

MONSANTO COMPANY

**CENTRAL ENGINEERING DEPARTMENT
SAFETY & PROPERTY PROTECTION**

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PLANT LOSS PREVENTION & ENVIRONMENTAL CONTROL REVIEW GUIDE

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REFERENCE: EXHIBIT A, CED Procedure 602, Loss Prevention & Environmental Control Reviews

**Form G-1940 - Copies available from Office Supplies Department
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PLANT LOSS PREVENTION AND ENVIRONMENTAL CONTROL REVIEW GUIDE1. Reasons for Plant Loss Prevention Reviews

Each plant, as an integral part of the Company, is responsible for preventing losses and pollution. A necessary aid to accomplishing this is to hold loss prevention and environmental control reviews in each plant. The purpose of such reviews is to foresee hazards and to attack them before accidents occur. The savings resulting from accident prevention justifies the cost of holding loss prevention and environmental control reviews. In addition the communications achieved during the reviews often lead to side benefits such as increased unit capacity and improved product quality, etc.

With internal loss prevention and environmental control reviews each plant has a unique opportunity to gain a great deal. We can discuss process aspects freely among ourselves; this we could not do with the insurance company. We should thus do a better job of implementing Monsanto's safety policy, as stated in the Management Guide. This is quoted here as follows:

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"IN RELATIONS WITH PLANT COMMUNITIES, WE WILL STRIVE TO
...make our plants safe and attractive places in which to work.

...operate our plants with a maximum concern for the condition of our environment and in compliance with all appropriate environmental regulations."

Page D-I-7"Safety

"Monsanto recognizes its obligation to provide a safe working environment, to provide adequate protection devices, to establish and train employees in safe operating practices, and to monitor equipment and procedures in order to enforce these obligations. Every employee is obligated to perform his assigned duties safely by following established safe working procedures, by using proper protective equipment, and by correcting or reporting unsafe acts or conditions.

"Each location has a formal and effective safety program designed to discharge these obligations. The safety

aspects of operating conditions and practices at each location are reviewed at regularly scheduled intervals. In designing new facilities, a safety review is conducted to identify possible and potential hazards, and suitable provisions are incorporated into the design and construction of such facilities to ensure safe operation. Assistance, counsel and surveillance in the discharge of these obligations is provided by appropriate central departments (the Medical Department and the Safety and Property Protection branch of Central Engineering).

"Plants adopt safety recommendations made by the operating division responsible for the technology of a given operation. The respective directors, Manufacturing who provide the operating technology carry responsibility for safety policy and practices implementation. The Safety & Property Protection branch of Central Engineering is informed of safety recommendations and reviews their status.

"In the design, construction and operation of facilities, all applicable construction codes, pollution controls, sanitary and insurance codes, safety regulations and practices, governmental regulations and accepted, sound engineering practices are observed.

"Facilities are designed, constructed and operated so that wastes, fumes and dusts discharged do not create a safety hazard or a public nuisance. Such discharges are monitored in observance of atmospheric and stream pollution standards.

"To safeguard the health of employees and customers, appropriate toxicity data is assembled for the materials used in the production of products, for intermediates and by-products produced in the manufacture of such products themselves. Suitable protective measures are taken as indicated by the toxicity data.

"To prevent the loss of life and personal injury and to prevent the loss or damage of property and products by fire, each plant or other facility establishes fire prevention, fire protection and control programs. Such programs include fail-safe operating procedures and facilities, inspection, training of personnel and the strategic placement, operation and maintenance of fire protection and control equipment."

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2. Kinds of Loss Prevention and Environmental Control Reviews

Several kinds of loss prevention and environmental control reviews should be conducted by a plant, as outlined in Monsanto's CED Procedure 602. These are as follows: process development reviews, reviews for plant modifications to be handled within the plant, pre-start up loss prevention and environmental control reviews, and periodic (e.g., biennial) loss prevention and environmental control reviews for existing plants. This Guide is written primarily for the last-named type of review, but it can be usefully employed for the others.

3. Scheduling of Biennial Loss Prevention & Environmental Control Reviews

Biennial loss prevention and environmental control reviews for the different operations in a plant should be fairly evenly scheduled over the biennium. This can help the achievement of adequate preparation for, and sufficient depth in, the review. A crash program of reviews will tend to lead to shallowness. Reviews should cover not only process operations but also other parts of the plant such as utilities operation, maintenance shops, etc.

4. Loss Prevention and Environmental Control Review Meetings

A review team should meet regularly until its job is completed. A suggested frequency, recommended for a number of reasons, is once or twice per week. Meetings held too seldom lead to efficiency loss because too much time is then spent in recalling discussion from the previous meeting. The length of meetings should be great enough to permit real accomplishment. A suggested minimum time is four hours; some teams find six hours or even more to be desirable. If the meeting is too brief, too little will be accomplished per manhour. Time should be allowed early in the day, and at the end of the day, for team members to have a few minutes at their desks.

During review meetings the team members should not be called away for other than the very direst emergencies. Attendance of team members at the meetings should definitely take precedence over other phases of their jobs for the designated times of the meetings. All team members need to be present throughout all meetings. (They cannot delegate to others.) This will result in the maximum benefit of the review for the fewest total manhours spent. This comes about from the catalytic effect of each man's thinking on the others. A team member who is not a safety department representative should be assigned to take summary notes and to issue copies to team members between meetings.

5. Composition of Review Team

The review team should normally be made up of a central group which participates in reviews of all units in the plant, and others appointed for the particular review at hand. A representative from the plant safety department should always be a member of the central group. For large plants the central group usually consists of two or three people. For very small plants the central group may consist of the safety department representative only. Plant and/or division environmental control people should be involved in reviews including pollution control problems.

The people appointed for a particular review should include one or more selected representatives from each of the functions concerned with the operation to be audited. This will normally mean people from manufacturing, maintenance, plant technical service, plant instrument engineering, and, depending on the operation to be reviewed, possibly from research, engineering, or other groups. Each person should be selected on the basis of his ability to contribute the most from his function. This will usually mean that the busiest people are the ones to be appointed for the audit. The manufacturing representation should preferably include the Manufacturing Superintendent, or if not, then at least the Supervisor of the unit being reviewed. The Foreman of the unit should also be a member of the team.

Sometimes additional people, such as younger plant people, will be assigned to a review team as observers in order that their plant training may be further rounded out. Such people should have the freedom to raise questions, make comments, and give opinions. They do not serve in place of experienced people as team members. Sometimes also the review team itself may want to call in other people to give special assistance or consultation in parts of its deliberations. Hourly employees may be included in this group as well as salaried people.

6. Special Value of Central Group

Although the central group will be the most experienced, the total group of people should work as one team. The central group should neither direct nor dominate the review meetings; it should not ask all the questions but should see that the proper questions are asked. The central group should participate in the deliberations, but only on a basis of equality with the other review team members. The review is definitely not a presentation to the central group by the other team members.

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The central group will bring to the reviews a wealth of experience derived from prior reviews. It will know of internal and external information sources. It will also have a broad knowledge of interdependency of hazards among the various operations. Further, because of its experience, it can help in the development and wording of recommendations.

7. Review in Depth

The loss prevention and environmental control reviews should be in depth rather than in petty detail. (Details should be reserved for routine safety inspections conducted by running down check lists. Such safety inspections are important, and records of them can also be of great help to review teams.) It will be necessary to cover some detail during the review, but a team should not do this unnecessarily lest it lose valuable time and also lest it fail to see the forest for the trees. Again, the central group of the team can greatly help in minimizing aimless drifting.

The review needs to include all areas of safety, such as people, fire protection, electrical, process, mechanical, and all others that may apply. Each of these needs to be covered in real depth as it applies to the particular part of the operation under review at the moment.

Desirably the team should accomplish most of its work by free discussion guided by some logical sequence of operation coverage. It should preferably reserve reference to, or use of, a check list to the end of its deliberations. Faithful following of a detailed check list throughout all its discussions, or use of check list as a discussion guide, will throttle the thinking that is so necessary for objective evaluation of an operation for hazard analysis. Checklists do serve a useful function when, at the end of its deliberations, the audit team uses such checklists to help prevent overlooking points which should be covered. Such checklists are included as one of the attachments to Monsanto's CED Procedure 602. On the other hand a plant can develop its own check list.

Throughout the deliberations the emphasis needs to be on hazard recognition and prevention.

8. Recommendations by Team

The review team should develop recommendations for attacking hazards recognized, but it should not try to engineer the solutions. Again, the function of the team is to analyze in depth, not to design. Rather, it should assign to a particular department the responsibility of execution of each

recommendation. Sometimes the audit team can suggest approaches.

9. Review Team Report

The activity of the review team should culminate in a concise, definitive report. The report should not be written by a safety department representative. This report should have two primary sections or areas of coverage. The first is a listing of loss exposure, both property and business interruption (B/I). The second is a listing of hazards, recommendations for preventing the hazards, assignment of responsibilities for actions, and target dates for action completions. In this latter section should also be dates for a check for action completion and assignment for doing this, as well as provision for closeout when action is satisfactorily completed. The checks and status reports are very suitably handled in meetings of the Plant Executive Safety Committee.

Each report should be dated and should be addressed to a specific person. The plant should decide upon the list of people who will receive copies of the report. In most plants the report should be addressed to the Plant Manager.

The team reports also serve as useful source material for future teams carrying out succeeding reviews of the same operating units. Copies of the reports should be sent to other Monsanto plants worldwide which have the same or similar operations.

10. Management Responsibilities in Implementing Biennial Reviews

In instituting plant biennial loss prevention and environmental control reviews the Plant Manager assumes significant responsibilities. He establishes the top priority which review team meetings shall have. He states the caliber of men who shall constitute a review team. He sets the basic policy regarding execution of the review team's recommendations. This policy needs to be one of assuming that the team's recommendations will be carried out unless justification, other than simple statements of lack of money, manpower, or time, is provided to the contrary or unless the recommendations are modified to accomplish the same hazard reduction in a more nearly optimum manner. The caliber of the team members must be such that their recommendations will be respected. The Plant Manager needs to recognize that, depending on the complexity of the unit being reviewed and other factors, the review of an operation can require 200 to 600 manhours spent by team members in meetings, by these people in work assignments made by the team to its members to be executed between team meetings, and by consultants whom the team may call in.

11. Plant Loss Prevention & Environmental Control Review Reports

Suggested Format

I. Title Page

Date of review
Division responsible for review
Location at which review held
Department, plant unit, or other subdivision reviewed
Location of reviewed project
Status--project status, years of operation of unit, etc.
Product(s)
Names, departments, and functions of those present
Distribution (include local safety supervisor and
Safety and Property Protection Branch, CED)

II. Loss Exposure, Property and Business Interruption (B/I)

Estimate probable maximum loss

Property value + (Daily production value* x assumed days down

*Daily production value = Sales value of production,
less raw materials, operating wages,
purchased utilities, repair wages and materials,
operating supplies, and royalties.

Outline assumptions made,--worst probable accident, fire
or explosion, etc.

III. Status of Prior Unresolved Hazards & Problems

Description
Planned solution and status of solution
Responsibility for action
Target date
Check date

IV. Hazards & Problems Uncovered by this Review

Description
Proposed solution
Responsibility for action
Target date
Check date
Influence on costs and scheduling
Changes needed in operating manual

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