

Risk- Based, Evidence- Directed Inspection Program

The Process Safety Management Rule, OSHA 29 CFR 1910.119(j), refers to industry standards such as American Petroleum Institute (API) for specific programs and guidelines for maintenance and inspection system development. The latest industry trend is to base maintenance and inspection programs on the combined risk (likelihood and consequence) of failure. The benefits of a Risk-Based Inspection Program are recognized in the industry, and a guideline by that name is currently under development from API (RP 580). Currently, there are existing standards which imply that the consequence of failure and likelihood of failure be considered for maintenance

and inspection programs, specifically in API 750 and API 570.

Aptech Engineering Services, Inc. (APTECH) recommends that companies adopt a philosophy similar to that used by some of our clients. Risk-Based Inspection can best be implemented through an Evidence-Directed Inspection Program. The evidence used in our system comes from the plant itself, and includes documentation of the hardware and knowledge of the people. Basing maintenance activities on an evidence-directed program makes good business sense. In many cases, the amount of inspection activity can be reduced and, in all cases, the inspection activity will be focused on the most critical areas of your plant.

APTECH has been involved for many years in risk analysis with the pipeline and power industries (nuclear and fossil fuel plants), and our extensive experience has been applied to the petrochemical industry. APTECH has developed and applied a risk-ranking approach, which considers both the likelihood and consequence of failure effects. Our program is a very practical approach in which the point of risk ranking is to efficiently utilize the maintenance budget on the high-risk equipment, not on the ranking process itself. We have also developed all of the necessary supporting software programs and procedures to augment your existing inspection activity.

A primary advantage offered by APTECH's program is that it is "evergreen," so the risk ranking of equipment can be continuously updated to include new available evidence, focusing maintenance resources on the highest risk items. APTECH can also apply the principles of the current API approach or higher order (more quantitative) approaches. Attached is a sample of the flowcharts used to develop the risk ranking of equipment.

Procedures

The following is a list of procedures APTECH has established and implemented for the Risk-Based, Evidence-Directed Inspection Program. These procedures are provided to the client as a standard part of APTECH's Risk-Based Inspection Program, along with the risk database.

- 🔥 Risk Directed Mechanical Integrity Procedure (AES-RR-01)*
- 🔥 Work Instruction for Likelihood of Failure Determination (AES-RR-02)*
- 🔥 Work Instruction for Consequence of Failure Determination (AES-RR-03)*
- 🔥 Guidelines for Establishing Inspection Frequency and Scope (AES-RR-04)
- 🔥 Guidelines for Updating Equipment Criticality (Evergreen Process) (AES-RR-05)*
- 🔥 Guidelines for Equipment Condition Assessment and Deficiency Resolution (AES-RR-06)*
- 🔥 Mechanical Integrity Risk Evaluation (AES-RR-07)*
- 🔥 Guidelines on Use of Risk Ranking Database (AES-RR-08)*
- 🔥 Work Instruction for Remaining Useful Life Determination (AES-RR-09)
- 🔥 Guidelines for Development of Specific Equipment Plans (AES-RR-10)
- 🔥 Work Instruction for the Development of the Equipment Checklist (AES-RR-11)
- 🔥 Work Instruction for the Development of Process and Location and PHA Information Forms (AES-RR-13)

For More Information

For additional information on Risk-Based Inspection and Prioritization or any other APTECH services, please contact Robert Heller or Edwin Merrick in APTECH's Houston, Texas office or call the APTECH office nearest you.

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*Flowcharts for these procedures are attached for your reference.

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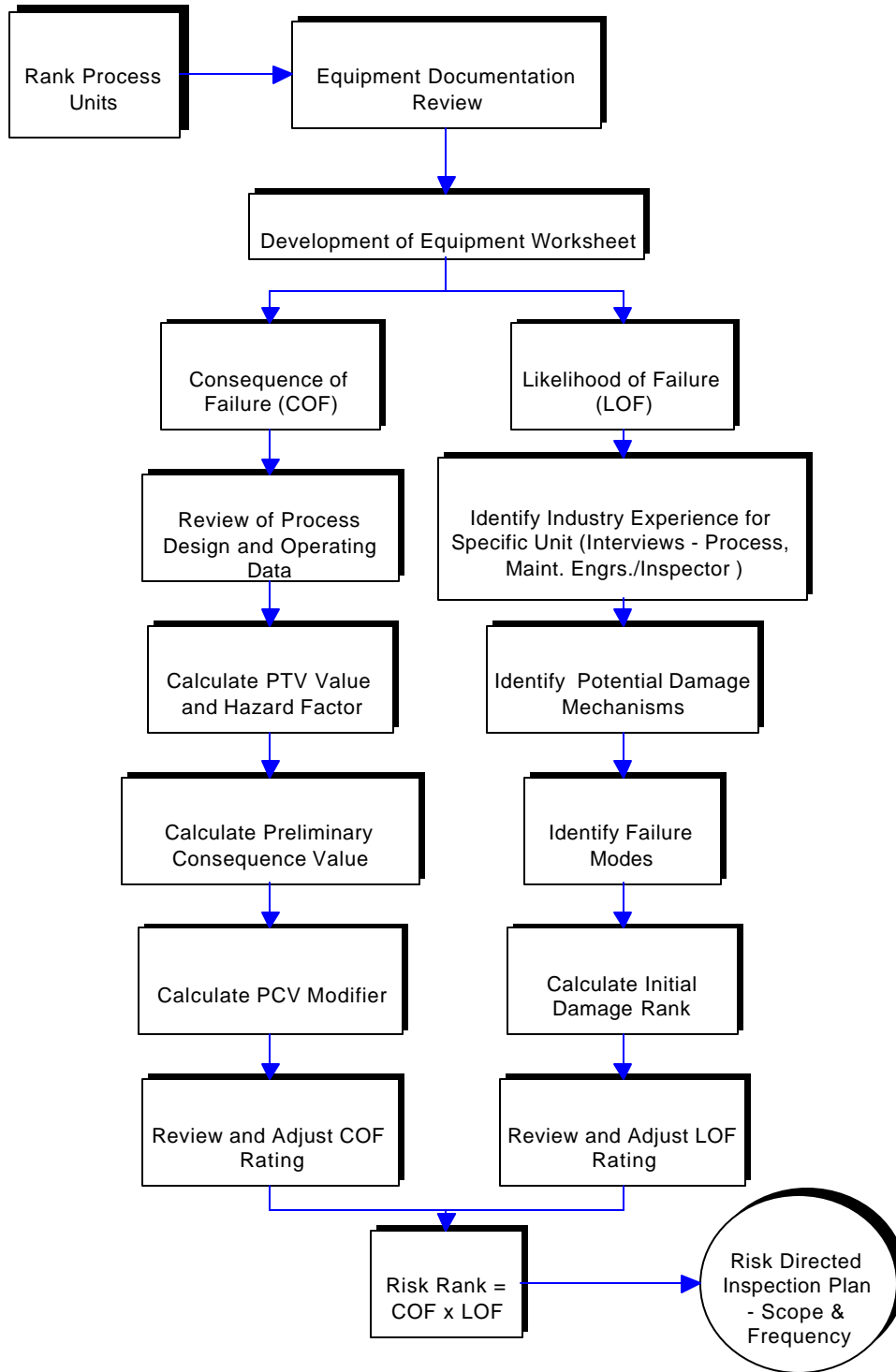


Figure 1 — Risk Ranking Process, Procedure AES-RR-01.

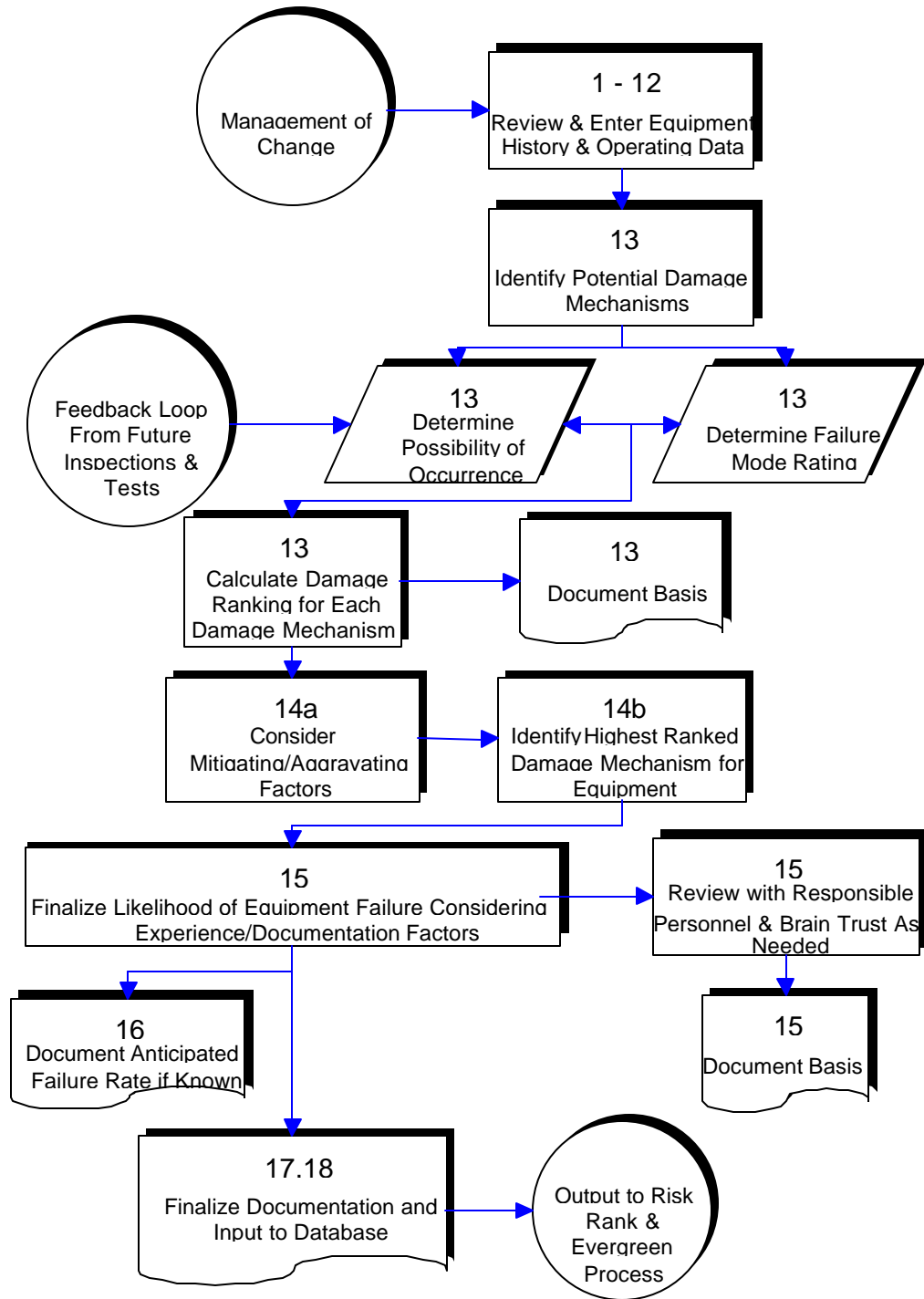


Figure 2 — Likelihood of Failure Determination, Procedure AES-RR-02.

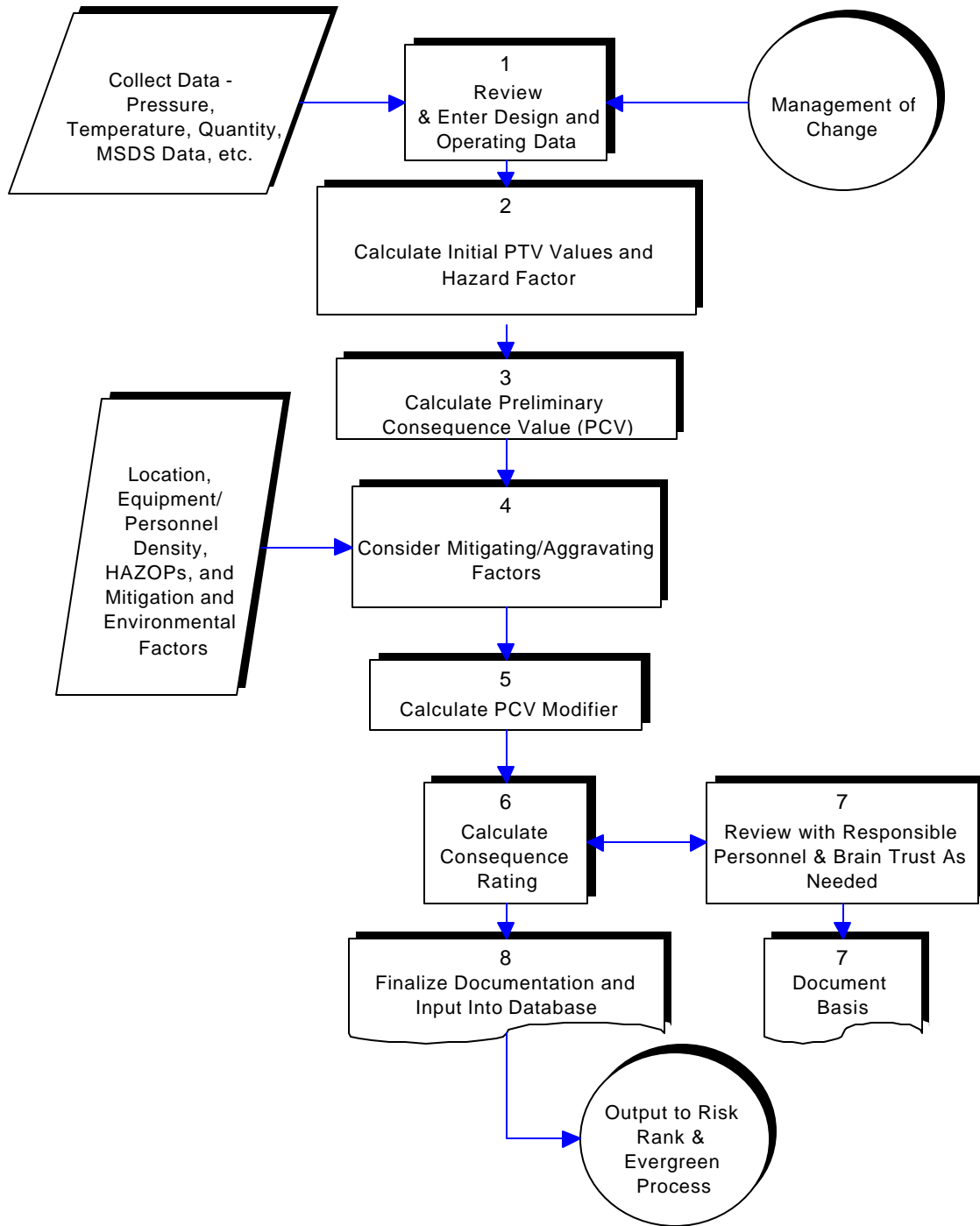


Figure 3 — Consequence of Failure Process, Procedure AES-RR-03.

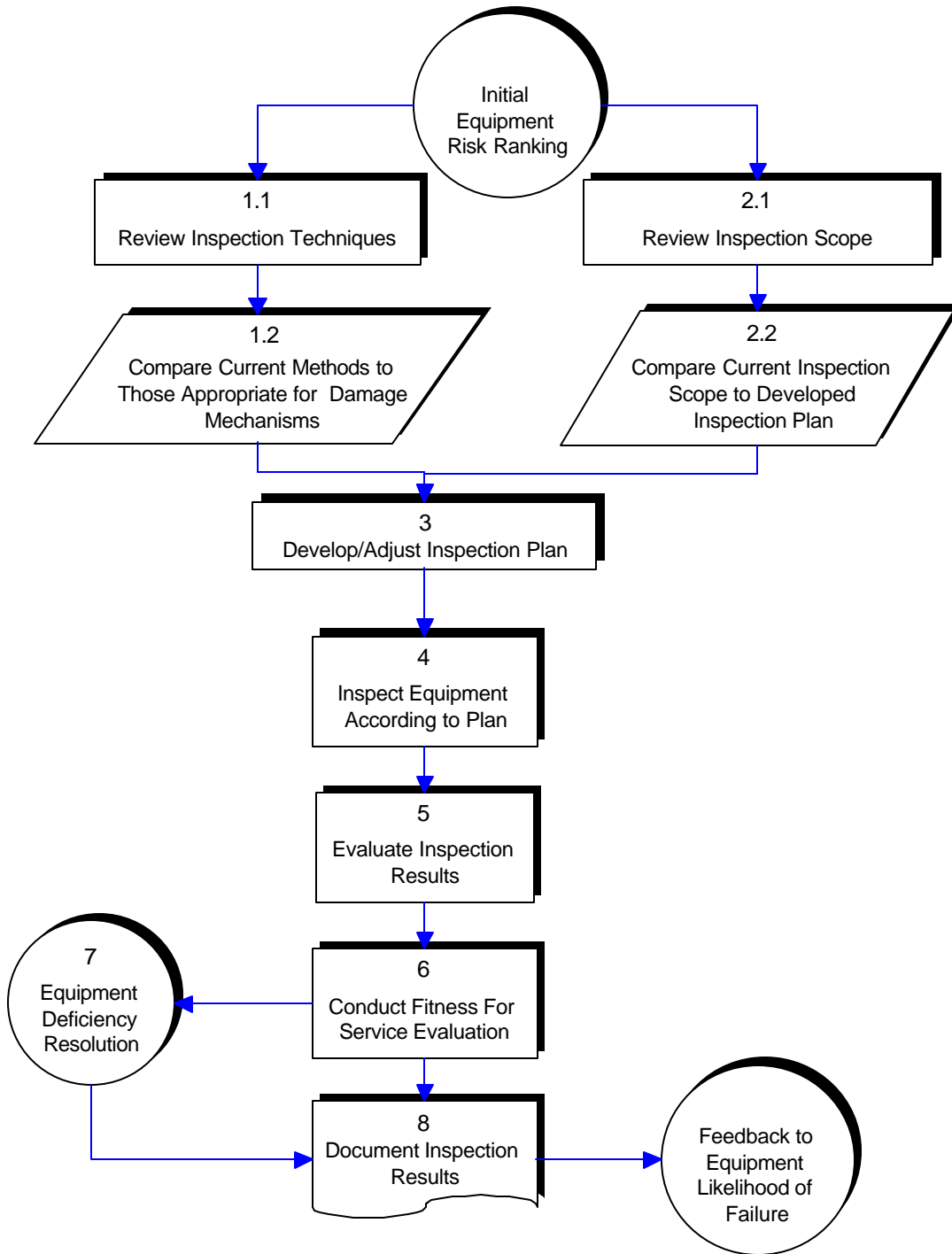


Figure 4 — Evergreen Procedure, Procedure AES-RR-05.

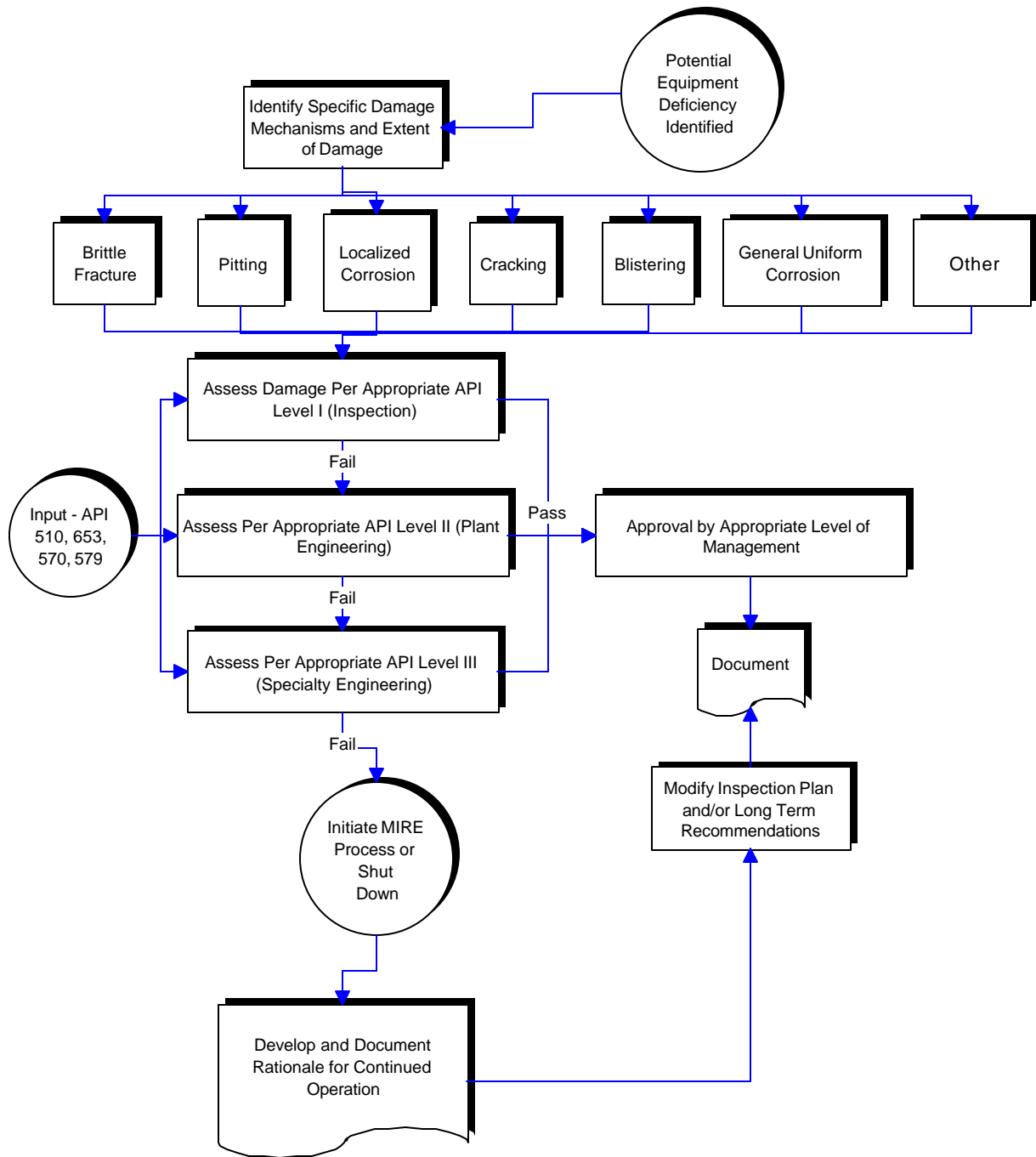


Figure 5 — Equipment Condition Assessment and Deficiency Resolution, Procedure AES-RR-06.

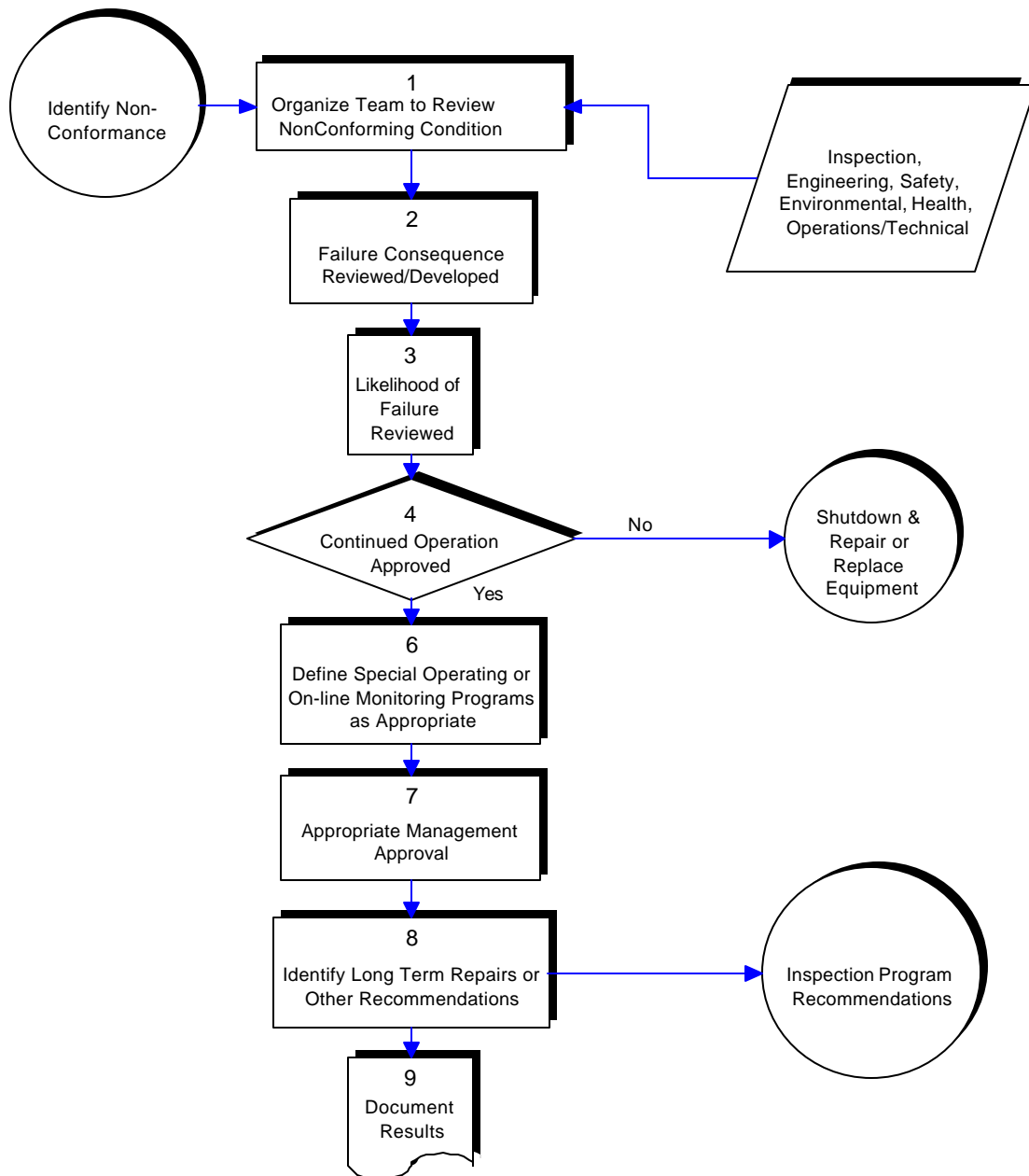


Figure 6 — Mechanical Integrity Risk Evaluation, Procedure AES-RR-07.

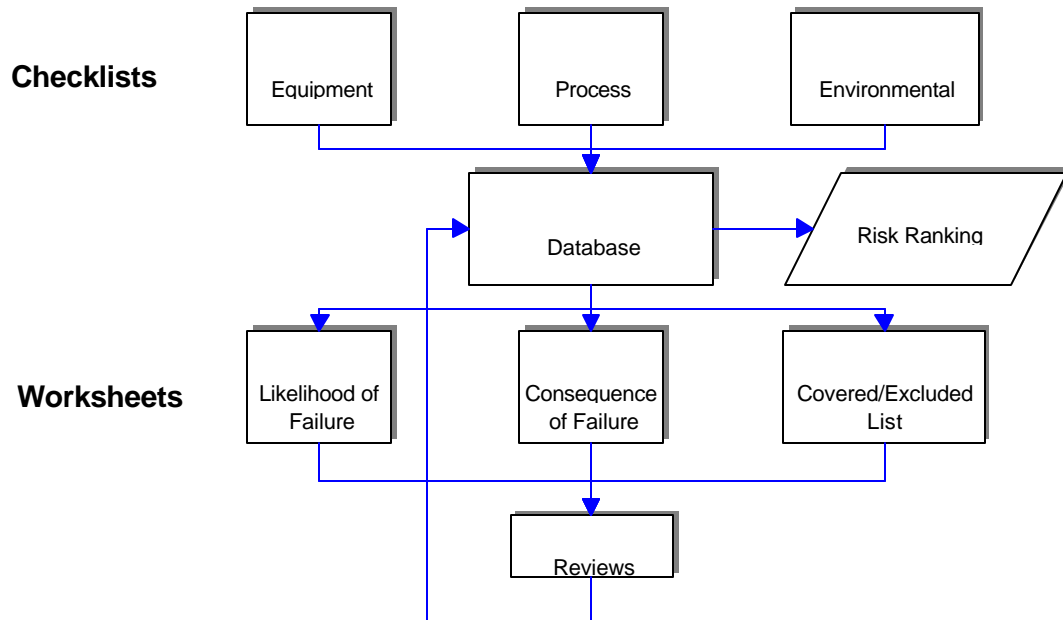


Figure 7 — Documentation Flow, Showing Relationship Between Checklists, Worksheets, and the Database, Procedure AES-RR-08.