ASSESSMENT REPORT

PROCESS SAFETY MANAGEMENT
OF
HIGHLY HAZARDOUS CHEMICALS
29 CFR 1910.119

For

Deer Park PVC Facility
Deer Park, Texas

Auditor

THOMAS M. JONES
OCTOBER 30 THROUGH NOVEMBER 3, 1995

Prepared By

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NGC 13258

PROCESS SAFETY MANAGEMENT ASSESSMENT

DEER PARK PVC PLANT

OCTOBER 30 THROUGH NOVEMBER 3, 1995

The purpose for conducting this review was to audit the requirements of OSHA's 1910.119 Process Safety Management of Highly Hazardous Chemicals standard respective to the implementation status at the Deer Park Plant. Through this process, opportunities for improvement and recognition of exceptional safety systems already implemented to address the PSM standard would be achieved.

An assessment of the implementation status for each element of the 1910.119 standard is included in this document. The implementation status corresponds to the following classification and is based on findings during the assessment process.

Stage I:	No action
Stage II:	Evaluating plant practices against system requirements
Stage III:	Developing plans to implement system requirements
Stage IV:	Implementing action plans
Stage V:	System in place
Stage VI:	Improvement reviewed and reaffirmed this year

A narrative summary for each element of the process safety management standard is included in order to provide a rationale for the status of each element. The GEON Company and the Deer Park Plant were extremely cooperative during this assessment process.

PROCESS SAFETY MANAGEMENT

FACILITY: *Deer Park PVC Plant*

REVIEW DATE: *October 30 through November 3, 1995*

REVIEWER: *T. Michael Jones*

PSM ELEMENT	IMPLEMENTATION STATUS					
	I	II	III	IV	V	VI
APPLICATION					✓	
EMPLOYEE PARTICIPATION					✓	
PROCESS SAFETY INFORMATION					✓	
PROCESS HAZARD ANALYSIS					✓	
OPERATING PROCEDURES			✓			
TRAINING				✓		
CONTRACTORS					✓	
PRE START-UP SAFETY REVIEW					✓	
MECHANICAL INTEGRITY					✓	
HOT WORK PERMIT						✓
MANAGEMENT OF CHANGE					✓	
INCIDENT INVESTIGATION					✓	
EMERGENCY PLANNING/RESPONSE					✓	
COMPLIANCE AUDIT					✓	
TRADE SECRET					✓	
	NA	EVAL	DEV	IMP	IN PLC	REAFFIR

"Safety - A Continuous Improvement Process"

NGC 13260

PROCESS SAFETY MANAGEMENT ASSESSMENT SUMMARY

APPLICATION: **1910.119(a)**

A facility should determine the extent to which it has identified PSM risks and characterized what it needs to do and know in order to manage these risks. Documentation of this activity is often not completely achieved but as a minimum should include, 1) the method used to determine which processes are included in the PSM program at the facility, 2) the logic for inclusion and exclusion of specific processes within a facility, 3) the intended method to maintain a process safety management program, and 4) the regulations or requirements with which the facility must comply.

The plant has an abundance of information available and recognition of the existence of this information should become a key part of the applications file. Therefore, it is important that an index to the total process safety management program be developed to include physical location and responsible person or position required to address each element of the standard. *(Opportunity No. A9501)*

EMPLOYEE PARTICIPATION: **1910.119(c)**

The intent of this paragraph is to assure employers afford their employees an opportunity to become involved in the process safety management activities at an elemental level. The plant's written employee participation policy is in place. The procedure allows for employee consultation in the following areas; 1) mechanical integrity, 2) process safety information, 3) safe work procedure preparation, 4) emergency planning and response, and 5) compliance audits. Employees at the Deer Park Plant have unrestricted opportunity to participate on Hazop teams, development of process safety information and to become involved in the day-to-day operation of the plant. Written documentation of employee participation was available for review and verified through interviews with plant personnel. No recommendations are thought necessary.

PROCESS SAFETY INFORMATION: 1910.119(d)

The intent of this paragraph is to provide complete and accurate information concerning the process. This information is essential for an effective process safety management program and for conducting process hazard analyses. Due to the extensive amount of written information required by this element and to facilitate easy retrieval and utilization of the data, a list of all available process safety information, location of the various pieces of information and who is responsible for maintaining and updating the data should be developed. Listing this information will also help to reduce the possibility of omitting critical data required by this section. *(Opportunity No. PSI9502)*

PROCESS HAZARD ANALYSIS: 1910.119(e)

Employers are required to develop a thorough, orderly, systematic approach for identifying, evaluating and controlling processes involving highly hazardous chemicals. There are six sections which must be considered to achieve minimum requirements outlined by this paragraph.

1. **Setting Priorities**: An initial hazard evaluation of the processes has been completed. The rationale for the prioritized order for completing PHAs was considered according to the standard.

2. **Methodology**: The plant utilizes Primatech software to conduct process hazard analyses. What-if or check list are also employed based on complexity of the process to be reviewed.

3. **PHA Scope**: The plant's PHA process is thorough and addresses all elements of paragraph 1910.119 (e)(3).

4. **Process Hazard Analysis Team**: Team membership includes experience from plant and process engineering, operating personnel, safety and environmental and at least one person skilled in the Primatech Hazop methodology. The plant completes biographical information on each member of a PHA team. Good participation from all levels of plant people is achieved at this facility.

5. **Team Findings and Recommendations:** Interviews with plant employees indicate that recommendations are resolved and there is no indication of "foot dragging" by GEON. Although considerable work has been expended to resolve PHA recommendations, there are still open items which must be brought to closure with complete documentation. *(Opportunity No. PHA9503)*

6. **Updating and Revalidating PHAs:** The plant is well aware of the requirements of this paragraph. The plant has completed a full PHA cycle and has started its second cycle which involves new reactors that are part of an expansion project. PHAs will be retained for the life of the process.

OPERATING PROCEDURES: 1910.119(f)

The requirements of this section are for the employer to provide clear instructions for safely conducting activities involved in the covered processes consistent with the process safety information assembled by the Deer Park PVC Plant. Plant operating procedures are presently being converted to ICT format. A careful review will be required by the plant to ensure that each operating phase listed in paragraph 1910.119 (f)(l)(i) is included in the rework. *(Opportunity No. OP9504)* In addition, operating procedures must include operating limits that outline consequences of process deviation and steps required to correct or avoid deviations. *(Opportunity No. OP9505)*

The PSM standard requires that operating procedures be reviewed as often as necessary to assure that they reflect current operating practices. In addition, these operating procedures are to be certified annually by the employer to insure the procedures, as written, actually reflect operating practice and technology. *(Opportunity No. OP9506)*

The plant is to be commended as it moves toward ISO 9002 certification. The entire ISO format lends itself nicely to the detailed documentation required by the PSM standard. There may be a need to develop a cross-reference system involving record documentation as there is considerable overlap causing redundancy in several areas.

TRAINING: 1910.119(g)

The intent of this section is to help employees understand the nature and causes of problems arising from process operations and increase employee awareness with respect to the hazards of a particular process. Effective training and retraining programs can significantly reduce the number and severity of incidents arising from process operations. Proper initial training and retraining programs can be instrumental in preventing small problems from becoming or leading to catastrophic events.

Deer Park operators have completed NUS basic process operator training with good documentation in place. Written certification indicating that operators, involved in operating a PSM process prior to May 26, 1992, have the required knowledge, skills, and ability to safely carry out their duties. It would be best management practice to apply this same activity to maintenance people complete with why a person was certified. *(Opportunity No. T9507)* Training records must include information indicating that each employee involved in operating a PSM process has been trained in each phase listed under paragraph 1910.119 (g)(l)(i) dealing with consequences of deviation and steps to avoid deviations. *(Opportunity No. T9508)*

Employers must consult with their employees who are involved in operating a covered process to determine the appropriate frequency (minimum of once every three years) for retraining. This effort must be documented for record. *(Opportunity No. T95090)*

The plant is presently maintaining training records manually with records being stored in more than one location. It is recommended that an electronic data management system be employed to handle this large volume of information. *(Opportunity No. T9510)*

CONTRACTORS: 1910.119(h)

The intent of this section is to require employers who use contractors to perform work in and around processes involving highly hazardous chemicals to establish a screening method to select contractors who will accomplish the task without compromising the safety of the Deer Park Plant. The contractor, as an employer, has specific responsibilities under this standard and must assure that their employees are trained on performing the job safely, the hazards relating to the job and understand the provisions of the owner's emergency response plan. Deer Park may want to consider adding a section to purchase orders for contractor services listing their

responsibilities under paragraph 1910.119 (h)(2)(v). *(Opportunity No. C9511)* In addition, it is recommended that an audit of contractors (routinely used) to verify that they are fulfilling their obligations according to paragraph 1910.119 (h)(2)(v). *(Opportunity No. C9512)*

Superintendents from Amber Electric and CCC were interviewed at length to determine their knowledge of Deer Park's safety, health and environmental requirements. Both of these superintendents had been associated with this facility for some time and had a clear understanding of plant requirements. Contractors are an integrated part of the Deer Park Plant culture and participate in routine safety meetings, incident investigations and safety and housekeeping inspections.

PRE START-UP REVIEW: 1910.119(i)

New processes and modified processes which necessitate a change to the plant's process safety information dictate considerations before highly hazardous chemicals are introduced into the process. These requirements include a pre start-up safety review to confirm that the following actions have been addressed:

- Construction and equipment is according to design and specification.
- Safety, operating, maintenance and emergency procedures are in place and adequate.
- A PHA or other hazard recognition methodology has been performed and recommendations have been resolved or implemented.
- Management of change (if required) and training of each employee and contractor involved in the process has been completed.

Pre start-up reviews are routinely completed. This activity has been documented complete with actions to resolve findings. No recommendations are thought necessary.

MECHANICAL INTEGRITY: 1910.119(j)

This section of the PSM standard establishes requirements to assure that equipment used to process, store, or handle highly hazardous chemicals is designed, constructed, and maintained to minimize the risk of a chemical release. The elements of a mechanical integrity program include the identification and categorization of equipment and instrumentation, the development of written maintenance procedures, training for process maintenance activities, inspection, testing and correction of deficiencies outside of acceptable limits and a quality assurance program.

Using the document, *Elements of a Written Technical PSM Analysis* (Appendix 1) and SA-136 *Corporate Mechanical Integrity Policy*, as guidelines for establishing inspection protocols, what equipment and systems are either included or excluded in a PSM program, the Deer Park Plant should develop a site specific mechanical integrity policy. This policy should reflect actual actions being executed at the plant. *(Opportunity No.MI9513)* All elements according to paragraph 1910.119 (j)(l) are being addressed. Inspections are being completed by outside vendors complete with report documentation. There are areas where improvements can be made to the M.I. program by providing better follow-up on inspection recommendations (natural gas line). There may be other similar circumstances which were not discovered during the audit that will require attention. *(Opportunity No. MI9514)*

The plant has a very good relief valve and rupture disc program. When relief valves are removed from service and sent to a test shop, each P.R.V. is "popped" which allows historical data to be collected. To enhance this activity further, it is recommended that a random audit system be established whereby relief valve repairs and settings are verified prior to being received in the plant. *(Opportunity No. MI9515)*

HOT WORK PERMIT: 1910.119(k)

Employers must control, in a consistent manner, non-routine work in process areas covered by the standard. Specifically, this element is concerned about permitting hot work operations associated with welding and flame cutting in highly hazardous chemical process areas. Minimum requirements to comply with this section include meeting OSHA's 1910.252(a) General Requirement Standard.

The Deer Park Plant's safety procedure meets the requirements of OSHA's 1910.252 standard. Rigid controls are in place which must be followed in order to weld or burn in any area of the Deer Park Plant. The hot work authorization policy requires written permit and approval before work can be performed in the plant. Instruments used to verify L.E.L. readings are maintained by the instrument personnel on a regular basis complete with records of instrument calibration.

Evidenced through interviews with both plant and contract employees, there is good comprehension of the hot work policy at this plant. No recommendations are thought necessary.

MANAGEMENT OF CHANGE: 1910.119(l)

Careful consideration of all modifications to equipment, procedures, raw materials and process conditions other than "replacement in kind" must be controlled by identifying and reviewing prior to implementing a change. The plant has a management of change procedure which functions very well. Plant people that were interviewed have knowledge of the policy and generally comprehend how M.O.C. activities are carried out. There is a method to insure all operating employees impacted by a M.O.C. take place. It is recommended that this information sharing activity be expanded to GEON maintenance people and contractors as appropriate. There are two recommendations that should be implemented to improve this policy. 1) Utilize a form as a check list to ensure all steps of 1910.119 (l)(1) through 1910.119 (l)(5) are achieved. *(Opportunity No. MOC9516)* and 2) Establish a list of positions who have the authority to approve M.O.C.s in the plant. *(Opportunity No. MOC9517)*

INCIDENT INVESTIGATION: 1910.119(m)

The plant is required to investigate each incident which results in, or could reasonably have resulted in a catastrophic release of highly hazardous chemicals in the workplace. The plant is accustom to reporting any high incident potential as part of their safety culture for preventing accidents. The preparation of narrative reports to document the investigation activities includes causal analysis (management system investigation) to pinpoint the root causes is a normal course of action at this plant. Continued tracking of action item recommendations to closure and making this information available for use when PHAs are conducted will pay long term dividends. *(Opportunity No. II9518)*

EMERGENCY PLANNING AND RESPONSE: **1910.119(n)**

This paragraph requires employers to address what actions employees are to take when there is an accidental release of highly hazardous chemicals. The plant has a comprehensive emergency response plan which addresses the requirements of this element. The plant has trained emergency response personnel to respond to Hazmat type incidents beyond their assigned work areas. The plant also trains this group to the structural interior firefighter level for manual intervention of major fire scenarios. No recommendations are thought necessary.

COMPLIANCE AUDIT: **1910.119(o)**

Employers are required to audit (self evaluate) the effectiveness of their PSM program to identify improvement opportunities and take appropriate corrective action to resolve deficiencies. *(Opportunity No. CA9519)* Minimum requirements include:

- Audit at least every three years
- Each element has been investigated
- Include at least one person knowledgeable in the process
- Develop a report of the findings:
  - Document response to each finding
  - Track to completion
  - Document closure
- Retain the two most recent audits.

TRADE SECRETS: **1910.119(p)**

This section requires employers to provide all information necessary to comply with personnel developing sections 1910.119(d) process safety information, 1910.119(e) PHA's, 1910.119(f) operating procedures, 1910.119(n) emergency planning and response, and 1910.119(o) compliance audits without regard to possible trade secrets. The GEON Company and the Deer Park PVC facility have provided all information requested to conduct the 1910.119 Process Safety Management of Highly Hazardous Chemicals Audit.

T.Michael Jones, CSP

12/18/95
Date

IMPROVEMEI OPPORTUNITIES
1995 PSM AUDIT - DEER PARK PVC PLANT

ELEMENT	I. NO.	DESCRIPTION	RESPONSIBILITY	TARGET DATE	COMPLET DATE
Application 1910.119(a)	A9501	Develop an index system that will clearly identify the PSM file contents, location of data and the person(s) responsible for each portion of the PSM effort.	J. B. CANN		4/30/96
Process Safety Information 1910.119(d)			J. B. CANN		
Process Hazard Analysis 1910.119(e)			A.F.DESANTIS		
Operating Procedures 1910.119(f)	OP9504	Review each operating procedure, as they are being reworked by ICT, to ensure inclusion of each operating phase listed under paragraph 1910.119(f)(l)(i).	E.L.PAYNE		
	OP9505	Ensure operating procedures include operating limits that outline consequences of process deviation and steps required to correct or avoid deviations.	E.L.PAYNE		
	OP9506	Establish a routine to review and certify annually that operating procedures are current, accurate and reflect existing process technology.	E.L.PAYNE		
Training 1910.119(g)	T9507	Verify completeness of file documentation where Deer Park Plant has "grandfathered" operators involved in operating a process prior to May 26, 1992. Apply this same activity to maintenance craft person. Ability to justify why a person was "grandfathered" will be best management practice.	E.L.PAYNE L.HENDERSON		

ELEMENT	IO#	DESCRIPTION	RESPONSIBILITY	TARGET DATE	COMPLETI DATE
Training 1910.119(g)	T9508	Training records must include information indicating that each employee involved in operating a PSM process has been trained in each phase listed under paragraph 1910.119(g)(l)(l). Operating limits relating to consequences of deviation and steps to avoid deviations need to be addressed	E.L.PAYNE		
	T9509	Employers must consult with its employees, who are involved in operating the PSM process, to determine the frequency for refresher training. Document this effort.	E.L.PAYNE		
	T9510	Recommend converting manual training data management system to electronic data management system such as TRIM. This system is used at several GEON facilities.	E.L.PAYNE		
Contractors 1910.119(h)	C9511	Implement a requirement whereby contractors, as an employer, understand and carry out their responsibilities under paragraph 1910.119(h)(2)(v).	J.HEINTSCHEL		
	C9512	Deer Park person(s) should audit contractors (routinely used by the plant) to verify that they are fulfilling their responsibility according to paragraph 1910.119(h)(2)(v).	W.H.LINDSTROM J.A.HEINTSCHE.		5/1/96
Mechanical Integrity 1910.119(j)	MI9513	Recommend plant develop site specific Mechanical Integrity policy to reflect actual actions being executed in complying with this element. Review the document *Elements of a Written Technical PSM Analysis* (Appendix No. 1) so that all appropriate equipment/systems are included and non PSM equipment/systems are excluded with reasons for each decision.	W.H.LINDSTROM		
	MI9514	Where recommendations have been made to correct deficiencies noted during inspection of PSM elements, timely action to resolve, complete documentation and communication to appropriate people must be achieved, i.e. natural gas pipeline.	W.H.LINDSTROM		4/19/96
	MI9515	Establish random audit system whereby relief valve repairs and settings are verified at repair shop prior to receiving in plant.	W.H.LINSTROM		4/19/96

ELEMENT	ID#	DESCRIPTION	RESPONSIBILITY	TARGET DATE	COMPLETE DATE
Management of Change 1910.119(l)	MOC9516	Develop check list type form to ensure, except for "replacement in kind", management of change request address technical basis for change, impact on safety and health, modifications to operating procedures, necessary time period, authorization required, informing and training of affected employees, and updating process safety information and operating procedures or practice.	E.J.McKINLEY M.W.REYNOLDS B.DESJARDINS		
	MOC9517	Develop a list of positions who have authority to approve a M.O.C. involving other than "replacement of kind" in a PSM area.	E.J.McKINLEY		
Incident Investigation 1910.119(m)	II9518	Take action to bring formal closure to action item recommendations noted during incident investigations.	B.DESJARDINS		4/15/96
Compliance Audits 1910.119(o)	CA9519	Retain the two most recent audits. Utilizing report findings, develop response, take corrective action and document closure.	B.DESJARDINS		4/15/96

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Process Safety Information 1910.119(d)	PSI9502	Maintain a data base of information pertaining to the chemicals of the process, technology of the process and equipment in the process. To facilitate easy retrieval and utilization of this information, it is recommended that an index system be maintained including methods for updating and maintaining the data current.	J. B. CANN		
Process Hazard Analysis 1910.119(e)	PHA9503	Provide proper disposition for all items resulting from Hazops regardless of whether or not they have value and are actually implemented. Closure of findings and communication to appropriate people are critical parts of the documentation necessary to complete a process hazard evaluation.	A.F.DESANTIS		
Operating Procedures 1910.119(f)	OP9504	Review each operating procedure, as they are being reworked by ICT, to ensure inclusion of each operating phase listed under paragraph 1910.119(f)(i)(i).	E.L.PAYNE		
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	T9509	Employers must consult with its employees, who are involved in operating the PSM process, to determine the frequency for refresher training. Document this effort.			
	T9510	Recommend converting manual training data management system to electronic data management system such as TRIM. This system is used at several GEON facilities.			
	C9511	Implement a requirement whereby contractors, as an employer, understand and carry out their responsibilities under paragraph 1910.119(h)(2)(v).			
	C9512	Deer Park person(s) should audit contractors (routinely used by the plant) to verify that they are fulfilling their responsibility according to paragraph 1910.119(h)(2)(v).			
Mechanical Integrity 1910.119(j)	MI9513	Recommend plant develop site specific Mechanical Integrity policy to reflect actual actions being executed in complying with this element. Review the document *Elements of a Written Technical PSM Analysis* (Appendix No. 1) so that all appropriate equipment/systems are included and non PSM equipment/systems are excluded with reasons for each decision.			
	MI9514	Where recommendations have been made to correct deficiencies noted during inspection of PSM elements, timely action to resolve, complete documentation and communication to appropriate people must be achieved, i.e. natural gas pipeline.			
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Compliance Audits 1910.119(o)	CA9519	Retain the two most recent audits. Utilizing report findings, develop response, take corrective action and document closure.			

Appendix No. 1

ELEMENTS OF A WRITTEN TECHNICAL PSM ANALYSIS

1. IDENTIFY HHC CHEMICALS

Processes that contain HHC chemicals are included in PSM per OSHA list and definitions.

2. APPLICATION OF PSM BY PROCESS AREA (PLOT PLAN)

- Establish typical physical boundaries that plant personnel relate to
- Identify areas that are known "hazardous areas"
- Sketch this information onto a plot plan

3. SAFEGUARD EQUIPMENT ARE COVERED - INCLUDING SUCH SYSTEMS AS:

Fire water, instrument air, gas monitors, flares, pressurized control room compressors, cooling water, breathing air systems, etc.

4. REVIEW PROCESS OUTSIDE PSM AREA THAT MAY AFFECT A COVERED AREA

- Utilities, non-HHC raw materials, waste treatment, etc.
- Identify effects of functional and mechanical failures
- Include processes that have potential for catastrophic consequences
- Exclude systems/equipment that have no effect on the HHC process
- Exclude systems/equipment that catastrophic consequences for failure are mitigated by highly reliable redundant design and are proven to not cause an emergency status.

Note: It's OSHA's position that - system failures that result in enactment of an emergency procedure on a HHC process and these failures (emergency procedure enacted) result in going to the last line of defense is a test for inclusion, and associated systems are to be included under the standard.

5. REVIEW PROCESSES WITHIN A PSM PROCESS AREA FOR POSSIBLE EXCLUSION

- Include all components that contain the HHC (piping, vessels, etc.)
- Identify effects of functional and mechanical failures of equipment supporting the HHC process
- Exclude systems/equipment that have no effect on the HHC process
- Exclude systems/equipment that catastrophic consequences for failure are mitigated by highly reliable redundant design
- Exclude systems of the HHC process that upon failure are mitigated by highly reliable redundant design, and are not the last line of defense.

5a. CONTROLS

- Define controls to include instrument loops which provide information or control of process variables which have safe operating limits. (Cross reference with operating procedures)
- Include loops which upon failure result in loss of process control, or provide information which could result in improper process control.
- Establish rationale by which process control loops will be included or excluded.

6. REVIEW PLANT FOR NON HHC PROCESSES THAT UPON FAILURE MAY WITHIN THEMSELVES LEAD TO A CATASTROPHIC EVENT - for inclusion within the mechanical integrity section of PSM.

- Based on incident investigation
- Input from employees

7. DOCUMENT ANALYSIS, DEVELOP PSM LISTS OF THE PLANT'S COVERED EQUIPMENT AND PROCESSES

- Analysis report - a body of information defining scope, purpose, and results
- Detail method for application to mechanical integrity
  - Marked up P&IDs
  - Equipment lists

Note: It's OSHA's position that - system failures that result in enactment of emergency procedures on HHC processes and these failures (emergency procedure enacted) result in going to the last line of defense, is a test for inclusion.

VERY IMPORTANT TO REMEMBER THE NEXT STEP!
Once you think you have found something to include, what then?

8. ONCE A SYSTEM IS INCLUDED, THE NEXT STEPS ARE TO PREPARE THE APPROPRIATE MECHANICAL INTEGRITY PROGRAMS THAT ARE NECESSARY TO MITIGATE THE IDENTIFIED SYSTEM FAILURE.

- Programs can vary based on risk, probability, existing historical data, but above all SOUND ENGINEERING JUDGMENT that must be documented. For example:
  - A hydrocarbon containing vessel will be inspected per API 510.
  - A cooling water system that is necessary for a HHC process control shall be inspected to mitigate a total failure, not minor leaks - thus a visual inspection program that initiates action based on small leaks may be appropriate.
  - A chlorine line will be inspected per chlorine pamphlet #60.
- Utilize qualified mechanical integrity personnel
- Include all appropriate industrial standards (API, ASME, ANSI, etc.)
- Utilize existing historical data
- Consider consequences
- Document all inspections and testing basis.

AUDITOR QUALIFICATIONS

T. MICHAEL JONES:

Mike Jones has worked in the petrochemical industry with The BFGoodrich Chemical Company, Diamond Shamrock Chemicals, Cain Chemical and Occidental Chemical Corporation for 29 years. He was the Corporate Manager - Facility Safety and Industrial Hygiene for OxyChem until he elected early retirement in September, 1993, to form the company of T.Michael Jones & Associates. Mike is a Certified Safety Professional with extensive experience in plant operations, maintenance, engineering design/construction, safety, industrial hygiene, emergency management, and process safety management. Product manufacturing experience includes synthetic rubber, PVC resin, vinyl chloride monomer, olefins and aromatics, ethylene dichloride, caustic soda, chlorine, and ethylene oxides/derivatives. He holds a B.S. Degree in Industrial Arts and Chemistry from Stephen F. Austin University and a M.S. Degree in Engineering Management from Louisiana State University Baton Rouge.