DOE-STD--1048-92

DE93 009357

DOE STANDARD

DOE PERFORMANCE INDICATORS GUIDANCE DOCUMENT

U.S. Department of Energy
Washington, D.C. 20585

AREA SAFT

DISCLAIMER

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Foreword

The DOE Performance Indicator (PI) Program was initially established by SEN-29-91, which directed that a Department-wide uniform process for trending and analysis of operational data be established for DOE facilities. The requirements for trending, analyzing and reporting operational data are defined by DOE Order 5480.26.

This standard (DOE-STD-1048-92) applies to the facilities participating in the DOE PI Program (identified in Appendix 1) and provides information on:

- Definitions and clarifications of the Department's PIs;
- Facilities/programs/activities included in the DOE PI Program;
- Trending and analysis methodologies;
- Schedule, content and format of the contractor, Field Office and Program Secretarial Officer Quarterly reports.

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Preface

1. Generic Terms and Clarifications

- **Contractor Totals** (PI 1.5, 1.6, 2.5, 4.1, 4.2, 4.3): The intent is for the contractor (as identified on the PI Facility List) to report a total for that location and is not limited to data from the PI facilities assigned to the contractor. Subcontractors and visitors are excluded from PIs 1.5 and 1.6 (see PI 1.5 and 1.6 definitions for clarification).

- **DOE**: Department of Energy

- **E, U, ON** (DOE Order 5000.3B section references for occurrence categories): E=Emergency, U=Unusual, ON=Off Normal

- **ES&H**: Environment, Safety and Health as defined by Order 5482.1

- **Final Versus Draft Audit Issues**: Items will be counted on official correspondence received from the organization responsible for identifying the item. Issues cited in draft correspondence (either from DOE or other organizations) will not be counted in the PI program.

- **FO**: DOE Field Office. The FOs participating in the DOE PI Program are: Albuquerque (**AL**), Chicago (**CH**), Idaho (**ID**), Nevada (**NV**), Oak Ridge (**OR**), Rocky Flats (**RF**), Richland (**RL**), San Francisco (**SF**), Savannah River (**SR**). **XX** has been used as the Field Office designation for facilities which do not report to one of the other FOs.

- **Open Versus Closed Issues**: Issue closure will be determined by the facility management (Contractor) when all associated corrective actions are completed (rather than when DOE signoffs are completed). If subsequent actions by DOE result in reopening an issue, then it will be counted under the PI Program. The original due date (in effect at the time of closure) will be used when the item is reopened until the Contractor formally reschedules its closeout for a future quarter.

- **1 Occurrence Report May Identify More Than 1 PI Event** (PI 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 3.3): It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using Occurrence Report Processing System as a source for PI data. Individual ORs must be reviewed to determine the PIs involved.

  For example, one occurrence report could describe an unplanned shutdown which resulted from a violation of operating procedures and included an environmental incident spill which contaminated one person. This will be counted as 1 for each of the PIs involved.

- **OSH:** Occupational safety and health.

- **OSHA**: Occupational Safety and Health Act.

- **PI**: Performance Indicator. Operational information which is indicative of the performance or condition of a facility, group of facilities, or site.

- **PSO**: Program Secretarial Officer. The PSOs participating in the DOE PI Program are: Defense Programs (**DP**), Environmental Restoration and Waste Management (**EM**), Energy Research (**ER**), Fossil Energy (**FE**), Nuclear Energy (**NE**).

- **Reportable Occurrences** means reportable under DOE Order 5000.3, "Occurrence Reporting and Processing of Operations Information".

2. Key Program References

- Tasking memorandum, J. D. Watkins to W. H. Young, "Performance Indicators for Department of Energy Operations", 11-2-90.

- Letter, J. D. Watkins to The President, "Results of the Required Office of Management and Budget Evaluation of DOE's Management Control System", 12-21-90.

- Memorandum for All Department Heads from John C. Tuck, "Headquarters/Field Realignment", 12-28-90.

- SEN-29-91, "Performance Indicators and Trending Program for Department of Energy Operations", 1-11-91.

- Guidance Memo, W. H. Young to PSOs and Managers of FOs, "DOE Performance Indicator (PI) Program", 3-7-91.

- Guidance Memo, W. H. Young to PSOs and Managers of FOs, "DOE Performance Indicator (PI) Program - Clarification of PI Definitions and Related Program Issues", 9-12-91.

- NE-73 to Distribution (PSOs and FOs, PI Primary Contacts), "DOE Performance Indicator (PI) Program - Summary of 1-Year Review Meeting, July 7-9, 1992", 7-28-92.

- DOE Order 5480.26, "Trending and Analysis of Operations Information Using Performance Indicators", December 1992.

Summary - Requirements Overview

1. Purpose

SEN-29-91 directed that a Department-wide uniform process for trending and analysis of operational data be established for DOE facilities.

This Performance Indicator (PI) Program establishes a uniform system for trending and analyzing operational data providing an important tool to help assess and support progress in improving performance and strengthening both DOE and contractor line management control of operations.

DOE, similar to the commercial nuclear industry, considers that facilities with good performance, as measured by an overall set of performance indicators, are well-managed facilities. The Performance Indicator Program established by SEN-29-91 is but one of several initiatives undertaken by DOE to instill a new DOE and DOE contractor line management culture committed to achieving a rising standard of acceptable performance. Line management trending and analysis of data depicting the performance of their facilities is an essential element in creating this culture of "continuous improvement", where performance gains achieved are maintained and early identification of deteriorating environmental, safety, and health conditions is accomplished.

The intent of establishing this program is to enhance the safety culture in both DOE and contractor organizations by using PIs to improve performance. It is expected that active management involvement with facility operations will include using PIs, so that potential problems and/or deteriorating conditions related to environment, safety, and health activities can be readily identified and promptly corrected. In addition, good practices are identified which can be applied to benefit other DOE operations areas.

To support the goal of continuous improvement, program review meetings with the participating organizations will be conducted periodically. PSOs are encouraged to have periodic meetings with the organizations under their cognizance.

An objective of this program is to provide trends and analyses of operational data that will be useful to both DOE and its contractors. As directed in SEN-29-91, each PSO shall maintain direct responsibility for ensuring the preparation and accuracy of the PI data for the activities under their cognizance.

It is important to recognize the diverse nature of the types, missions, and staffing levels of the facilities participating in the DOE Performance Indicator Program. Because of these differences, direct comparison of the facilities and their PI values is not appropriate and may lead to erroneous or suspect judgments regarding performance. It should also be kept in mind that the absence of a facility or group of facilities from the list of top contributors does not necessarily imply that performance is either acceptable or unacceptable. Assessments of this nature and conclusions reached on adequacy of performance must be based on evaluation of all the relevant operational information and are the responsibility of line DOE program, field, and contractor management.

It is a requirement that all data reported in this program be unclassified. Modifications to data requirements will be made as necessary to meet this requirement.

2. Program Development

The steps involved in development and implementation of any performance indicator system, and those employed for the development of the DOE PI program, are:

1. Identify general areas that represent the scope of operations.
2. Choose reporting elements that are representative of the span of operations.
3. Select specific parameters which can serve as representative leading indicators of safe performance in those general operations areas.
4. Collect information in a concise form to assist line management in viewing their operations with a broad, integrated perspective.
5. Use a consistent structure, organization and method of presenting the data to minimize the mechanics of interpreting the data and enable management to focus on using the information to support engineering judgments in areas which significantly influence DOE operations.

The PIs chosen represent the consolidation of information that, in some cases, was previously reported to separate areas of DOE or, in other cases, not reported at all. PI development considered:

- Current nuclear industry programs (NRC and INPO);
- Office of Environment, Safety and Health pilot PI program; and
- DOE Senior Management input.

3. Scope and Applicability

This PI Program will be implemented throughout the Department, except for the Naval Nuclear Propulsion Program.

The required level of detail identifies the discussion of the facilities (or contractor totals for FOs) within the responsibilities of the organization preparing the PI Report. The required level of detail for each of the PI reports is shown below.

Reporting Organization	Required Level of Detail
Contractor	Facilities
FO	Contractors
PSO	Facilities (programmatic)
DOE Summary	Facilities

The facilities participating in the DOE PI Program are listed in Appendix 1. The corresponding Contractors, FOs, and PSOs are also identified.

The facility selection considered the necessity to limit the number of reporting units to a manageable size and the requirement to represent the full scope of significant DOE activities within each program office.

4. Program Implementation

Data collection and reporting will originate with the DOE contractors responsible for the operation of the facilities designated in Appendix 1. Each PSO is responsible for the preparation and accuracy of the data for the activities under their cognizance. As a vital part of meeting this responsibility, each PSO shall establish a program to verify the accuracy of the PI data being reported by contractors under their direction. Development of the verification program shall be planned to ensure that data can be verified from the onset of the PI Program (first quarter 1991). The data verification program of each PSO shall be documented in a form that is auditable.

To facilitate successful implementation of this PI Program, a PI Program Primary Contacts List is maintained and distributed by NE-70 which identifies designated PI coordinators and alternates for each organization participating in the program. The list will be periodically reviewed and updated information shall be provided by the participants as necessary to NE- 70. This list is used to encourage communications, provide information on program changes/modifications, and to conduct periodic program surveys and review meetings.

5. Schedule and Distribution

5.1 Schedule

The schedule for data submittal and PI Report completion is provided in Table 1. The data is due from the Contractor 60 days after the end of the quarter. Data is "frozen" (no further changes shall be made) 2 weeks later. The Contractor PI Reports are due 2 weeks later (90 days after the end of the quarter). FO PI Reports are due 1 week after the Contractor PI Reports. PSO PI Reports are due 1 week after the FO PI Reports. The DOE Summary PI Report is due 3 weeks after the PSO PI Reports.

5.2 Distribution

PI Report distribution is the responsibility of the report originator. The minimum required distribution is:

- Contractor PI Reports and associated data sheets: FO, affected PSOs, and NE-70 (2 copies).
- FO PI Reports and associated data sheets: applicable Contractors and PSOs, NE-70 (2 copies).
- PSO PI Reports and associated data sheets: affected FOs and PSOs, NE-70 (2 copies), the respective PSO Special Assistant in the Office of the Secretary, Assistant Secretary for Environment, Safety and Health (EH-1), Office of Nuclear Safety (NS-1).
- DOE Summary Reports: Office of the Secretary (S-1), The Deputy Secretary (S-2), EH-1, NS-1, PSOs (DP, EM, ER, FE, NE), FOs.

Additional distributions of all or portions of any of the PI reports may be determined locally as considered appropriate.

6. Program Overview

6.1 PI Definitions

The general areas chosen to represent the scope of DOE operations are:

- Personnel Safety
- Operational Incidents
- Environment
- Management

The specific parameters selected as representative leading indicators of safe performance in the above general DOE operations areas are listed in Table 2. Each indicator is further defined in Appendix 2. General data considerations which apply to all the PI data are also discussed in Appendix 3.

6.2 Report Format and Content

The PI Report purpose is to establish a tiered system, progressively detailed, with traceability to contractor performance. The PI Reports are the primary mechanism for conveying PI information, associated evaluations of trends, and pertinent operational information. A consistent format is used to provide focus and organization/structure which helps the reader evaluate the PI information in the proper context of operations.

Each PI Report contains a Management Summary, Overview trend graphs and discussion for each PI, and a list of facilities covered by the report. Further details of the minimum information to be included are provided in Appendix 4. The latest DOE Summary PI Report serves as the format and content example.

FOs may request a PI Report waiver for Contractors under their cognizance with PI programs in place that are sufficiently comprehensive and mature. The approval process and evaluation criteria for this waiver are provided in Appendix 4.

6.3 Trending and Analysis

The trending and analysis methodology couples graphing of data with evaluation of the results, factoring in relevant operational information to assist with evaluation of the implications of the PIs (both individually and collectively) from a management perspective.

The following charts are used to summarize the information evaluated and data compiled. Additional discussion of the trending and analysis methodology is provided in Appendix 5.

- Control Chart - an X-Y graph depicting trends over time.

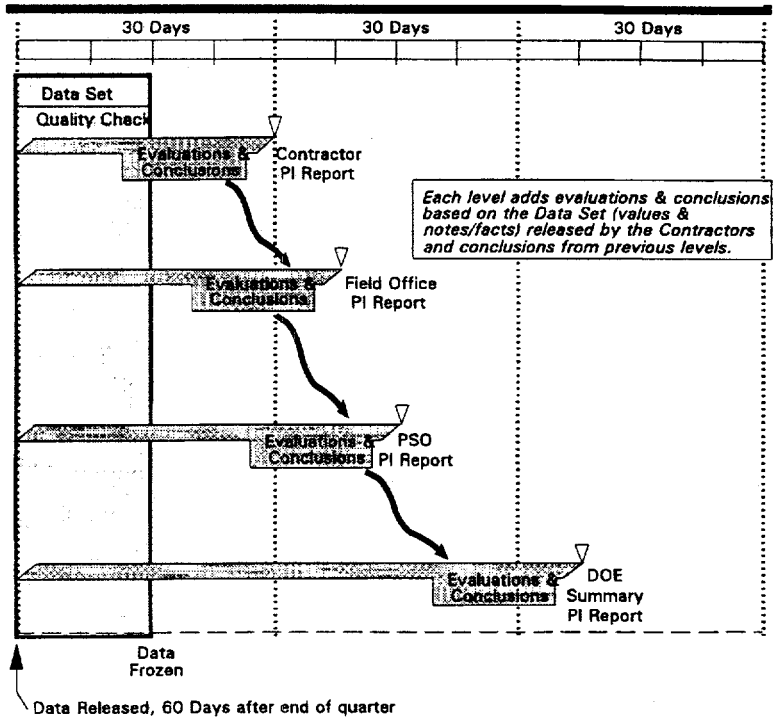
  The Control Chart reflects the total number of events for each time period of interest. This provides a measure for monitoring changes in the performance indicator. Control limits are the bounds within which the value is expected to occur, barring any "special cause" influences. A data point falling outside control limits or any obvious long-term patterns (e.g., consistently above or below center, consistently rising or falling within the control limits) indicates a significant change to the system.

- Distribution Diagram - a block diagram showing data in order of contribution to the total.

  The horizontal axis of the Distribution Diagram lists the most frequent item in the performance indicator population on the left and progresses in descending order to the least frequent item on the extreme right. The cumulative total for the items is reflected above the block at each interval. By structuring the data in this form, the Distribution Diagram provides a focus on the largest contributing items in each performance indicator.

TABLE 1

DOE PI PROGRAM SCHEDULE



Data Period		Data Due from Contractor		Data Frozen	Contractor PI Report	Field Office PI Report	PSO PI Report	DOE Summary PI Report
	+90 days	+60 days	Adjusted*	+2 wks	+2 wks	+1 wk	+1 wk	+3 wks
1st Qtr 92 01-01-92	03-31-92							
2nd Qtr 92 04-01-92	06-30-92	08-29-92 Saturday	08-31-92 Monday	09-14-92	09-28-92	10-05-92	10-12-92	11-02-92
3rd Qtr 92 07-01-92	09-30-92	11-29-92 Sunday	11-30-92 Monday	12-14-92	12-28-92	01-04-93	01-11-93	02-01-93
4th Qtr 92 10-01-92	12-31-92	03-01-93 Monday	03-01-93 Monday	03-15-93	03-29-93	04-05-93	04-12-93	05-03-93
1st Qtr 93 01-01-93	03-31-93	05-30-93 Sunday	05-31-93 Monday	06-14-93	06-28-93	07-05-93	07-12-93	08-02-93
2nd Qtr 93 04-01-93	06-30-93	08-29-93 Sunday	08-30-93 Monday	09-13-93	09-27-93	10-04-93	10-11-93	11-01-93
3rd Qtr 93 07-01-93	09-30-93	11-29-93 Monday	11-29-93 Monday	12-13-93	12-27-93	01-03-94	01-10-94	01-31-94
4th Qtr 93 10-01-93	12-31-93	03-01-94 Tuesday	03-01-94 Tuesday	03-15-94	03-29-94	04-05-94	04-12-94	05-03-94

* Data Due from Contractor adjusted to next working day if due date falls on a weekend.

TABLE 2

DOE PERFORMANCE INDICATORS

1.0 Personnel Safety

1.1 Collective Radiation Dose

1.2 Skin/Clothing Contaminations

1.3 Internal Contaminations

1.4 Radioactive/Hazardous Material Overexposures

1.5 Lost Work Day Case Rate

1.6 Recordable Injury/Illness Rate

2.0 Operational Incidents

2.1 Unplanned Safety Function Actuations

2.2 Violations of Operating Procedures

2.3 Unplanned Shutdowns

2.4 Emergencies and Unusual Occurrences

2.5 Substance Abuse Incidents

3.0 Environment

3.1 Radionuclide Effluent

3.2 Hazardous Substance/Regulated Pollutant Effluent

3.3 Environmental Incidents

3.4 Solid Low-Level Radioactive and/or Hazardous Waste Generated

4.0 Management

4.1 DOE Audit Issues

4.2 External Organization Issues

4.3 OSH Noncompliance

4.4 Corrective Maintenance Backlog

4.5 Preventive Maintenance Overdue

4.6 Occurrence Reports with Open Corrective Actions

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Appendix 1 - PI Program Facility List

The Performance Indicator Program major facilities are listed on the following pages. The current approved Facility List is published as an appendix to the DOE Summary PI Report. Subsequent revisions of the Guidance Document will reflect the Facility List of record at the time of the Guidance Document revision.

The PSO with landlord responsibility is listed in parenthesis after each FO. The PSO with programmatic responsibility for the facility is identified in the column to the right of the facility.

A1.1 Making Changes to the Facility List

The initial facility list was identified to NE-70 by the line PSOs. Changes to the Facility List may be proposed by any organization.

1. Proposed facility additions or deletions must be coordinated between the involved Contractor, FO, and PSO(s).

2. Upon agreement, the PSO should then notify NE-70 (in writing) of the proposed changes.

3. The revision will be incorporated into the next DOE Summary PI Report issued.

4. All affected organizations will be notified of changes.

Facility names and acronyms used for data submittals and PI Reports shall be consistent with the Facility List as published in the DOE Summary PI Report. It is the intent to utilize the commonly used acronyms for the facilities, where possible. NE-70 should be contacted if an acronym change is requested.

Table A1 - 1
PI Program Facility List

The PSO with landlord responsibility is listed in parenthesis after each Field Office. The PSO with programmatic responsibility for the facility is identified in the column to the right.

Contractor	Facility Acronym	Major Facility	PSO
FIELD OFFICE = AL (DP)			
Allied Signal	KANSAS CITY	Kansas City Plant	DP
EG&G/Mound	MOUND BLDG 50	Alpha Fuels Facility - Mound Plant/Bldg. 50	NE
	MOUND SW BLDG	Mound Plant - SW Building	DP
	MOUND T BLDG	Mound Plant - T Building	DP
	MOUND BLDG 23	Rad. Waste & Mixed Waste Storage Fac. (Bldg. 23)	EM
	WDA BLDG	Waste Disposal Alpha Bldg facilities Cyclone Incinerator Glassmelter Thermal Treatment Unit Low Level Beta Wastewater Solidification Facility	EM
Martin Marietta Speciality Components	HWSF BLDG 1040	Hazardous Waste Storage Facility (Bldg. 1040)	EM
	PINELLAS	Pinellas Plant [except HWSF Bldg 1040 =EM]	DP
M.K. Ferguson	UMTRAP-GJN	Uranium Mill Tailings Remedial Action Project - Grand Junction Site	EM
Mason & Hanger-Silas Mason Co.	PANTEX	Pantex Plant [except HWSA 11-7 N Pad =EM]	DP
	HWSA 11-7 N PAD	Hazardous Waste Storage Area (11-7 N Pad)	EM
Sandia (Albuquerque)	SANDIA BLDG 6920	Packaging, Storage & Decontamination of Rad/Mixed Waste (Bldg 6920)	EM
	SANDIA TECH AREA V	Sandia - Tech Area V	DP
Sandia (Livermore)	CRF	Combustion Research Facility	ER
	SANDIA BLDG 961	Rad & Mixed Waste Storage Fac. (Bldg. 961)	EM
University of California LANL	LAMPF	Los Alamos Meson Physics Facility	ER
	LANSCE	Manual Lujan Jr. Neutron Scat. Center	ER
	TA-2	Omega West Reactor (TA-2)	DP
	CMR	Chemistry/Metallurgy Research (TA-3-29)	DP
	TA-41-4	Weapons Subsystem Lab. & Vault (TA-4l-4)	DP
	TA-55	Plutonium Facility (TA-55)	DP
	WETF	Weapons Engineering Tritium Facility (TA-l6)	DP
	LACEF	LANL Critical Exper. Facility (TA-l8)	DP
	TA-50 BLDG 69	TRU Waste Size Reduction Facility	EM
Westinghouse Albuquerque	WIPP	Waste Isolation Pilot Plant	EM
FIELD OFFICE = CH (ER)			
Brookhaven National Laboratory	AGS	Alternating Gradient Synchrotron	ER
	BMRR	Brookhaven Medical Research Reactor	NE
	HWMF-UP	Haz. Waste Manag. Fac. Upgrades I & II [facility dropped 4th Qtr 91]	EM
	HFBR	High Flux Beam Reactor	NE
	NSLS	National Synchrotron Light Source	ER
Princeton University	TFTR	Tokomak Fusion Test Reactor	ER
Universities Research Associates	FERMI	Fermi National Accelerator Laboratory	ER
University of Chicago/ANL	B-306	Building 306 and Annex	EM
	EBR-II	Experimental Breeder Reactor-II	NE
	FMF	Fuel Manufacturing Facility	NE
	HFEF	Hot Fuel Examination Facility	NE
	JANUS	JANUS	NE
	NRAD	Neutron Radiography Facility	NE
	TREAT	Transient Reactor Test	NE
	ATLAS	Argonne Tandem Linear Accel. System	ER
	BLDG 200	Chemistry Building	ER
	IPNS	Intense Pulsed Neutron Source	ER
University of TN Space Institute	CFFF	Coal Fired Flow Facility - Magnetohydrodynamics Project/TN (MHD-TN)	FE

Contractor	Facility Acronym	Major Facility	PSO
FIELD OFFICE = ID (NE)			
EG&G/Idaho	TRACF	Test Reactor Area Critical Facilities [includes CFRMF, ATRC, ARMF] ARMF - Advanced Reactivity Measurements Facility ATRC - Advanced Test Reactor Critical CFRMF - Coupled Fast Reactivity Meas. Facility	NE
	ATR	Advanced Test Reactor	NE
	RWMC	Radioactive Waste Management Complex	EM
	TRAHC	Test Reactor Area Hot Cells	NE
	WERF	Waste Experimental Reduction Facility	EM
West Valley Nuclear Services	WVDP	West Valley Demonstration Project	EM
Westinghouse Idaho Nuclear Corp.	ICPP/NWCF	Idaho Chemical Processing Plant [includes NWCF] NWCF - New Waste Calcining Facility	DP EM
FIELD OFFICE = NV (DP)			
EG&G Energy Measurements	LGFSTF	Liquified Gaseous Fuels Spill Test Facility	FE
REECO/EG&G et al	NTS	Nevada Test Site [except RWMA = EM and LGFSTF = FE]	DP
Reynolds Electrical Engrg Co.	RWMA	Rad. Waste Manag. Area - Area 5	EM
FIELD OFFICE = OR (NE)			
Bechtel National	FUSRAP-CISS	Formerly Utilized Site Remedial Action Prog-Colonie Interim Storage Site	EM
	FUSRAP-MISS	Formerly Utilized Site Remedial Action Prog-Maywood Interim Storage Site	EM
M.K. Ferguson	WSSRAP	Weldon Springs Site Remedial Action Project	EM
Martin Marietta Energy Systems	CPCF/PRTF	Central Pollution Control Facility/Y-I2 [including PRTF] PRTF - Plating Rinsewater Treatment Facility/Y-I2	EM
	HFIR	High Flux Isotope Reactor	NE
	HHIRF	Holifield Heavy Ion Radiation Facility	ER
	WMD	K-25 Process Building/Storage Facility	EM
	NRWTP	Non-Radiol. Wastewater Treat. Plant/X-10	EM
	ORELA	Oak Ridge Electron Linear Accelerator	ER
	K-25 SITE BOP	K-25 Site Balance of Plant	EM
	PADUCAH	Paducah Gaseous Diffusion Plant	NE
	PORTSMOUTH	Portsmouth Gaseous Diffusion Plant	NE
	REDC	Radio. Engineering Development Center	NE
	TSCA	TSCA Incinerator	EM
	TSR	Tower Shielding Reactor	NE
	WOCC	Waste Operations Control Center/X-10	EM
	Y-12 EU	Y-I2 Plant Enrichment Uranium Operations Bldgs. 9212 and 9215	DP
	Y-12 LI	Y-I2 Plant Lithium Operations, Bldg. 9204-2	DP
FIELD OFFICE = RF (DP)			
EG&G/Rocky Flats	LWTF BLDG 774	Rocky Flats Liquid Waste Treatment Facility	EM
	RF NON-PU	Rocky Flats Non-Plutonium Operations [except LWTF Bldg 774 =EM]	DP
	RF PU	Rocky Flats Plutonium Operations [except WSSF Bldg 664 =EM]	DP
	WSSF BLDG 664	Rocky Flats Waste Storage and Shipping Facility	EM
FIELD OFFICE = RL (EM)			
Westinghouse Hanford Co. - WHC	FFTF/FSF	Fast Flux Test Facility [includes FSF] FSF - Fuel Storage Facility	NE
	FMEF	Fuels & Materials Exam. Facility	NE
	FMEF BLDG 308	Fuels & Materials Exam. Facility Bldg 308	NE
	K AREA BASINS	K Area Basins	DP
	MASF	Maintenance and Storage Facility	NE
	N REACTOR	N Reactor	DP
	PUREX/UO3	PUREX Plant/UO3 Plant	DP
	PFP	Plutonium Finishing Plant	DP
	TANK FARMS	Waste Tank Farms - 200 Area	EM

Contractor	Facility Acronym	Major Facility	PSO
FIELD OFFICE = SF (ER)			
Rockwell International	ETEC	Energy Technology Engineering Center (all facilities)	NE
Stanford University	SLAC	Stanford Linear Accel. Ctr./incl. SSRL	ER
University of California LBL	88 CYCLOTRON	88" Cyclotron	ER
	BEVALAC	BEVALAC	ER
	MSD	Material Sciences Building (Buildings 66 & 62)	ER
University of California LLNL	HEAVY ELEM.	LLNL Heavy Elements Facility (Bldg. 251)	DP
	HEAF	LLNL High Explosion Appl. Fac. (Bldg. 191)	DP
	BLDG 801	LLNL Hydrodynamic Diagnostic Complex (Bldg. 801 Site 300)	DP
	BLDG 850	LLNL Hydrodynamic Diagnostic Complex (Bldg. 850 Site 300)	DP
	PLUTONIUM	LLNL Plutonium Facility (Bldg. 332)	DP
	TRITIUM	LLNL Tritium Facility (Bldg. 331)	DP
	NOVA	NOVA Laser Facility	DP
	WASTE YARD	Yard Waste Management Area (Bldg. 612)	EM
FIELD OFFICE = SR (DP)			
Westinghouse Savannah River Co.	300-M	300-M (Bldgs. 320-M and 321-M LETF)	DP
	F AREA	F Area (F Canyon FB Line NSR Bldg. 772-F and PSF)	DP
	H AREA	H Area (H Canyon HB Line Receiving Basin for Offsite Fuel)	DP
	K REACTOR	K Reactor	DP
	L REACTOR	L Reactor	DP
	SRTC	Savannah River Technology Center (formerly SRL)	DP
	TANK FARM/EVAP	Tank Farm/Evaporator (H-Area)	EM
	SR TRITIUM	Tritium Facilities (Tritium Replacement Facility & Bldgs. 232 234 & 238)	DP
FIELD OFFICE = XX			
Bechtel Corp.	NPR CA	Naval Petroleum Reserve - CA	FE
Boeing Petroleum Services	SPRO	Strategic Petroleum Reserve Office - New Orleans	FE
Mountain States Energy Inc. - MSE	CDIF	Component Development and Integration Facility - Magnetohydrodynamics Facility/MT [formerly MHD-MT]	FE
Westinghouse Env. Mgmt. of Ohio	FEMP-1	Fernald Environmental Mgmt Project 1	EM
	FEMP-2	Fernald Environmental Mgmt Project 2	EM
John Brown E and C	NPOSR-CUW	Naval Petroleum and Oil Shale Reserves in Colorado, Utah, and Wyoming. Added to PI Program 92-2	FE
(Govt-owned, Govt-operated)	PETC	Pittsburgh Energy Technology Center [includes Components Dev. & Integration Facility]. Added to PI Program 92-1	FE
(Govt-owned, Govt-operated)	METC	Morgantown Energy Technology Center. Added to PI Program 92-2	FE
(Govt-owned, Participant-operated)	BPO/NIPER	Bartlesville Project Office/ National Institute for Petroleum and Energy Research. Added to PI Program 92-2	FE

Participating Field Offices and PSOs:

AL	Albuquerque Field Office	DP	Defense Programs
CH	Chicago Field Office	EM	Environmental Restoration & Waste Management
ID	Idaho Field Office	ER	Energy Research
NV	Nevada Field Office	FE	Fossil Energy
OR	Oak Ridge Field Office	NE	Nuclear Energy
RF	Rocky Flats Field Office		
RL	Richland Field Office		
SF	San Francisco Field Office		
SR	Savannah River Field Office		
XX	None of the above		

Appendix 2 - PI Definitions

Table A2-1 summarizes the performance indicators including the PI number, cross references to DOE Order 5000.3B, root cause information required, and notation of the PI number from Revision 0 of the Guidance Document (if the PI number is being changed).

Requirements are presented in the definition and data needed statements. The purpose and notes sections are provided for additional clarification. All PIs are reported by facility unless otherwise noted.

PI 1 PERSONNEL SAFETY

PI 1.1 COLLECTIVE RADIATION DOSE

Purpose: The purpose of this indicator is to measure the effectiveness of the facility radiation control program in maintaining facility personnel radiation exposures as low as reasonably achievable (ALARA).

Definition: The total external dose (shallow and deep, reported separately) received by all facility personnel (including subcontractors and visitors) as measured by the primary dosimeter, i.e., thermoluminescent dosimeter (TLD), or film badge. Exposure measured by direct reading dosimeters should be included only for those periods or situations when more accurate data are not available.

Notes: Data for this indicator are mainly collected quarterly by contractor. For reporting under this indicator, the data will be collected on a facility basis. It is recognized that the collective radiation dose for certain personnel (maintenance, health physicists, construction, etc.), due to their site-wide services, may be difficult to identify as resulting from exposure at a given facility. How these personnel are handled in each specific facility case should be discussed in the written descriptive statements that are provided with the data.

Data Needed: PI 1.1.1 Shallow dose.
PI 1.1.2 Deep dose.
Units: Person-rem.

PI 1.2 SKIN/CLOTHING CONTAMINATIONS

Purpose: The purpose of this indicator is to monitor progress in controlling radioactive contamination as a measure of the effectiveness of radiological work practices. A low number of contaminations indicates good radiological work practices, minimum contamination in areas intended to be free of contamination, and/or effective precautions for work in contaminated areas. This indicator is valuable for identifying adverse trends so that corrective actions can be taken.

Definition: The total number of confirmed skin and personal clothing contaminations (reportable under Order 5000.3B, Attachment 1, Group 4.B all) for all facility personnel, including subcontractors and visitors. Skin or clothing contaminations due to radioactive noble gases or naturally occurring radon gas will not be included.

Notes: The intent of this PI is to count the number of personnel contaminated, not the number of related occurrence reports. It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 1.2 Number of personnel contaminated

PI 1.3 INTERNAL CONTAMINATIONS

Purpose: The purpose of this indicator is to monitor the effectiveness of radiological control programs to limit the internal intake and deposit of radiological materials by facility personnel.

Definition: The total number of intakes of radioactive material (positive bioassays reportable under Order 5000.3B Attachment 1, Group 4-C all) confirmed during the reporting period for all facility personnel, including subcontractors and visitors.

Notes: Verification of contamination of an individual through multiple bioassays will be reported as 1 personnel contamination. The intent of this PI is to count the number of personnel contaminated, not the number of related occurrence reports. It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 1.3 Number of personnel contaminated.

PI 1.4 RADIOACTIVE OR HAZARDOUS MATERIAL OVEREXPOSURES

Purpose: The purpose of this indicator is to measure the overall effectiveness of the facility radiation and hazardous material control programs that are established to ensure the prevention of overexposures.

Definition: The number of personnel exposed to radioactive or hazardous materials in excess of limits established in DOE Orders (reportable occurrences per Order 5000.3B Attachment 1, Group 3C and 4A, all). Includes all facility personnel, including subcontractors and visitors.

Notes: The intent of this PI is to count the number of personnel overexposed, not the number of related occurrence reports. It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 1.4 Number of personnel exposed

PI 1.5 LOST WORK DAY CASE RATE

Purpose: The purpose of this indicator is to measure the progress in improving occupational safety and health performance for contractor personnel. This indicator measures the number of accidents that are serious enough to require time off from work.

Definition: Number of lost work day cases per 200,000 hours worked (100 person-years). Subcontractors and visitors will be excluded.

Notes: Report case in the period that it is confirmed as OSH reportable (similar to reporting internal contaminations based on date of confirmation).

Subcontractors and visitors are excluded because it is consistent with OSH and it would be impossible to determine the hours worked contribution. Accidents and illnesses will be counted against the permanent assignment location rather than where the accident occurred because of the difficulty in determining the hours worked contribution. The facility is responsible for the employee independent of the temporary work location.

This PI is intended to report only lost work day cases and will not include restricted work cases.

Rate = (200,000 hrs x number of cases)/(total hrs. worked)

Data Needed: PI 1.5.1 Number of cases.
PI 1.5.2 Total hours worked.
Contractor total.

PI 1.6 RECORDABLE INJURY/ILLNESS RATE

Purpose: The purpose of this indicator is to measure the progress in improving the occupational safety and health for contractor personnel. By measuring all work-related injuries and illnesses meeting OSH Standards, this indicator measures all instances where work restrictions occur.

Definition: Number of personnel injury or illness cases resulting from on-the-job activities recordable in accordance with OSH standards, per 200,000 person-hours worked (100 person-years). Subcontractors and visitors will be excluded.

Notes: Report case in the period that it is confirmed as OSHA reportable (similar to reporting internal contaminations based on date of confirmation).

Subcontractors and visitors are excluded because it is consistent with OSHA and it would be impossible to determine the hours worked contribution. Accidents and illnesses will be counted against the permanent assignment location rather than where the accident occurred because of the difficulty in determining the hours worked contribution. The facility is responsible for the employee independent of the temporary work location.

Data Needed: PI 1.6.1 Number of cases.
[Total hours worked reported under PI 1.5.2.] Contractor total.

PI 2 OPERATIONAL INCIDENTS

PI 2.1 UNPLANNED SAFETY FUNCTION ACTUATIONS

Purpose: The purpose of this indicator is to monitor progress in reducing the number of instances of significant abnormal facility conditions, requiring the actuation of facility safety functions (equipment/systems). In addition, this indicator monitors the unnecessary exercising of facility safety functions, due to spurious or inadvertent signals, which could result in those functions not being available when needed. Limiting the number of unplanned safety function actuations indicates that an adequate margin of safety is being maintained.

Definition: The number of unplanned actuations of any safety function or facility safety systems that occur when an actuation setpoint for a safety function is reached or when a spurious or inadvertent signal is generated. Unplanned means that the actuation was not part of a planned test or evolution. Specifically, those incidents reportable under Order 5000.3B Attachment 1, Group 1-I-(U-(a), ON-(g)).

Notes: Although not included in the definition of safety systems, actuation of a system designed, installed, and operated for the protection of facility or co-located facility workers shall also be included (e.g., fire protection, excluding those in office spaces; radiation monitoring systems such as continuous air monitors; criticality alarm system; etc.). For the purposes of this program, a safety function or system shall be defined to be con-

sistent with the DOE Order 5000.3 definition of "Class A Equipment" - any active or passive safety device/system or any primary environmental monitor.

It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 2.1 Number of events

PI 2.2 VIOLATIONS OF OPERATING PROCEDURES

Purpose: The purpose of this indicator is to monitor the adequacy of facility training programs which emphasize compliance with procedures that are intended to ensure safe, healthy, and effective facility operations. This indicator is a measure of the effectiveness of the safety and health culture and discipline of the management and staff of the facility.

Definition: The number of instances where a failure of personnel to follow operating procedures resulted in a reportable occurrence (per Order 5000.3B Attachment 1, Group 1-F-U, -ON and/or those reportable occurrences whose root, direct, or contributing cause category is Personnel Error, Item C Violation of requirement or procedure).

Notes: It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 2.2 Number of events

PI 2.3 UNPLANNED SHUTDOWNS

Purpose: The purpose of this indicator is to measure progress in minimizing unplanned shutdowns that result from equipment failures, personnel errors, and other causes. This indicator reflects the effectiveness of facility programs that support operations and permit the facility to meet its intended mission. These facility programs include, but are not limited to, maintenance, training, and engineering support for correction of design problems. Experience has generally shown that facilities that operate with a high availability rate (i.e., minimal number of unplanned shutdowns) are usually well-maintained, are managed and staffed by personnel that are competent and follow good operating practices, and can be expected to have a high margin of safety.

Definition: The number of unscheduled shutdowns of a facility, process or operation that result in a reportable occurrence (per Order 5000.3B Attachment 1, Group 8, all U and all ON).

Notes: It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 2.3 Number of events

PI 2.4 EMERGENCY AND UNUSUAL OCCURRENCES

Purpose: The purpose of this indicator is to provide an overall measure of the frequency of significant problems that arise at a facility. Reporting in accordance with DOE Order 5000.3 provides the details of each occurrence. This indicator provides a measure of the safety culture existing at the facility and the degree of control being main-

tained over the activities being conducted. Repeated significant problems are an indication of potentially reduced margins of safety for facility operations.

Definition: The number of Emergency and Unusual Occurrences reported in accordance with DOE Order 5000.3, "Occurrence Reporting and Processing of Operations Information."

Notes: Off-normal occurrences are excluded from this PI.

Data Needed: PI 2.4 Number of events

PI 2.5 SUBSTANCE ABUSE INCIDENTS

Purpose: The purpose of this indicator is to measure the effectiveness of DOE and contractor specific fitness-for-duty programs. Individuals involved with controlled substances contribute to unsafe operating conditions and undermine efforts to accomplish the facility mission.

Definition: The number of reportable occurrences (Order 5000.3B Attachment 1, Group 5-C all) involving personnel use, possession or involvement of/with controlled substances (e.g., drugs, alcohol, etc.).

Notes: It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 2.5 Number of events. Contractor total.

PI 3 ENVIRONMENT

PI 3.1 RADIONUCLIDE EFFLUENT

Purpose: The purpose of this indicator is to measure the effectiveness of radiological effluent control programs in place to minimize radionuclide releases to the environment.

Definition: Separate reporting for total airborne and liquid releases to the environment, as measured at the point of release, for the following radionuclides: plutonium, uranium, noble gases, particulates (including radiocesiums and radiostrontium, and activation products), radioiodine, tritium, and other actinides.

Notes: Some facilities do not directly release effluent to the environment, but transport their effluent to a central treatment facility. The facility shall report 0 (zero) curies released, if the central treatment facility reports under the PI Program. The facility shall report the PI as "Not Available", if the central treatment facility does not report under the PI Program. Identification of major constituents in the narrative is consistent with current guidance. Trending individual constituents is recommended at a local level.

Data will be the total released during the quarter.

Data Needed: PI 3.1.1 Airborne Effluent. 3.1.2 Liquid Effluent
Units: Curies.

PI 3.2 HAZARDOUS SUBSTANCE/REGULATED POLLUTANT EFFLUENT

Purpose: The purpose of this indicator is to measure the effectiveness of the facility programs in place to control and minimize releases to the environment of hazardous substances and regulated pollutants.

Definition: The quantity of hazardous constituent released through "permitted" airborne and liquid non-radioactive effluents during the reporting period. All hazardous substances/regulated pollutants that are listed in permits or otherwise reported to regulators reports are included (e.g., Clean Air Act, NPDES permits, SARA Title III Section 313 reporting requirements).

Notes: This indicator is to reflect the total quantity of hazardous material released and is not limited to only the amount exceeding permitted levels.

Brine, drilling mud, cement washout, sewage treatment effluent, non-hazardous constituent of steam emissions and cooling water, and rain water runoff are excluded.

Some facilities do not directly release effluent to the environment, but transport their effluent to a central treatment facility. The facility shall report 0 (zero) pounds released, if the central treatment facility reports under the PI Program. The facility shall report the PI as "Not Available", if the central treatment facility does not report under the PI Program. Identification of major constituents in the narrative is consistent with current guidance. Trending individual constituents is recommended at a local level.

Data Needed: PI 3.2.1 Airborne effluent . PI 3.2.2 Liquid effluent.
Units: pounds.

PI 3.3 ENVIRONMENTAL INCIDENTS

Purpose: The purpose of this indicator is to measure the effectiveness of the facility programs and controls in place to minimize inadvertent releases of radioactive or hazardous materials to the environment.

Definition: The number of reportable occurrences (per Order 5000.3B Attachment 1, Group 2-A thru -D, all), both on-site and off-site, involving an inadvertent radioactive or hazardous material spill or release.

Notes: It is emphasized that, since one occurrence report can involve more than one PI event, care must be taken when using the Occurrence Report Processing System as a source for PI data. Individual occurrence reports must be reviewed to determine the PIs involved.

Data Needed: PI 3.3 Number of events

PI 3.4 SOLID LOW LEVEL WASTE GENERATED

Purpose: The purpose of this indicator is to monitor generation of solid low-level radioactive, hazardous, and mixed waste. Reducing the volume will decrease storage, transportation, and disposal needs and will decrease the environmental impact of such operations.

Definition: The total volume, in cubic feet, of solid low level radioactive and/or hazardous and/or mixed waste generated during the reporting period, separately reported.

Note: It is understood that all hazardous waste, regardless of the form, is considered to be solid waste. Process waste is defined as waste generated as a result of an on-going

process line or operations, excluding waste generated as a result of environmental restoration activities. Environmental management/restoration waste is defined as all waste other than process waste.

Process and environmental management/restoration wastes shall be differentiated in the data narrative, since management actions in responding to trends differ significantly depending on the type of waste and the maturity of the program.

Uncharacterized waste should be reported as environmental management/restoration Mixed Waste in the quarter during which it was generated. Since uncharacterized waste is not likely to be a product of ongoing process lines or operations, it should be considered environmental management waste. Based on discussions at the 1-Year Review meeting, it should be categorized as mixed waste (consistent with general practice). If uncharacterized waste is subsequently characterized as something other than mixed waste, it shall not be reported as generated a second time under the PI program, nor shall previously reported data be revised. Recategorization of significant amounts of waste shall be discussed in the PI report management summary.

Data Needed: PI 3.4.1 Radioactive Waste Generated.
PI 3.4.2 Hazardous Waste Generated.
PI 3.4.3 Mixed Waste Generated.
Units: cubic feet.

PI 4 MANAGEMENT

PI 4.1 DOE AUDIT ISSUES

Purpose: The purpose of this indicator is to measure the responsiveness of management and staff to findings, concerns, and recommendations from oversight and line program assessments. This PI provides an indication of the management control and staff attitude toward improvements in the conduct of contractor activities and openness to suggestions of outside DOE organizations.

Definition: The number of DOE audit issues open longer than 90 days at the end of the reporting period. Open issues are defined as DOE audit issues (including findings, concerns, recommendations, etc.) for which all associated contractor corrective actions have not been completed.

Notes: This PI includes ES&H related issues identified by DOE or DOE-sponsored oversight assessments and line program self-assessments. All Tiger Team findings and ES&H related security/quality assurance issues for which contractor corrective actions were identified are to be included. OSH noncompliances and contractor-identified audit issues are excluded.

Data Needed: PI 4.1 Number of issues open longer than 90 days.
Contractor total.

PI 4.2 EXTERNAL ORGANIZATION ISSUES

Purpose: The purpose of this indicator is to measure the responsiveness of management and staff to findings, concerns, and recommendations from external organizations. This PI provides an indication of the management control and staff attitude toward improvements in the conduct of contractor activities and openness to suggestions of external organizations.

Definition: The number of external organization issues open longer than 90 days at the end of the reporting period. Open issues are defined as external organization issues (in-

cluding findings, concerns and recommendations) for which all associated contractor corrective actions have not been completed.

Notes: This PI includes ES&H related issues identified by external organizations (e.g., Defense Nuclear Facility Safety Board, National Academy of Sciences, EPA, state and local agencies). Issues identified by M&O contractor corporate organizations are to be included. ES&H related security/quality assurance issues for which contractor corrective actions were identified are to be included. OSH noncompliances are excluded.

Data Needed: PI 4.2 Number of issues open longer than 90 days.
Contractor total.

PI 4.3 OSH NONCOMPLIANCE

Purpose: The purpose of this indicator is to measure the responsiveness of management and staff to resolve identified occupational safety and health (OSH) concerns.

Definition: The number of OSH noncompliance items open longer than 90 days at the end of the reporting period. Open items are defined as OSH noncompliance items for which all associated contractor corrective actions have not been completed.

Notes: OSH noncompliance items to be counted are those identified by anyone, not just those identified during OSH inspections. This is considered consistent with OSH requirements. Noncompliance items are to be counted separately to reflect instances of noncompliance; instances identified by more than one organization will not duplicate existing open items.

Data Needed: PI 4.3 Number of items open longer than 90 days.
Contractor total.

PI 4.4 CORRECTIVE MAINTENANCE BACKLOG

Purpose: The purpose of this indicator is to measure the effectiveness of the programs in place to ensure necessary and timely repairs are made to facility equipment. Maintaining a small backlog is an indication of management control and staff concern regarding the material and safety status of the facility. It is a measure of effective planning, scheduling, coordination, and materials management. Keeping long-standing deficiencies to a minimum enhances the ability to operate the facility and encourages facility personnel to report deficiencies.

Definition: The percentage of open corrective maintenance work requests, including those requiring facility or process shutdown, that are greater than three months old at the end of the reporting period. Corrective maintenance may include minor modifications if performed under a corrective maintenance work request.

Notes: The definition of corrective maintenance is as follows:

Corrective (Repair) Maintenance: The repair of failed or malfunctioning equipment, system, or facility to restore the intended function or design condition. This maintenance does not result in a significant extension of the expected useful life.

The 90-day clock starts at the date of item identification.

Data Needed: PI 4.4.1 Number of open items >90 days old.
PI 4.4.2 Total number of open items.

PI 4.5 PREVENTIVE MAINTENANCE OVERDUE

Purpose: The purpose of this indicator is to monitor progress in the administration and execution of facility preventive maintenance programs. A small percentage of preventive maintenance items overdue indicates a management and staff commitment to the preventive maintenance program and an ability to plan, schedule, and perform preventive maintenance tasks as programs require. A facility with a good preventive maintenance program should require less emergency maintenance, which may be reflected in improved safety and reliability and more efficient operation.

Definition: The percentage of preventive maintenance items that were not completed within the originally scheduled interval.

Notes: The definition of preventive maintenance is as follows:

Preventive Maintenance: All those systematically planned and scheduled actions performed for the purpose of preventing equipment, system, or facility failure.

In addition, it is the intent that, if a facility maintenance program is such that the scheduled time interval includes a grace period (i.e., ±25% of the frequency of the maintenance), the item will not be considered overdue until that grace period has expired.

Data Needed: PI 4.5.1 Number of items not completed.
PI 4.5.2 Total Items scheduled during the quarter.

PI 4.6 OCCURRENCE REPORTS WITH OPEN CORRECTIVE ACTIONS

Purpose: The purpose of this indicator is to measure the commitment of DOE line program management and facility management and staff to taking timely corrective actions for improving facility operations and safety margins. This PI is an indication of the safety culture of the facility personnel by demonstrating follow-up and applying lessons-learned from occurrences.

Definition: The number of Final Occurrence Reports for which all corrective actions have not been completed at the end of the quarter.

Data Needed: PI 4.6 Number of final reports with open corrective actions.

TABLE A2-1 PI SUMMARY

[ ] = Reference Order 5000.3B, Attachment 1 Section.
<RC> = Root cause required.
All data by facility except where noted.
E=Emergency, U=Unusual, ON=Off Normal, all= E,U,and ON.
{ } = Old PI number, if different.

Performance Indicator	Order 5000.3B Attachment 1 Section	Root Cause	Previous PI#
1.0 PERSONNEL SAFETY			
1.1 Collective Radiation Dose			
1.1.1 Shallow dose (person-rem)			
1.1.2 Deep dose (person-rem)			
1.2 Skin/Clothing Contaminations	[Group 4-B, all]	<RC>	
1.3 Internal Contaminations	[Group 4-C, all]		
1.4 Radioactive/Hazardous Material Overexposures	[Group 3C, 4A, all]		
1.5 Lost Work Day Case Rate (contractor total)			
1.5.1 Cases			
1.5.2 Total hours worked			
1.6 Recordable Injury/Illness Rate (contractor total)			
1.6.1 Cases			
2.0 OPERATIONAL INCIDENTS			
2.1 Unplanned Safety Function Actuations	[Group 1-I, U-(a) ON-(g)]	<RC>	{2.2}
2.2 Violations of Operating Procedures	[Group 1-F, U ON and Cause Personnel Error Item C]	<RC>	{2.3}
2.3 Unplanned Shutdowns	[Group 8, U ON]	<RC>	{2.5}
2.4 Emergency & Unusual Occurrences	[Attach. 1, E U]		{2.6}
2.5 Substance Abuse Incidents (contractor total)	[Group 5-C, all]		{4.6}
3.0 ENVIRONMENT			
3.1 Radionuclide Effluent			
3.1.1 Airborne (curies)			
3.1.2 Liquid (curies)			
3.2 Hazardous Substances/Regulated Pollutant Effluent			
3.2.1 Airborne (pounds)			
3.2.2 Liquid (pounds)			
3.3 Environmental Incidents	[Group 2-A thru D, all]	<RC>	{2.1}
3.4 Solid Low Level Waste Generated			{4.7}
3.4.1 Radioactive Waste (cu-ft)			{4.7.1.1}
3.4.2 Hazardous Waste (cu-ft)			{4.7.2.1}
3.4.3 Mixed Waste (cu-ft)			{4.7.3.1}
4.0 MANAGEMENT			
4.1 DOE Audit Issues (contractor total)			
4.1Items open >90 days			
4.2 External Organization Issues (contractor total)			
4.2 Items open >90 days			
4.3 OSH Noncompliance (contractor total)			{2.4}
4.3 Items open >90 days			
4.4 Corrective Maintenance Backlog			
4.4.1 Items open >90 days			
4.4.2 Total open items			
4.5 Preventive Maintenance Overdue			
4.5.1 Items not completed			
4.5.2 Number scheduled			
4.6 Occurrence Reports with Open Corrective Actions			{4.3}

Appendix 3 - General Data Issues

A3.1 Data

The data required is identified on the Data forms at the end of this appendix. It should be noted that:

Data = numbers and narrative discussion. Information needs to be facility specific.

Discussion provides information to help the reader relate values in the proper context of the facility's operations (i.e., What does this value mean for this facility?) Notes should be brief and not cryptic, so the reader can quickly get the point being made. The intent is to avoid having to make many follow up calls to determine the significance of the reported value.

Try to answer the question "What does this value mean for this facility?"

Consider: 1) Relate to historical performance. 2) Identify influencing factors such as status of facility operations, seasonal changes, significant management initiatives. 3) Relate to management performance goals. 4) Explain reasons for (and effects of) significant increases or decreases.

A3.2 Data Not Applicable, Not Available, Not Provided

Data not applicable, not available, or not provided must be differentiated from 0 (zero) values. They have different meanings when evaluating the data.

Data shall be reported as actual values of greater than or equal to zero or one of the following discrete categories:

NA = Not Applicable. Limited to cases where there is no physical possibility of the PI occurring. Examples are radiation related PIs for facilities which have no radioactive material on site (including test sources).

CU = Currently Unavailable. The PI could occur at the facility and potentially contribute to the PI total; however, the data is not physically or technically available for reporting. This designation shall be used for data temporarily unavailable, but expected to be provided in the future. Use should be minimized.

NAS = Not Available, Security Concerns. Currently, the only approved instance for the long term designation of NAS is PI 3.1.1 for ICPP/NWCF due to security concerns.

There shall be no data categorized as "Data not provided or not usable as provided".

Reporting of partial data will not be considered. If data is consistently unavailable within 60 days after the end of the quarter, it should be viewed as an indication of process inadequacies, since timely monitoring is necessary to support personnel safety. Problems of this nature should be resolved with the cognizant PSO(s).

Examples:

1.) A facility is not currently operating. In this case "Not Applicable" is considered inappropriate. The value will be reported as 0 (zero), if appropriate, with indication in

the notes that the facility isn't currently operating. Note that many PIs would not be expected to be zero, and may actually increase (e.g., maintenance activities), *when* a facility is not operating.

2.) A contractor total is reported. Report the value as a contractor total. Show individual facilities as value=0 with note "reported as contractor total". Splitting evenly across the facilities misrepresents the data. Using "CU" for the individual facilities is inappropriate since the PI total would not be increased if the facility-specific data were provided.

A3.3 Data Corrections (Errata)

Since "significance" may be difficult to determine in relation to the purposes of the PI Program, all data changes to the "frozen" data set should be reported. A sample Errata Form is provided in this appendix. The required information includes: PI number, Facility, Reported value, Revised value, and Basis (reasons) for change. Contractor/FO/PSO concurrence is needed. Distribute to affected organizations as noted on the Errata Form.

A3.4 Controlled Data Set and Electronic Data Transfer

Resolution of multiple versions of the same data has resulted in delays, discrepancies and errors. PSOs are responsible for the accuracy of the data for activities under their cognizance and for notifying NE-70 of proposed changes to the data. NE-70 maintains a controlled data set as part of its responsibility for preparing the DOE-wide PI Summary Report for the Secretary. The mechanics of electronic data transmission and access by participating DOE /contractor organizations to the controlled data set are being established by NE-70.

A3.5 Combined Facilities

In some cases PI values cannot be differentiated between 2 or more facilities. For these situations, assign value to dominant facility and 0 to the other(s). Identify the combined facilities in the notes. Do NOT double count, assigning the total value to both facilities. One facility in the combination will be designated by PSO agreement as the controlling facility and report the combined value. The other facility will report zero (0).

Another situation requiring close coordination and cooperation between PSOs is that of the transition of a facility from one PSO to another as a result of changes in the mission of the facility. A timetable will be developed for transfer to assure a smooth transition and continuity of PI reporting. The new PSO will pick up the prior data from the facility and designate the transition point and the prior PSO in its PI records.

Changes in facilities or PIs must be carefully considered before implementation to ensure that previously recorded data can be rebaselined to maintain their validity in light of the modifications. If the data are not available to permit such backfitting, valid statistical analysis of the changed facility or PI will not be possible for an extended period of time, seriously affecting a possible advantage to be gained from the change. It must be remembered, however, that the purpose of the baselining, trends, etc., is assistance of the PSOs in achieving secretarial management, institutional, and program goals, not to ease and improve the work of those providing statistics, process control, and measurements.

A3.6 Reporting Data for Rate PIs

The components (numerator and denominator) of the ratio PIs 1.5, 1.6, 4.4, and 4.5 must be reported separately in order to be rolled up properly.

A3.7 Estimates

Estimates must be clearly identified by the Contractors. The use of estimates should be considered on a case by case basis, with FOs and PSOs scrutinizing methods and bases for the estimates.

Examples: Using flow and concentration to calculate total releases may be valid; however, pro-rating an annual release total over 4 quarters is inadequate for trending purposes.

Some sites have been reporting estimated doses, apparently due to the tight deadlines. Since the deadlines have been adjusted by two weeks, this practice should be discontinued. Data backfit is required if estimates were reported.

A3.8 Root Cause Data

The root cause data reported each quarter shall be a replacement total representing the new cumulative value, not an incremental value to be added to previously reported values.

The Root Cause Distribution Chart shall be prepared based on cumulative root cause information in the Occurrence Reporting and Processing System (ORPS) from the date of implementation of DOE Order 5000.3A (9/1/90) until six quarters of root cause data are available. From that point, a six- quarter "rolling window" (e.g., data from the previous six reporting periods, including the current period) will be used for trending.

Root causes shall be obtained from final Occurrence Reports since they may change from those reported in earlier (e.g., notification or 10-day) reports.

Root cause data shall be reported as whole numbers (by facility, where available).

A3.9 Expanded Facility Descriptions

The purpose of expanded facility descriptions is to give additional information which may provide insight for evaluating trends in terms of subgroups, where appropriate. It is not intended to introduce new reporting requirements. Suggested categories are: Non-nuclear, Nuclear (subcategories: reactor, processing/production facilities, other). The Data Form in this appendix has been revised to include a check box for operations status.

DOE PERFORMANCE INDICATORS

FACILITY: _____ Status of Operations: ☐ Operating ☐ Standby/Outage ☐ Shutdown ☐ Inactive/D&D

CONTRACTOR: _____ FIELD OFFICE: _____ PSO: _____ REPORT PERIOD: ____QTR 199__

PERFORMANCE INDICATOR		UNITS	TOTAL	DESCRIPTIVE NARRATIVE (See Notes on Page 3 of 4) REQUIRED INFORMATION
1.0 PERSONNEL SAFETY				
1.1 Collective Radiation Dose	1.1.1 Shallow	Person-rem		
	1.1.2 Deep	Person-rem		
1.2 Skin/Clothing Contaminations		Number of people contaminated		
1.3 Internal Contaminations		Number of people contaminated		
1.4 Radioactive/Hazardous Matl Overexposures		Number of people overexposed		
1.5 Lost Work Day Case Rate (Contractor total)	1.5.1	Number of cases		
	1.5.2	Total hrs worked		
1.6 Recordable Injury/Illness Rate (Contractor total)	1.6.1	Number of cases		
2.0 OPERATIONAL INCIDENTS				
2.1 Unplanned Safety Function Actuation		Number of events		
2.2 Violations of Operating Procedures		Number of events		
2.3 Unplanned Shutdowns		Number of events		
2.4 Emergency & Unusual Occurrences		Number of events		
2.5 Substance Abuse Incidents (Contractor total)		Number of events		

DOE PERFORMANCE INDICATORS

FACILITY: _____

CONTRACTOR: _____ FIELD OFFICE: _____ PSO: _____ REPORT PERIOD: ____QTR 199__

PERFORMANCE INDICATOR		UNITS	TOTAL	DESCRIPTIVE NARRATIVE (See Notes on Page 3 of 4) REQUIRED INFORMATION
3.0 ENVIRONMENT				
3.1 Radionuclide Effluent	3.1.1 Airborne	Curies		
	3.1.2 Liquid	Curies		
3.2 Hazardous Substances/ Regualted Pollutant Effluent	3.2.1 Airborne	Pounds		
	3.2.2 Liquid	Pounds		
3.3 Environmental Incidents		Number of events		
3.4 Solid Low Level Waste Generated	3.4.1 Radioactive	Cubic feet		
	3.4.2 Hazardous	Cubic feet		
	3.4.3 Mixed Waste	Cubic feet		
4.0 MANAGEMENT				
4.1 DOE Audit Issues (Contractor total)		Number open > 90 days		
4.2 External Org. Issues (Contractor total)		Number open > 90 days		
4.3 OSH Noncompliance (Contractor total)		Number open > 90 days		

DataForm Page 2 of 4

DOE PERFORMANCE INDICATORS

FACILITY: _____

CONTRACTOR: _____ FIELD OFFICE: _____ PSO: _____ REPORT PERIOD: ____QTR 199__

PERFORMANCE INDICATOR		UNITS	TOTAL	DESCRIPTIVE NARRATIVE (See Notes on Page 3 of 4) REQUIRED INFORMATION
4.4 Corrective Maintenance Backlog	4.4.1	Number open > 90 days		
	4.4.2	Total number open		
4.5 Preventive Maintenance Overdue	4.5.1	Number not completed		
	4.5.2	Number scheduled		
4.6 Occurrence Reports with Open Corrective Actions		Number of occurrence reports		

NOTES:

1. All data to be provided by facility, except:
   * PI 1.5, 1.6, 2.5, 4.1, 4.2, 4.3 are provided by contractor total.

2. DESCRIPTIVE NARRATIVE:
   * Facts related to the PI which help the reader relate the values in the proper context of the facility's operations.
   * Should be brief but not cryptic.
   * Try to explain what this value means for this facility. Consider:
     - relate to historical experience,
     - influencing factors (status of operations, seasonal changes, significant management initiatives),
     - reasons for and effects of significant increases or decreases.

3. Report data as shown for use in development of overall DOE report.. However, calculation of the PI for the PI Final Reports shall be as follows:
   * PI 1.5: Rate=(200,000 hrs x number of events)/(total hrs. worked).
   * PI 1.6: Rate=(200,000 hrs x number of events)/(total hrs. worked).
   * PI 4.4: Backlog % = (number open > 90 days)/(total number open).
   * PI 4.5: Overdue % = (number not completed)/(number scheduled).

DOE PERFORMANCE INDICATORS

FACILITY: _____

CONTRACTOR: _____ FIELD OFFICE: _____ PSO: _____ REPORT PERIOD: ____QTR 199__

PERFORMANCE INDICATOR	NUMBER OF EVENTS (Cumulative total as of the end of the quarter) (Whole numbers only)								DESCRIPTIVE NARRATIVE
	Design	External	Management	Materials	Other	Personnel	Procedures	Training	
1.2 Skin/Clothing Contaminations									
2.1 Unplanned Safety Function Actuations									
2.2 Violations of Operating Procedures									
2.3 Unplanned Shutdowns									
3.3 Environmental Incidents									

DataForm Page 4 of 4

DOE Performance Indicator Program - Data Errata Form

Provide a separate request for each PI. All information is required. Date _____

REVISION REQUEST

Facility: _____ Field Office: _____

Contractor: _____ PSO: _____

Pi Number _____ Quarter _____

Original Data _____

REVISE TO

Data _____

Notes _____

BASIS FOR REVISION

REVIEW/CONCURRENCE (Primary PI Contacts)

	Concur with Revision	
Field Office _____	☐ Yes	☐ No
PSO (Programmatic) _____	☐ Yes	☐ No
PSO (Landlord) _____	☐ Yes	☐ No

Comments _____

DISTRIBUTION (Primary PI Contacts)

Contractor: _____

Field Office: _____

PSO(s): _____

NE-70

Appendix 4 - Report Format and Content

A4.1 Purpose

The PI reports are the primary mechanism for conveying PI information, associated evaluations of trends, and pertinent operational information. The Report purpose is to provide a tiered system, progressively detailed, with traceability to contractor performance. Report audience is expected to be DOE Senior Management and DOE/Contractor line management.

The Report Format purpose is to make it easy for the reader to get the point being made, providing focus and organization/structure which helps the reader evaluate the PI information in the proper context of operations.

A4.2 Required Reports

Quarterly PI Reports will be prepared by each participating organization:

- Contractor PI Reports
- FO PI Reports
- PSO PI Reports
- DOE Summary PI Report to the Office of the Secretary.

Report originators are responsible for their report's accuracy and legibility.

Field Offices may request a report waiver for contractors under their cognizance with PI programs in place that are sufficiently comprehensive and mature. On a case-by-case consideration, the requirement for a Contractor PI Report may be waived by the Field Office and PSOs, with concurrence of NE-70. This does not relieve the contractor of the responsibility to provide completed data sheets (values and narrative).

Minimum criteria for this evaluation will be:

- The Contractor has in place a formal (documented) performance indicator program that covers performance indicators in the DOE PI Program, as a minimum.
- Performance indicator trending and analyses are performed.
- Performance indicator information and evaluations are summarized and compiled into reports provided to management at least quarterly.
- There is indication that this performance indicator information is factored into line management decision making processes.
- Complete data, as required by the PI Program, is provided consistent with the schedule for data release (e.g., 60 calendar days after the end of the quarter).

A4.3 Format Consistency

All PI Report formats shall be similar, taking into account options identified below (since the audience is essentially the same), so that readers do not have to overcome different formats when going from one report to another.

A4.4 Report Organization

At a minimum, the sections identified below are required. Additional information may be added at the discretion of the originator. The current DOE Summary PI Report serves

as an example of the expected format and content (with the exception of item 8). The report period (e.g., 2nd Qtr 92, or 92-2), reporting organization, and page number *shall* be identified on each page as an aid in identifying the source document when pages are extracted from the report.

1. Contents page.

2. List of facilities covered by the report, including nature of operations and operating status, and originating organization.(1-2 paragraphs)

3. Management Summary - Highlights discussing significant PIs, initiatives, good practices, lessons learned. (2-3 pages)

4. Overview trend graphs and discussion - Includes for each PI:
   - PI definition,
   - Historical control chart showing totals for reporting organization,
   - Discussion addressing significant changes (increases or decreases) from previous periods, major contributors, major influences on the PI total, relevant information to place PI in proper perspective related to DOE operations.

5. Root Cause Pareto Charts for PIs 1.2 Skin/Clothing Contaminations, 2.1 Unplanned Safety Function Actuations, 2.2 Violations of Operating Procedures, 2.3 Unplanned Shutdowns, 3.3 Environmental Incidents. Include discussion of any trends.

6. Errata Summary, if applicable.

7. Data Summary Table identifying current quarter data values, if they are not clearly identified in the text or on the graphs.

8. Facility History (Contractor PI Report only) - Control charts showing historical information for each facility reporting to the Contractor. Facility graph captions use the narrative discussion provided with the values.
   - In the interest of reducing the bulk of the primary report, the Contractor may choose to produce a 2-volume report. Volume 1 should contain items 1 through 7 and be a stand-alone, complete document. The next level of detail information (item 8 above) may be segregated into Volume 2, which could have a much more limited distribution. The second volume should be considered supplemental information and, as such, does not need to be a stand-alone document. It is not necessary to repeat information in Volume 2 that appears in Volume 1.
   - The facility historical (Control) charts should be grouped with all graphs for a facility together, each facility starting on a new page. Each page should identify the facility, Contractor, Field Office, PSO(s), and report quarter to facilitate use by individuals who may extract pages to focus on a particular facility. Organization by facility, rather than by PI, should reduce the tendency to compare facilities, generally considered inappropriate due to the diversity of operations.

The level of detail and information to be provided by each of the PI Reports is summarized in Table A4-1.

A4.5 Format and Content Primary Factors Considered

Primary factors in establishing the PI Report format and content are:

- Tiered approach provides increasing levels of detail as needed.

- Separating the summary information from the historical details allows the reader to focus on evaluations and trends.
- Reducing duplication and bulk allows the preparer to focus more time on evaluations and conclusions.
- Reducing the volume of the primary document should address feedback received that indicated the report size discouraged its use.
- Comparison between facilities is generally not meaningful due to the diverse nature of operations.
- More complete perspective can be provided through focus on the discussions.

Table A4-1 PI Reports Cross Reference

Detail	DOE Summary PI Report	PSO PI Report	FO PI Report	Contractor PI Report
Required Level of Detail of Reports	Facilities	Facilities (Programmatic)	Contractors	Facilities
Information Presented				
DOE Historical	X			
PSO Historical		X		
FO Historical			X	
Contractor Historical				X
Facility Historical				X
Distribution Details	Facilities	Facilities (Programmatic)	Contractors	Facilities

- Lowest level of detail = discussion of the facilities (or Contractors for FOs) within the responsibilities of the organization preparing the PI Report.
- Facilities (Programmatic) = facilities the PSO has programmatic responsibility for. Landlord PSO information is contained in the FO PI Reports and is omitted from the PSO PI Reports to eliminate duplication.
- Historical detail = a control chart showing the totals at the level identified under Information Presented.
- Distribution detail = current period distribution (graph or narrative), broken down to the level identified in Information Presented.
- All reports are based on facility and contractor data (values and narrative) released by the Contractors.

Appendix 5 - PI Trending and Analysis

The general methodology for trending and analyzing data gathered under the DOE Performance Indicator Program combines numerical methods to organize the data with engineering management knowledge and insights concerning the process operations. This general approach can be applied to any performance indicators which have been identified as useful in assessing operations. Line management is encouraged to use this methodology to examine performance indicators of local interest beyond the set identified as part of this program.

Recognizing the diversity of the DOE facilities, it is not intended that the PI data be used to compare the performance of DOE facilities. In fact, to do so could result in misleading or inaccurate conclusions.

A5.1 Control Charts

In evaluating the data obtained under the DOE Performance Indicator Program, DOE and DOE contractor line management are required to assess and quantify the information for each PI using control charts and data distribution. The analysis itself is not a problem solving tool. It can assist in determining the cause of variations in operations, which is essential in selecting appropriate managerial actions to effect improvements. This is especially critical when resources are limited.

The two main uses for control charts are to:

- Monitor whether the system is stable and under control (to warn of changes), and
- Substantiate results from changes introduced into the system (to confirm positive results).

All control charts have a central line, upper control limit and lower control limit (CL, UCL, and LCL, respectively). The differences between the charts comes from how these parameters are defined. For the DOE Performance Indicator Program, three types of control charts are employed: the C-Chart, U-Chart, and X-Chart. The formulas used to calculate the central and limit lines for these control charts are identified in the table at the end of this appendix.

A brief discussion of each type of control chart used in the DOE Performance Indicator Program follows.

A5.1.1 Uses of Control Charts

Control charts serve to alert management to the existence of special causes of variation within a system or process. Limit lines drawn on the charts provide guides for evaluation of performance. These lines (called control lines) indicate the dispersion of data on a statistical basis and indicate if an abnormal situation (e.g., the process is not in control or special causes are adversely influencing a process in control) has occurred.

Control charts provide insight on the nature of changes in a system that take place over time. During his studies of process data in the 1920s, Dr. Walter Shewhart of Bell Laboratories first made the distinction between variation due to either special or common causes. Special causes of variation can be detected through the use of statistical techniques. These causes of variation are not common to all the operations involved. The discovery and removal of a special cause of variation is usually the responsibility of someone who is directly connected with the process, although management sometimes is in a better position to correct the problem. Common causes of variation can also be in-

dicated by statistical techniques, but the causes themselves need more detailed analysis to be fully identified. Common causes of variation are usually the responsibility of management to correct, although other people directly connected with the process sometimes are in a better position to identify the causes and pass them on to management for correction.

The influences of common and special causes for a system in statistical control, as depicted on a control chart, can be further explained using an analogy to an electrical system. The "noise" in the electrical signal is analogous to variations in a process due to common causes; it is variability inherent to the system and cannot readily be assigned to any specific cause (such as a change in signal frequency). The band defined by this signal noise is analogous to the control limits. Changing the signal frequency (a system variation from an identifiable source, i.e., a special cause) results in a system response outside the band defined by system "noise" alone (common causes).

A5.1.2 C-Charts

C-Charts (also referred to as "count" charts) are used in dealing with counts of a given event over consecutive periods of time. Many of the initial DOE performance indicators involve counts of events for consecutive calendar year quarters, making C-Chart analysis of these indicators appropriate.

Steps used to develop and analyze C-Charts:

1. Assemble data for the periods of interest.
2. Calculate the data central line.
3. Calculate the upper and lower control limits.
4. Plot the chart; include the central line, UCL, LCL, and data points.
5. Study the charts for stability and/or trends.

A5.1.3 X-Charts

X-Charts involve the analysis of individual measured quantities for indications of process control or unusual variation. The standard deviation for X-Charts (also referred to as individuals charts) is calculated using a moving range.

Steps used to develop and analyze X-Charts:

1. Assemble data for the periods of interest.
2. Calculate the average of the individual values.
3. Calculate the individual moving ranges (all ranges will be positive numbers).
4. Average the ranges.
5. Calculate the standard deviation and subsequent UCL and LCL for the individual values.
6. Plot the average and limit lines for the individual values and analyze for trends.

A5.1.4 U-Charts

U-Charts (otherwise referred to as "rate" charts) deal with event counts when the area of opportunity is not constant during each period. These charts will be used only for PIs 1.5, Lost Work Day Case Rate, and 1.6, Recordable Injury/Illness Rate. For both of these PIs, the "area of opportunity" is the total number of person-hours worked during the period of interest (e.g., calendar quarter). The rate is computed as a count per standard unit of opportunity, which for the two PIs is 200,000 person-hours.

The steps to follow for constructing a U-Chart are the same as a C-Chart, except that the control limits are computed for each individual quarter since the number of standard units (e.g., number of units (events) per 200,000 person-hours) varies.

A5.2 Distribution Charts

In this analysis, data is divided into categories of interest (e.g., root causes or reporting elements). It is then graphed as a stacked bar chart to compare the relative contribution of each category to the total.

Distribution charts are used in several ways, such as to compare data from different time periods, to show changes over time or to confirm improvements achieved. This type of analysis (which is more commonly referred to as a Pareto Analysis) focuses attention on areas which have the most influence on the total, facilitating the assignment of resources in order to prioritize improvement efforts.

Steps used to develop and analyze Distribution Charts:

1. Identify the categories of interest (e.g., root causes or reporting elements).
2. Identify the time period during which the data will be collected. For the DOE Performance Indicator Program, data will be collected on a quarterly basis.
3. Collect the data for each category (e.g., cumulative data for root causes: material, procedure, personnel, management, design, training). See section A3.8 for additional discussion of root cause data.
4. Place the category with the largest value on the far left of the horizontal axis of the chart.
5. Repeat the process for each category in descending order. As each item is added, the cumulative percentage for the items is reflected at the top of the chart.

A5.3 Data Evaluation & Analyses

In evaluating control charts, managers should look for the following indications:

- *Outliers* - Data that falls outside the control lines.
- *Runs* - Series of data points above or below the central line. A "run" of 7 consecutive points or 10 out of 11 points indicates an abnormality. Other approaches exist for identifying runs, such as detecting 2 of the last 3 data points beyond 2 standard deviations (2-sigma) and the more general CUSUM (cumulative sum) procedures, which involve adding up standardized deviations from the calculated mean to detect abnormalities (such as runs or trends) sooner.

- *Trends* - Continual rise or fall of data points. If 7 data points rise or fall continuously, an abnormality is considered to exist.
- *Periodicity* - Data shows the same pattern of change over time.

Data analysis should also consider:

- Apparent increasing or decreasing trends over time for a facility or group of facilities.
- Significant increases or decreases in the value reported from one quarter to the next.
- Reported changes in operating status or facility mission.
- Facilities not reporting data.
- Conditions identified in the narrative which influence the value reported.

A5.4 Other Trending and Analysis Issues

A5.4.1 Standard Time Interval for Collecting, Trending, Reporting PI Data

A 3-year "rolling window" (e.g., 12 quarterly reporting periods) is to be used at all reporting levels in the analysis of PI data for performance trends. For example, the 4th Quarter 1993 PI Report would evaluate data over the first 12 reporting periods of the SEN-29-91 PI Program. However, beginning with the 1st Quarter 1994 PI Report, the "window" would move, removing the 1st Quarter 1991 PI data from consideration.

Regarding root cause data, a "rolling window" of 6 quarterly reporting periods is to be used at all reporting levels to analyze trends in identified root causes. The shorter "window" is considered necessary to permit more timely identification of changes in root cause trends.

In performing analysis of performance trends, it should be emphasized that, where appropriate, each reporting level can and should evaluate performance over shorter or longer intervals than the baseline reporting period to gain a better understanding of the influence of system changes or performance improvement initiatives on overall performance.

A5.4.2 Treatment of "Outliers"

In constructing control charts, individual or groups of data points may appear near or beyond the calculated control limit lines. Since these data appear to indicate that a system is not or may not be in control (i.e., stable), additional evaluation may be needed to ascertain if the data in question are the result of common cause or special cause variation. If the data are clearly influenced by a one time aberration (i.e., special cause), there could be a basis for excluding the number or estimating what the actual value should have been for the purpose of determining actual system control limits. It must be emphasized that "tossing" a data point applies only to the statistical evaluation process; actual values reported must be included in the overall roll-up of values from all participating DOE facilities. Also, where data are "tossed" from a statistical evaluation, justification shall be provided by the reporting organization.

A5.4.3 Treatment of "Rare" Events

PIs dealing with counts with average values of 5 or less are considered "rare" events. C-charts and U-charts are inappropriate in trending rare, infrequent events. Where the limited nature of the data does not support the use of control charts, the use of more sensi-

tive trend tests may provide a better indication of actual trends. These more sensitive trend tests include multinomial likelihood ratio tests, which involve comparing the likelihood of postulated rates of data change (i.e., constant, increasing, or decreasing) assuming the data are generated by a multinomial distribution. Descriptive information on multinomial likelihood ratio tests and other similar statistical methods for detecting performance trends are included in the referenced documents at the end of this appendix.

A5.4.4 Vertical Axis Scaling

The following general criteria should be applied to the depiction of trend data on control charts:

- The scale should be set so that the chart can be quickly understood, and;
- The data together with the limit lines should span at least half of the vertical axis.

A5.5 References

1. **Guide to Quality Control**, K. Ishikawa, Kraus International Publications, White Plains, New York, 1982

2. **The Deming Route to Quality and Productivity**, W. W. Scherkenbach, CEEPress Books, George Washington University, Washington, D.C., 1990

3. **Quality Improvement Using Statistical Process Control**, Lawrence S. Aft, Harcourt Brace Jovanovich, 1988

4. **A Practical Guide to Statistical Quality Improvement: Opening Up The Statistical Toolbox**, Michael R. Beauregard, Raymond J. Mikulak, and Barbara J. Olson, Van Nostrand Reinhold, 1992

5. **AT&T Statistical Quality Control Handbook**, Western Electric Company, Delmar Printing Company, Charlotte, North Carolina, 1985

6. **Statistical Methods For Quality Improvement**, Hitoshi Kume, The Association for Overseas Technical Scholarship (AOTS), 1985 (translated 1987)

7. **Statistical Quality Control For Manufacturing Mangers**, William S. Messina, John Wiley & Sons, Inc., 1987

8. **Statistical Methods For Quality Improvement**, T. P. Ryan, John Wiley & Sons, Inc., 1989

9. **Implementing Dr. Deming's Methods For Management Of Productivity And Quality**, George Washington University Continuing Education Program, 1990

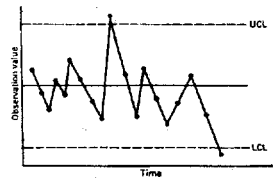
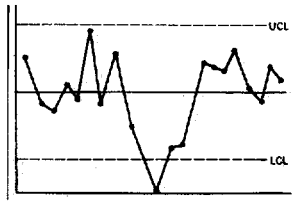
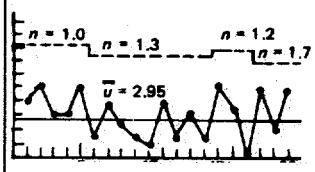
10. "Testing For and Against an Order Restriction on Multinomial Parameters", **Journal of the American Statistical Association**, 73, 197-202, 1978

TABLE A5-1. Calculation of Control Lines

In general terms:

Upper Control Limit = UCL= Average + 3σ

Lower Control Limit = LCL = Average - 3σ

Description	PIs	Average	Standard Deviation Sigma (σ)	Sample Graph
PIs measuring events or counts (C-Chart)	1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 3.3, 4.1, 4.2, 4.3, 4.6	$\bar{x} = \frac{\sum_{t=1}^{n} x_t}{n}$	For $\bar{x} > 5$, $\sigma = \sqrt{\bar{x}}$	
PIs measuring quantities (X-Chart)	1.1, 3.1, 3.2, 3.4	$\bar{x} = \frac{\sum_{t=1}^{n} x_t}{n}$	$\sigma = \frac{1}{d_2}\left(\sum_{t=2}^{n} \frac{\lvert x_t - x_{t-1}\rvert}{n-1}\right)$ where $d_2 = \frac{2}{\sqrt{\pi}}$	
Normalized Rate PIs (U-Chart)	1.5, 1.6	$\bar{u} = \frac{\sum_{t=1}^{n} x_t}{\sum_{t=1}^{n} \frac{y_t}{200{,}000}}$	$\sigma_t = \left(\frac{\bar{u}}{\frac{y_t}{200{,}000}}\right)^{1/2}$	
Percentage PIs (P-Chart)	4.4, 4.5	$\bar{p} = \frac{\sum_{t=1}^{n} x_t}{\sum_{t=1}^{n} y_t}$	Control charts do not appear to be appropriate based on the CY-1991 data.	

- For C-Chart and X-Chart:
  - n = number of calendar quarters
  - x_t = value for quarter t
- For U-Chart:
  - x_t = cases reported this quarter
  - y_t = total hours worked this quarter
- For P-Chart:
  - x_t = items late (not done) this quarter
  - y_t = total open (scheduled) this quarter

CONCLUDING MATERIAL

Review Activities:

Headquarters Offices

AC	IG
AD	IN
AN	MI
BC	NE*
BU	NP
CE	NS*
CP	OE
CR	PA
DP*	PR
DR	RG
EH*	RW
EI	SA
EM*	SL
EP	SP
ER*	AP
FE*	BPA
GC	SE
HG	SW
	WAPA

Field Offices

AL*
CH*
FERN*
ID*
NV*
OR*
RF*
RL*
SAN*
SR*

Preparing Activity:
DOE-NE-70

Project Number:

SAFT-0007

*Minimum review required for future revisions to DOE-STD-1048-92. (DOE-STD-1048-92 received wider review because it was reviewed in conjunction with DOE Order 5480.PI.)