete a single, comprehensive CAP. The Team Lead will oversee the development of the CAP in accordance with this manual.

2. The Joint Team should evaluate each finding / cause as documented in the Causal Analysis to determine the most appropriate corrective actions to implement. Appropriate corrective action(s) must have the following attributes:
   a) address the root or apparent cause(s) (and contributing cause(s), if corrective actions to preclude recurrence were created for the contributing causes),
   b) prevent recurrence of similar issue(s), due to similar cause(s),
   c) can demonstrate endurance and sustainability,
   d) will not introduced negative unintended consequences, and
   e) will improve process/program performance.

3. The Joint Team should include the corrective actions that will be implemented to address the finding(s)/root cause(s) and prevent recurrence in the CAP. Immediate and compensatory corrective actions also should be included in the CAP.

4. The Joint Team members should take the BLI2010: Corrective Action Development Training and ensure that the corrective action(s) are Specific, Measurable, Accountable, Reasonable and Timely.

   Specific — Describe the corrective action(s) that will address / fix the root or apparent cause and prevent recurrence.

   Measurable — Corrective action must be actionable and completion of the corrective action(s) must address the cause(s), be verifiable through objective evidence and demonstrate endurance.

Accountable — Responsibility for implementing the action(s) must be assigned and documented, which includes having the authority, accountability and resources to complete the action. This includes documenting the Division and actual Responsible Person, as appropriate.

Reasonable — Corrective action(s) should be feasible (a cost effective control measure.) and not introduce negative, unintended consequences.

Timely — Corrective action(s) should be implemented in a realistic timeframe to prevent recurrence. The expected completion date for each corrective action should be documented. Mini-steps should be included in the CAP, with completion dates, as appropriate.

5. The Joint Team should ensure that two standard corrective actions for High Risk level issues are included in the CAP. The standard corrective actions are:
   a) Perform an Effectiveness Review, and
   b) Submit a Lessons Learned Briefing *(specifically ORPS Significance Category 1 and R Reportable issues)*

6. The Responsible Division Director(s) should ensure that the CAP corrective actions address the finding / causes and prevent recurrence by approving the CAP.

7. Once the CAP developed by the Joint Team is approved by the appropriate Division Director(s), the responsible Division Management ensures that the issue and associated corrective actions are entered into the CATS Database (refer to OIA-OCA-0001, Rev.3 *Corrective Action Tracking System (CATS) Database User Manual)* and managed through resolution.

ACA

Corrective action development can be completed as part of the causal analysis process, in partnership with responsible division management and other parties as determined by management.

Attachment 12 – Corrective Action Plan Template

Corrective Action Plan Content Guidelines

The CAP can be documented in the RCA, ORPS and/or PAAA NTS Reports. If the CAP is documented in a stand-alone report, the following template can be used.

1. Cover page with the Corrective Action Plan caption, name of the Assessment / Incident, date of the CAP, and signature and date line for responsible management's approval.

2. Table of Contents, noting where plan contents can be found.

3. Executive Summary that provides a brief, high-level overview of the finding / incident and a listing of root cause(s). This information can be taken from the Executive Summary of the Assessment or Causal Analysis Report.

4. A section for each finding /cause that includes:
    a) a brief, high-level overview of the finding / cause (excerpts can be taken from the Assessment or Causal Analysis Report)
    b) immediate / compensatory actions
    c) corrective action(s) to address the finding / cause and prevent recurrence. This may include corrective actions that were implemented prior to finalizing the CAP
    d) for each corrective action, specify the expected completion date for this corrective action. List all mini-steps require to fully implement the corrective action, with a corresponding completion date, as appropriate
    e) if a corrective action will require significant time to implement, document interim actions or compensatory measures to prevent recurrence while the correction is pending completion
    f) identify the name of the Division and responsible person for completing or overseeing completion of the corrective action
    g) if the action has already been completed, identify the date the action was completed

5. Observations if management determines or agrees that an observation will be formally addressed.

6. Attachments, as applicable. Examples of potential Attachments include the following:
    a) Formal Root Cause Analysis/ Extent of Condition Report
    b) Objective evidence of corrective actions completed prior to issuance of the CAP

Attachment 12 – Corrective Action Plan Template *(Continued)*

{Name Of the Assessment / Incident}
Corrective Action Plan
{Date of Corrective Action Plan}

Approved By:

_____

Type Name of Division Director, Name of Division Date

Page 1

TABLE OF CONTENTS

Attachment 12 – Corrective Action Plan Template *(Continued)*

(The Header of each page in the body of the CAP)

Name of Assessment / Incident,
Corrective Action Plan and Date

1.0 EXECUTIVE SUMMARY

2.0 FINDING(S) / ROOT CAUSE(S)

2.1 FINDING / ROOT CAUSE-001: Copy the finding / root cause verbiage as documented in the formal assessment or root cause analysis report.

Immediate/ Compensatory Actions:
List the action(s) and date(s) taken to fix the circumstances / condition associated with the incident, but not necessarily the cause of the issue. If multiple immediate/ compensatory actions were taken, separately identify them by adding additional sections (e.g. CA 1-1, CA 1-2, etc.).

If a corrective action to prevent recurrence will require significant time to implement, document interim actions or compensatory measures to prevent recurrence while the correction action is pending completion.

Corrective Actions to prevent recurrence (include the following elements for each corrective action):

a) Corrective Action Description: Describe the action(s) that address the root cause of the finding / incident and will prevent recurrence. These actions must be Specific, Measurable, Accountable, Reasonable and Timely. Continue with the numbering convention as used for immediate / compensatory actions (e.g. CA 1-3, CA 1-4, etc.).
b) Projected Completion Date: Specify the expected completion date for each corrective action. If the action has already been completed, identify the date the action was completed.
c) Responsible Person: Identify the responsible Division and the name of the person responsible for implementing or overseeing implementation of the corrective action.

3.0 OBSERVATIONS (if applicable):

3.1 OBS-001:

Documented the observation that management will formally addressed. State the observation verbiage as documented in the formal assessment report.

Response:
Document the response that addresses the issue. If multiple responses are necessary for this observation, separately identify them by adding additional sections (e.g. Response 1-1, Response 1-2, Response 1-3, etc.). If the response indicates that an action(s) will be taken, identify the Projected Completion Date and the Responsible Person for the action(s).

4.0 ATTACHMENTS (IF APPLICABLE)

List all applicable attachments that provides objective evidence of compensatory or corrective action completion as part of the closure file.

Attachment 13 – Division Close-out Briefing

Overview

The purpose of the Division Close-out Briefing is to transition the final RCA Report from the Team to Responsible Division Management. This briefing is optional and will be held at the discretion of the Division Director (or designee). The structure of the meeting may vary based on the Division Director's (or designee's) and other key stakeholders' interaction / communication with the Team throughout the investigation and analysis process. The Team Lead will work with the Division Director (or designee) and other key stakeholders (as necessary) to determine the need and structure for the Close-out Briefing. The Lead Causal Analyst and QA Reviewer also should participate in the Division Close-out Briefing.

To ensure a successful transition of the causal analysis and corrective action implementation, the following items should be discussed and concurrence reached during the Close-out Briefing or during the investigation and analysis process:

1. Responsible Division Management accepts ownership of the investigation and analysis results and expected outcomes.

2. Responsible Division Management understands the incident's root cause(s) and extent of condition.

3. Responsible Division Management agrees that the corrective action(s) are appropriate, addresses the root cause(s) and should prevent recurrence if properly implemented.

4. Responsible Division Management commits to entering the corrective action(s) (documented in the RCA Report) in the CATS Database within five days of approving the final RCA Report and commits resources to completing the corrective action(s) as designed.

5. Responsible Division Management will assign a Division representative to work with the appropriate reporting coordinators, as applicable, to complete the outstanding reporting requirements.