

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 1 of 11

CONTENT

This General Instruction contains procedures for the investigation of incidents including fatalities, injuries and fires, but excluding motor vehicle accidents. The text includes:

1. PURPOSE
2. DEFINITIONS: MAJOR, MODERATE AND MINOR INCIDENTS
3. PROCEDURE FOR MAJOR INCIDENTS
4. PROCEDURE FOR MODERATE INCIDENTS
5. PROCEDURE FOR MINOR INCIDENTS
6. LESSONS LEARNED

1.0 PURPOSE

- 1.1 This General Instruction (GI) provides Saudi Aramco organizations with a uniform approach for investigating incidents, to ensure that incident investigations go beyond human errors and equipment failures to determine the underlying reasons (root causes) why the incident occurred, and to ensure compliance with Government regulations.
- 1.2 This GI emphasizes that the aim of an incident investigation is to recommend feasible, reasonable, and cost-effective ways towards avoiding recurrence of similar incidents.

2.0 DEFINITIONS: MAJOR, MODERATE AND MINOR INCIDENTS

- 2.1 Detailed definitions of these categories of incidents are given in General Instruction 6.001, Notification Requirements For Incidents (Including Fires).

3.0 PROCEDURE FOR MAJOR INCIDENTS

- 3.1 Formation of the Committee: A major incident shall be investigated by an investigation committee to be formed within one day of the incident.
 - 3.1.1 The vice president/executive director (or higher level) of the proponent organization shall appoint the committee chairman who will not be from the proponent department, and who will be from management ranks (superintendent or above). Appointment shall be recorded via an appointment letter.
 - 3.1.2 The following shall always be invited to become members of the committee:
 - (a) Representative(s) of the Saudi Arab Government (to be invited through the appropriate area manager of Saudi Aramco Affairs).

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 2 of 11

- (b) Loss Prevention Department representative who is trained in incident investigation techniques and root causes analysis.
 - (c) Representative from the Treasurer's Organization (Risk Management Division) if the damage is expected to exceed \$5 million.
 - (d) A technical representative for the committee who shall be appointed by the Chief Engineer.
- 3.1.3 The vice president/executive director of the proponent organization shall appoint the other members of the committee (e.g., from engineering, maintenance, operations, and/or an Industrial Security technical representative in cases where other than operational/technical factors are suspected) through their respective department managers.
- 3.1.4 In case of an injury/fatality incident, it is recommended that a representative of the Law Department be appointed to become a member of or advisor to the committee.
- 3.1.5 In cases where a representative of the Saudi Arab Government accepts an invitation, a representative of Saudi Aramco Affairs shall accompany him on the committee.
- 3.1.6 In cases where the Fire Protection Department (FrPD) was involved in controlling the incident, it is recommended that a representative from FrPD be appointed to become a member of or advisor to the committee.
- 3.1.7 In case damage loss is expected to exceed \$10 million, it is recommended that a representative of the Controller's Organization be appointed to become a member of or advisor to the committee.
- 3.1.8 With the exception of the Saudi Arab Government representative and the Saudi Aramco Affairs representative accompanying him, all members of the committee will be regarded as "working members" functionally under the control of the chairman for the duration of the investigation.
- 3.1.9 The chairman shall appoint a secretary to the committee. It is recommended that the secretary be from the proponent organization, and ideally be an engineer or a person of technical competence who is familiar with the area of the incident.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 3 of 11

3.2 Investigation: If practicable, the committee should not begin its formal investigation until members of the Saudi Arab Government are present, unless they have declined to participate. This does not prevent the early and immediate collection of pertinent data such as flow charts, logs, etc., which will be needed during formal committee deliberations. Given below is a list of the type of information that will be useful in any subsequent investigation. The operations management shall promptly collect this information.

- (a) Computer log of at least 24 hours prior to the incident
- (b) Computer logs of process upsets during the recent past
- (c) Operating supervisor's log
- (d) Duty roster
- (e) Plant foreman's log and shift coordinator's log
- (f) Process flow diagrams and piping and instrumentation diagrams
- (g) Layout maps
- (h) Schematic sketches of process, fluid flow
- (i) Log of safety system alarms such as H₂S/combustible gas detectors
- (j) Flow, temperature and pressure controller chart output
- (k) Startup and shutdown sequence documentation
- (l) Recent T&I reports
- (m) Inspection reports
- (n) Work permits issued and received
- (o) List of potential eye witnesses
- (p) Pressure surge records
- (q) Relief valve test reports
- (r) Fluid stream composition documents
- (s) System and product specification documents
- (t) NDT, radiography, hydrotest, corrosion monitoring results of the recent past
- (u) All still photographs and movie/video taken during the incident
- (v) All voice recordings of emergency notification and the log of the Emergency Control Center

3.2.1 The chairman shall inform all committee members that the purpose of the investigation is to identify the factual sequence of events, including causal factors, leading to the incident, determine the underlying (root) causes of the incident, and make recommendations to avoiding recurrence of similar incidents.

3.2.2 All department managers/organization heads shall instruct their personnel to give information only to committee members during the investigation.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 4 of 11

- 3.2.3 The proponent organization's management shall ensure, through the area Industrial Security manager, that the scene of the incident is secured and that access to the scene is limited to those authorized by him, with the concurrence of the investigation committee chairman and, when applicable, by appropriate Saudi Arab Government personnel.
- 3.2.4 Prompt collection of data and interviews of witnesses are vital. Therefore, the proponent organization's management shall provide the investigation committee immediate assistance with reports, statements, photographs, recorder charts, drawings, and other relevant material.
- 3.2.5 The incident investigation/analysis shall include identification of immediate causes and root causes. An immediate cause (also known as a "causal factor") is an equipment failure, human error, or condition that caused an incident, allowed an incident to occur, or allowed the consequences to be worse than they might have been. For a typical incident event, there are multiple causal factors. A root cause is the most basic cause that can reasonably be identified, which management has control to fix and for which effective recommendations for preventing recurrence can be generated. As such, root causes are the absence, neglect, or deficiencies of management systems that allowed the causal factors to occur or exist. Typical management systems include procedures, standards, planning, design, personnel selection, supervision, safety/hazard reviews, emergency planning, work permitting, training, communications, maintenance, inspection, etc. For a typical causal factor, there are usually one to four root causes. The investigation committee shall determine root causes using a structured root cause analysis technique.
- 3.2.6 The investigation committee chairman shall finalize the report and obtain concurring signatures from all members. He shall allow members to record dissent and deviation from the majority view when signing the report.
- 3.2.7 The investigation committee chairman shall have complete procedural freedom to direct the course of the investigation and the manner in which the investigation is conducted. For example, he may assign specific tasks to the working members of the committee, divide the committee into groups in order to utilize efficiently the expertise of the members available to him, or obtain the assistance of non-member specialists.
- 3.2.8 Investigation committee members shall be committed full time by their department/organization heads as requested by the chairman.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 5 of 11

3.2.9 If an investigation requires an extensive amount of time to complete, a preliminary report shall be submitted to the Manager, Loss Prevention Department, if requested. It shall include information identified thus far in a format similar to the summarized version (see paragraph 3.3.2).

3.3 The Report: The committee shall prepare two versions of the report: a complete version and a summarized version. The reports shall be in English. English translations of statements originally made in any other language(s) by witnesses shall be attached to the report. In both the complete and the summarized versions, use of difficult technical terms and acronyms or abbreviations should be avoided in order to facilitate subsequent translation into Arabic. Where this is not practical, an explanation of these terms should be given in the "Definitions and Acronyms" section of the report. The requirements in GI 710.002, Classification of Sensitive Documents, shall be complied with for labeling, handling, storing, and transmitting the report.

3.3.1 The original complete version shall be retained in the Loss Prevention Department files and shall include, at a minimum, the following:

- (a) Cover sheet (with incident title/date and date of issue of the report)
- (b) Executive summary
- (c) Table of Contents
- (d) Letter of appointment of the chairman
- (e) List of committee members with concurring signatures
- (f) Definitions of terms (if required)
- (g) Description of facilities and operations prior to the incident
- (h) Description of the incident
- (i) Timeline sequence of events
- (j) Incident notifications
- (k) Incident response
- (l) Post-incident actions
- (m) Findings and analysis
 - General findings
 - Causal factors and items of note
 - Root cause analysis
- (n) Recommendations
- (o) Appendices (organized as Appendix 1, 2, 3.... or Appendix A, B, C...), to include copies of pertinent corporate or departmental documents, sketches, drawings and photographs, cost estimates of repairs, witness statements and transcripts of interview notes, advisor and consultant technical reports, final report distribution list, letters to actionable parties(see paragraph 3.6), etc.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 6 of 11

- 3.3.2 The summarized version shall consist of, at a minimum:
- Cover sheet (with incident title/date and date of issue of the report)
 - Executive summary
 - Causal factors and items of note
 - Root causes
 - Recommendations
 - Definitions of terms (if required)

3.3.3 Each page of the complete and summarized versions, including appendices, shall contain a header of “CONFIDENTIAL” in accordance with the requirements of GI 710.002, Classification of Sensitive Documents.

3.3.4 All pages of the report (including appendices), for both the complete version and the summarized version, shall be paginated as 1 of n, 2 of n, etc., where n is the total number of pages, so that missing pages can readily be discovered, as required by GI 710.002, Classification of Sensitive Documents.

3.4 Guidelines for Making Recommendations:

The Saudi Arab Government has expressed its interest in monitoring implementation of recommendations arising from investigations of major incidents. The Loss Prevention Department maintains a computerized follow-up system recording the status of implementation programs. Investigation committee chairmen should, therefore, take into account the following guidelines when making recommendations.

- 3.4.1 Recommendations that are applicable exclusively to the plant or site of the incident are to be made in specific terms, with action parties or responsible organizations clearly identified.
- 3.4.2 A recommendation with a wide scope of applicability should be accompanied by a statement of the underlying intent and purpose of the recommendation and, if possible, guidance on locations for which the recommendation is applicable.
- 3.4.3 Recommendations are to address a root cause or an immediate cause and be technically feasible and cost-effective ways to avoid recurrence of similar incidents. “Technical feasibility” refers to well established methods and systems utilized by modern oil companies. “Cost-effectiveness” means that due consideration is given to the degree of improvement achievable by the recommendation in relation to the cost of implementing it.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 7 of 11

3.4.4 Recommendations are to generally comply with existing Saudi Aramco General Instructions, Engineering Standards, and procedures laid down in plant operating manuals. Exceptions in the case of Engineering Standards will be assigned to the Chief Engineer for review prior to implementation. Where recommendations do not comply with Engineering Standards, but are technically feasible and cost-effective (as defined in paragraph 3.4.3), proposals for modifying existing standards should be made so that these recommendations may be incorporated in new and existing facilities.

3.4.5 Broad, open-ended, generalized recommendations that offer no specific changes or improvements, or merely recommend enforcing an already existing requirement, are to be avoided. Examples of recommendations to avoid include statements such as "Follow safety procedures" or "Ensure safe operations." These types of statements offer little of substance in the way of concrete improvements, yet significant efforts must be expended to track them for company-wide implementation. Recommendations are to be a stand-alone statement, providing enough detail and specific information to be adequately implemented and closed.

3.4.6 Recommendations are to be assigned only to Saudi Aramco organizations. For a recommendation with responsibility assigned to a specific organization, the investigation committee should ensure that the organization is the correct agency for implementation.

3.5 Preview Arrangements:

3.5.1 The chairman shall ensure that all draft copies of the report are clearly identified as "DRAFT" on every page, and all copies are numbered. He shall ensure that all draft copies are withdrawn and destroyed upon finalization of the report. Personnel receiving draft copies should be warned against making any copies of any kind of the draft document.

3.5.2 Draft copies shall not be released to any organizations outside Saudi Aramco without prior authorization from Saudi Aramco Affairs and the Law Department.

3.5.3 Draft reports may be given on demand to the Saudi Arab Government representatives participating in the investigation.

3.5.4 The Loss Prevention Department and Law Department shall be sent a soft (CD/DVD) and hard copy of the complete draft report for review prior to finalizing the report. After review, the draft report shall be returned to the chairman. The chairman shall ensure that the final report adequately addresses all

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 8 of 11

review comments.

3.6 Notifications to actionable parties: This requirement only pertains to recommendations in the final report that identify specific organizations, other than the proponent organization, with responsibility for implementing the recommendation. To ensure actionable parties have prompt notice of their responsibilities, the investigation committee chairman shall issue a letter to each responsible organization/department. Each letter shall include a summary of the incident and sufficient information on the findings and conclusions to enable the actionable party to address the pertinent recommendation(s). Letters to actionable parties shall be included in an appendix of the complete version of the report. The Manager, Loss Prevention Department, shall be copied on each letter.

3.7 Distribution of the Report:

3.7.1 The complete version shall be distributed only to the following:

- (a) Manager, Loss Prevention Department (original, one copy, and CD/DVD)
- (b) Manager, proponent organization (one copy)
- (c) Vice president/executive director of the proponent organization (one copy)
- (d) Executive Director, Saudi Aramco Affairs, for transmittal to the appropriate Saudi Arab Government authorities (one copy)

3.7.2 The summarized version shall be distributed only to the following:

- (a) Manager, Loss Prevention Department (original, one copy, and CD/DVD)
- (b) Five copies to the Executive Director, Saudi Aramco Affairs, who shall send three copies to the Ministry of Petroleum and Mineral Resources, arrange to translate one into Arabic and send it to the Ministry of Interior through the Ministry of Petroleum and Mineral Resources, and send the remaining copy to Saudi Aramco Affairs' files
- (c) President and Chief Executive Officer (one copy)
- (d) All executive vice presidents (one copy each)
- (e) All senior vice president (one copy each)
- (f) The Chief Engineer (one copy)
- (g) Treasurer's Organization, Risk Management Division (one copy)

4.0 **PROCEDURE FOR MODERATE INCIDENTS**

4.1 In incidents involving cranes and heavy equipment, the investigation shall be per GI 7.026, Crane and Heavy Equipment Incident Reporting Procedures.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 9 of 11

* 4.2 Formation of the Committee: The proponent manager/organization head shall, within one day of the incident, appoint a committee chairman who will not be from the proponent department, and who will be from management ranks (superintendent or above) to head the incident investigation committee. Appointment shall be recorded via an appointment letter.

4.2.1 The chairman shall form the committee by inviting members from various functions as appropriate to the incident under investigation, including Loss Prevention, operations, maintenance, and engineering personnel from the affected area. The Chief Engineer shall appoint a technical representative to the committee. It is recommended that a representative from the Fire Protection Department (FrPD) be appointed to the committee for cases where FrPD was involved in controlling the incident.

4.2.2 The investigation committee shall be small enough to carry out the investigation in an efficient and objective manner. Other personnel can be called in as subject matter experts, as needed.

4.2.3 In general, Saudi Arab Government representatives do not participate in the investigation of moderate incidents; however, they may specifically request to do so through Saudi Aramco Affairs.

4.3 Investigation: The incident investigation committee shall promptly collect data, interview witnesses and analyze evidence. The committee shall be afforded every assistance with reports, statements, photographs, recorder charts, drawings, etc. The investigation shall include identification of immediate causes and root causes in accordance with paragraph 3.2.5.

4.4 The Report: The committee shall prepare a full report, using the format described in section 3.3. A summary version is not required.

4.4.1 Guidelines for making recommendations as given in section 3.4 are also applicable to incident investigations for moderate incidents.

4.4.2 The Loss Prevention Department and Law Department shall be sent a soft (CD/DVD) and hard copy of the draft report (clearly stamped "draft" on each page) for review prior to finalizing the report. After review, the draft report shall be returned to the chairman. The chairman shall ensure that the final report adequately addresses all review comments. Personnel receiving draft copies should be warned against making any copies of any kind of the draft document.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 10 of 11

4.4.3 Each page of the report shall contain a header of “CONFIDENTIAL” in accordance with the requirements of GI 710.002, Classification of Sensitive Documents.

4.4.4 The original version of the final report, plus an electronic version on CD/DVD, shall be sent to the Manager, Loss Prevention Department, and a hard copy shall be sent to the proponent manager.

4.4.5 Requests for copies of the report from outside Saudi Aramco shall be handled by Saudi Aramco Affairs.

4.5 Notifications to actionable parties: This requirement only pertains to recommendations in the final report that identify specific organizations, other than the proponent organization, with responsibility for implementing the recommendation. To ensure actionable parties have prompt notice of their responsibilities, the investigation committee chairman shall issue a letter to each responsible organization/department. Each letter shall include a summary of the incident and sufficient information on the findings and conclusions to enable the actionable party to address the pertinent recommendation(s). Letters to actionable parties shall be included in an appendix of the final version of the report. The Manager, Loss Prevention Department, shall be copied on each letter.

4.6 Follow-up on implementation of recommendations shall be through the Safe Operations Committee (SOC) of the affected department/organization.

5.0 PROCEDURE FOR MINOR INCIDENTS

5.1 Investigation and recording of these shall be in accordance with applicable General Instructions, e.g.:

5.1.1 GI 2.104, Leak and Spill Reporting

5.1.2 GI 6.005, Reporting, Investigation and Recording of Injuries/Occupational Illnesses

5.1.3 GI 7.026, Crane and Heavy Equipment Incident Reporting Procedures

5.1.4 GI 150.003, Ionizing Radiation Protection

5.1.5 GI 1787.000, Report of Fire, Emergency or False Alarm

5.1.6 GI 155.004, Preparation of Saudi Aramco Form 681, Supervisor's Investigation of a Job Related Injury or Illness

5.2 For minor incidents with the potential for significant loss, the proponent manager shall arrange an investigation to determine the underlying causes of the incident, record factual information relating to the incident, and make recommendations aimed at preventing

SAUDI ARABIAN OIL COMPANY (Saudi Aramco) GENERAL INSTRUCTION MANUAL ISSUING ORG. LOSS PREVENTION DEPARTMENT SUBJECT: INCIDENT INVESTIGATION	G.I.NUMBER Approved 6.003	
	ISSUE DATE 12/18/2011	REPLACES 08/10/2009
	APPROVAL HJK	PAGE NUMBER 11 of 11

recurrence. The investigation shall include identification of immediate causes and root causes in accordance with paragraph 3.2.5, as applicable. Before issue, the investigation report shall be reviewed for completeness by proponent management.

5.3 A copy of the final report shall be sent to the Manager, Loss Prevention Department.

5.4 Notifications to actionable parties: This requirement only pertains to recommendations in the report that identify specific organizations, other than the proponent organization, with responsibility for implementing the recommendation. To ensure actionable parties have prompt notice of their responsibilities, the proponent manager shall issue a letter to each responsible organization. Each letter shall include a summary of the incident and sufficient information on the findings and conclusions to enable the actionable party to address the pertinent recommendation(s). The Manager, Loss Prevention Department, shall be copied on each letter.

5.5 Follow-up on implementation of recommendations shall be through the Safe Operations Committee (SOC) of the affected department/organization.

6.0 LESSONS LEARNED

As may be appropriate, for significant incidents the Loss Prevention Department shall:

6.1 Arrange for communication of lessons learned within the Company.

6.2 Extend recommendations to company organizations not directly involved in the incident.

APPROVED: _____

Manager,
Loss Prevention Department

DATE: _____