

Behavior Based Safety and Human Factors Process at ExxonMobil

Joint EFCOG/DOE

Chemical Management 2003 Workshop

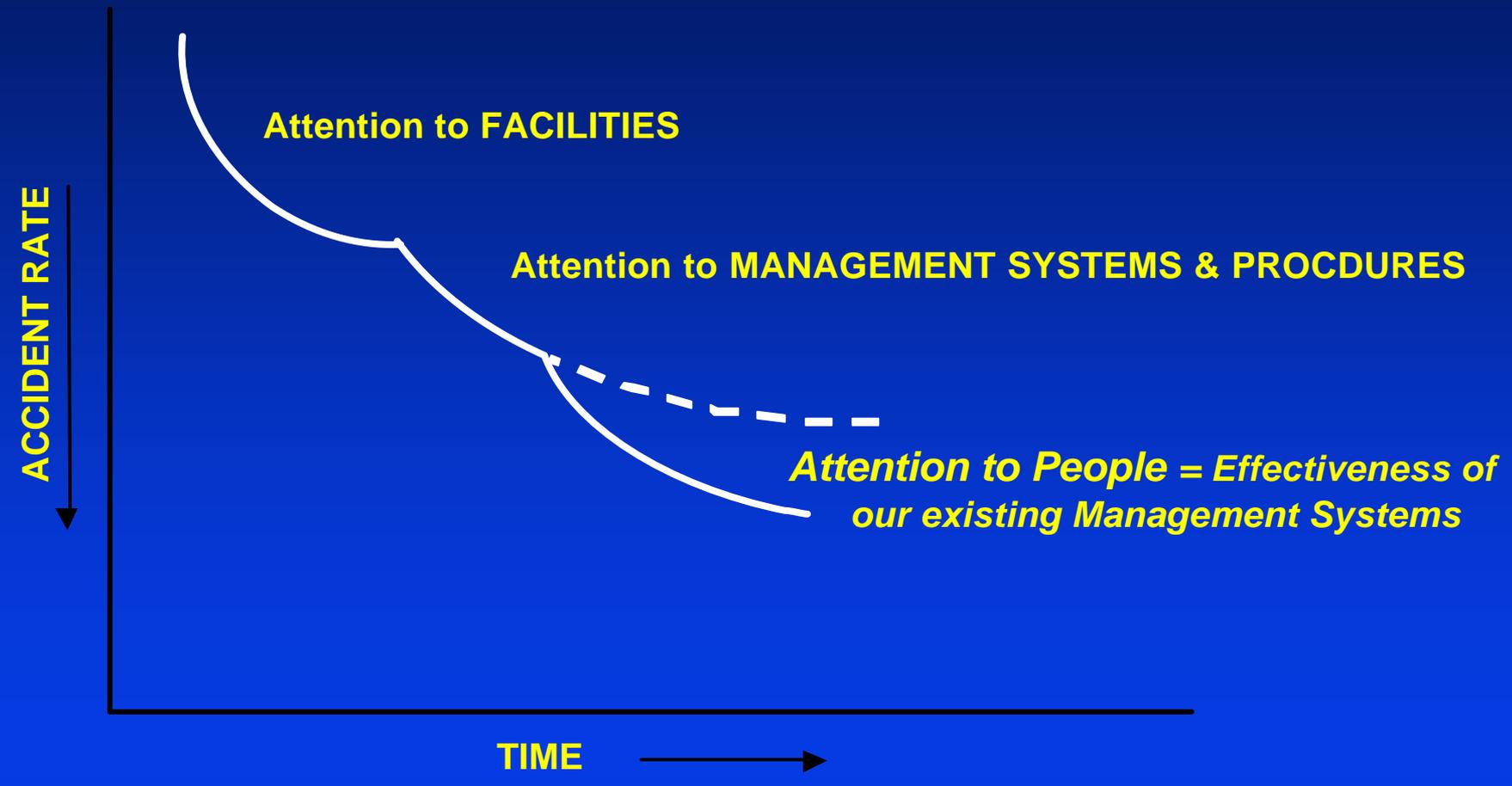
Edward Hojnacki
ExxonMobil
Downstream & Chemicals SH&E
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Overview

- **Why we are focused on Behavior Based Safety and Human Factors**
- **What we mean by Human Factors**
- **What is the Safety Excellence Process**
- **What type of results have we seen**
- **Wrap - up**



Vision - "Nobody Gets Hurt"



SEP Safety Triangle



SEP Human Factors

Operating Environment and Culture

Facilities
(Pumps, control systems, panels, valves, cranes, etc.)

Management Systems
(Procedures, risk assessment, incident investigation training, etc.)

People
(Human characteristics and behavior)

“Human Factors is the integration and application of available scientific knowledge about people, facilities, and management systems to improve interactions in the work place.”



Human Factors Spectrum

HF Spectrum

Workplace Design	<ul style="list-style-type: none"> • Facility Layout • Workstation Configuration • Accessibility
Equipment Design	<ul style="list-style-type: none"> • Controls • Displays • Field Control Panels • Control Systems • Hand Tools
Work Environment	<ul style="list-style-type: none"> • Lighting • Noise • Vibration • Temperature (Energy Expenditure)
Physical Activities	<ul style="list-style-type: none"> • Manual Handling • Cumulative Trauma Disorders
Job Design	<ul style="list-style-type: none"> • Work Schedules • Work Load (mental) • Fitness for duty • Team Building • Behavior-based Safety
Information	<ul style="list-style-type: none"> • Human Error • Labels and signs • Procedures/Instructions • Training
Personal Factors	<ul style="list-style-type: none"> • Individual and Group Differences • Body Size, Strength, Fitness • Age • Stress, fatigue, boredom

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Safety Excellence Process (SEP)

ExxonMobil Management System Performance

Leadership and Management Systems

UNIT ACTIVITIES, SYSTEMS, PROCEDURES

Behavior Based Safety Observation

Human Machine Interface

Workplace Perception

Risk Assessment

Incident Investigation

Human Factor Diagnostic Process

Collect, Analyze and Prioritize Data

HOT LIST

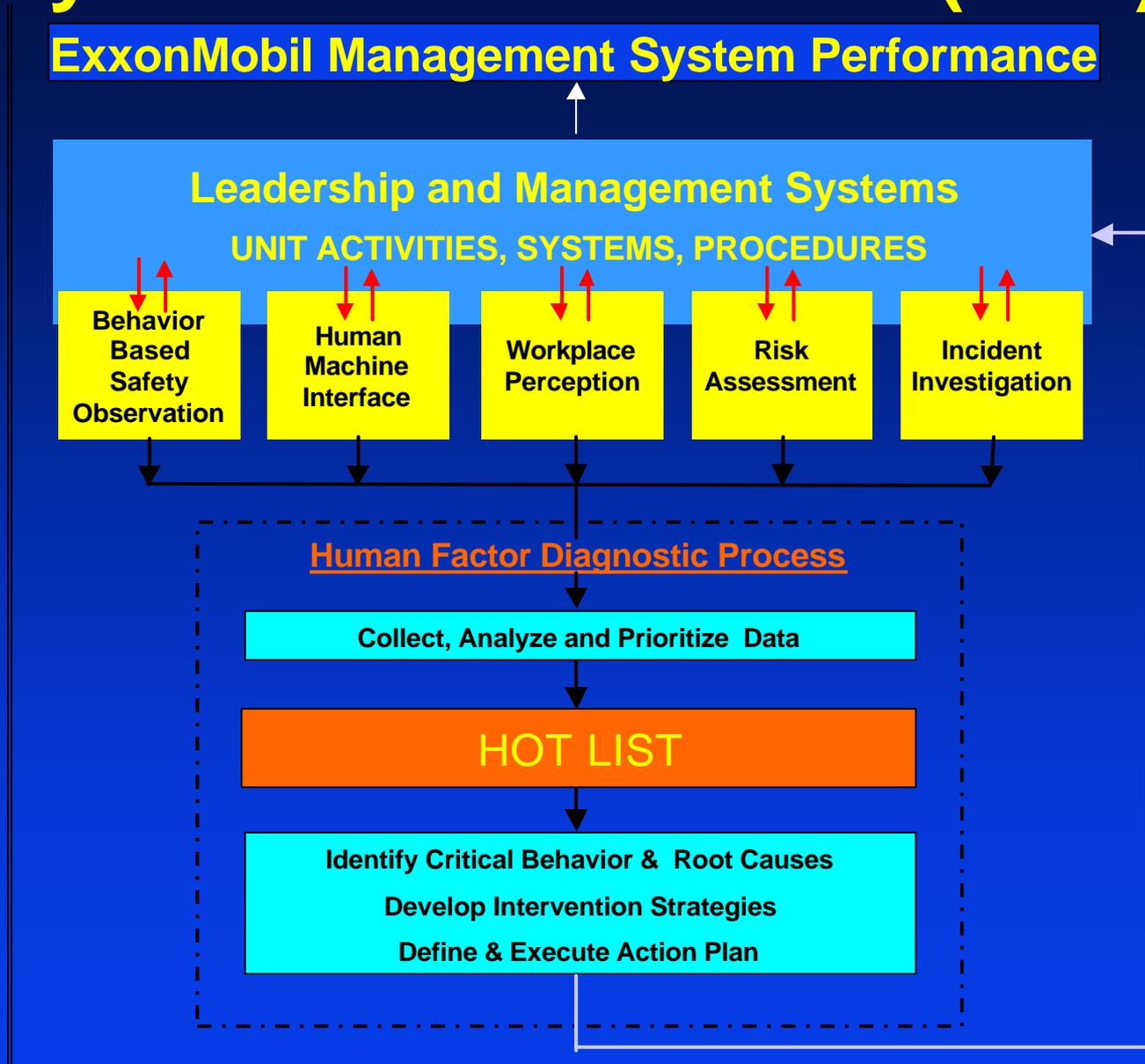
Identify Critical Behavior & Root Causes
Develop Intervention Strategies
Define & Execute Action Plan

Level I Processes

On-going data collection and short term / direct interventions

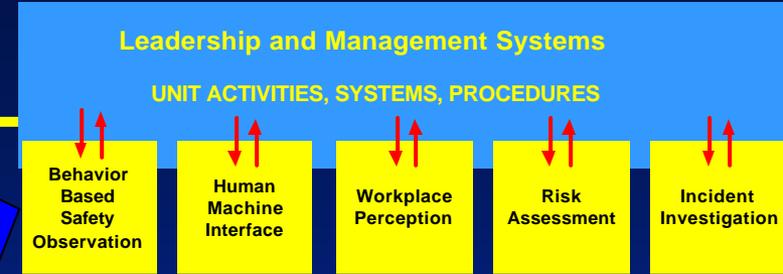
Level II Process (HFDP)

Periodic analysis and longer term interventions





Behavior Based Safety Observation



- **Objective:**

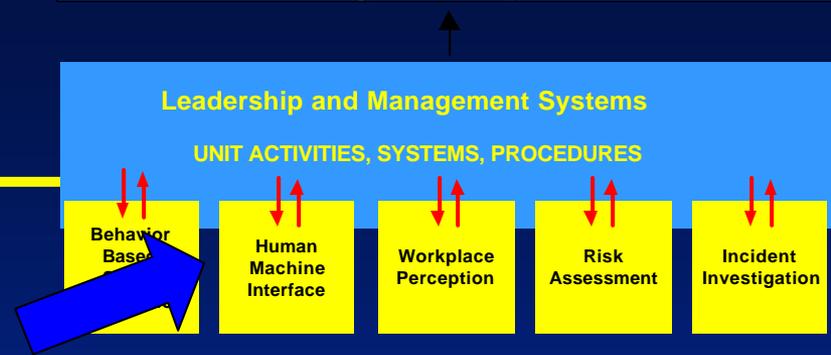
- All employees and contractors proactively and routinely identify and eliminate unsafe behaviors by themselves and their coworkers.

- **Key Attributes:**

- All levels of the organization are involved in the observations
- Mostly peer to peer observations
- Observations are interactive and used to reinforce safe behaviors and correct unsafe or at risk behaviors.



Human Machine Interface



- **Objectives:**
 - Design and construct facilities for people’s use
 - Build it right the first time
- **Systematically apply Human Factors (HF) through out the project life cycle**
 - Incorporate HF into the major project work flow
 - Incorporate HF into the small project work flow (Management of Change process)
 - Identify and improve existing facilities
 - Workforce able to identify and address ergonomic issues



Human Machine Interface Personal Factors

HF Spectrum

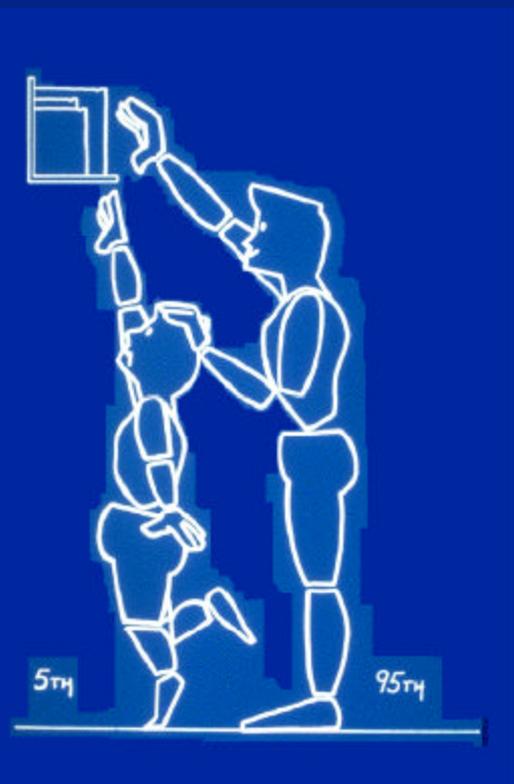


Spectrum Category

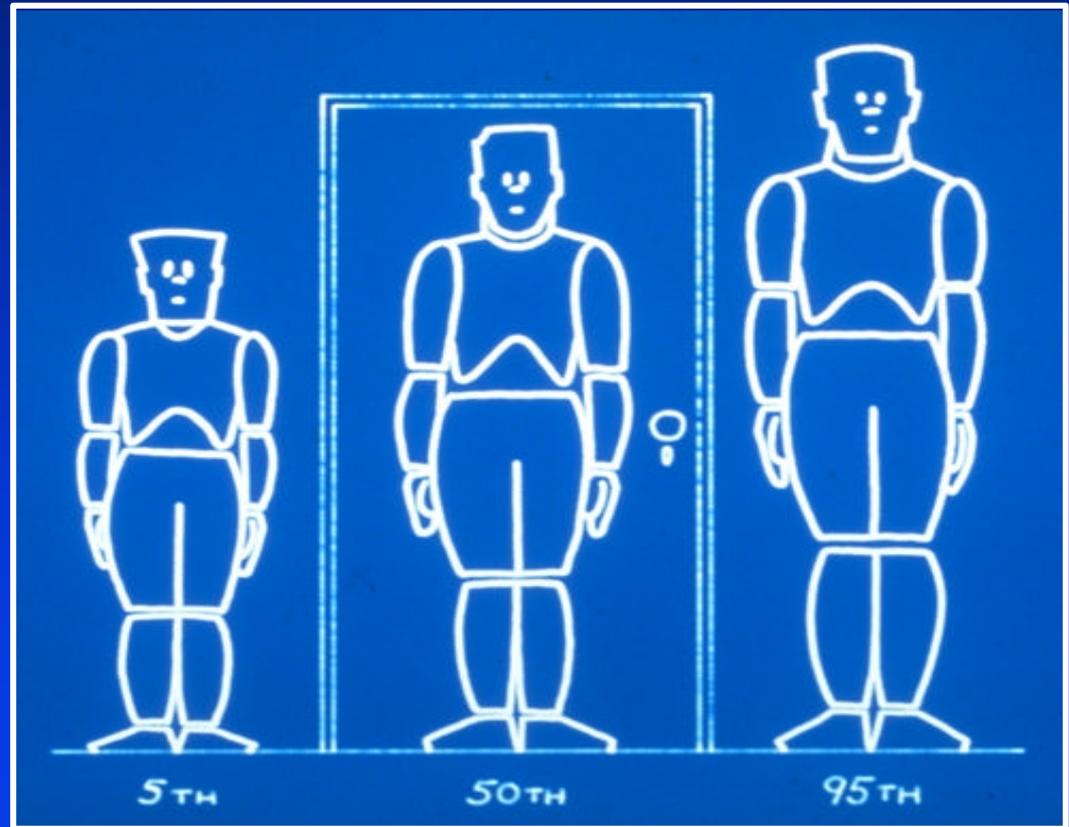


Designing for the Extreme

Reach



Fit





Human Machine Interface Personal Factors



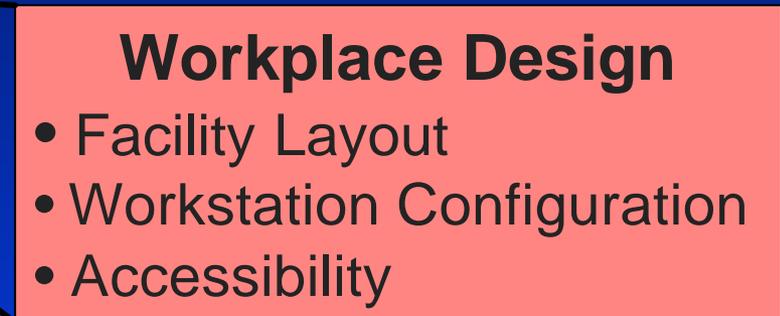


Human Machine Interface Workplace Design

HF Spectrum



Spectrum Category



Access from Stairs and Ladders

Operator must step outside
of the safety of the cage
to read display





Human Machine Interface Workplace Design





Human Machine Interface Equipment Design

HF Spectrum



Spectrum Category





Human Machine Interface Equipment Design

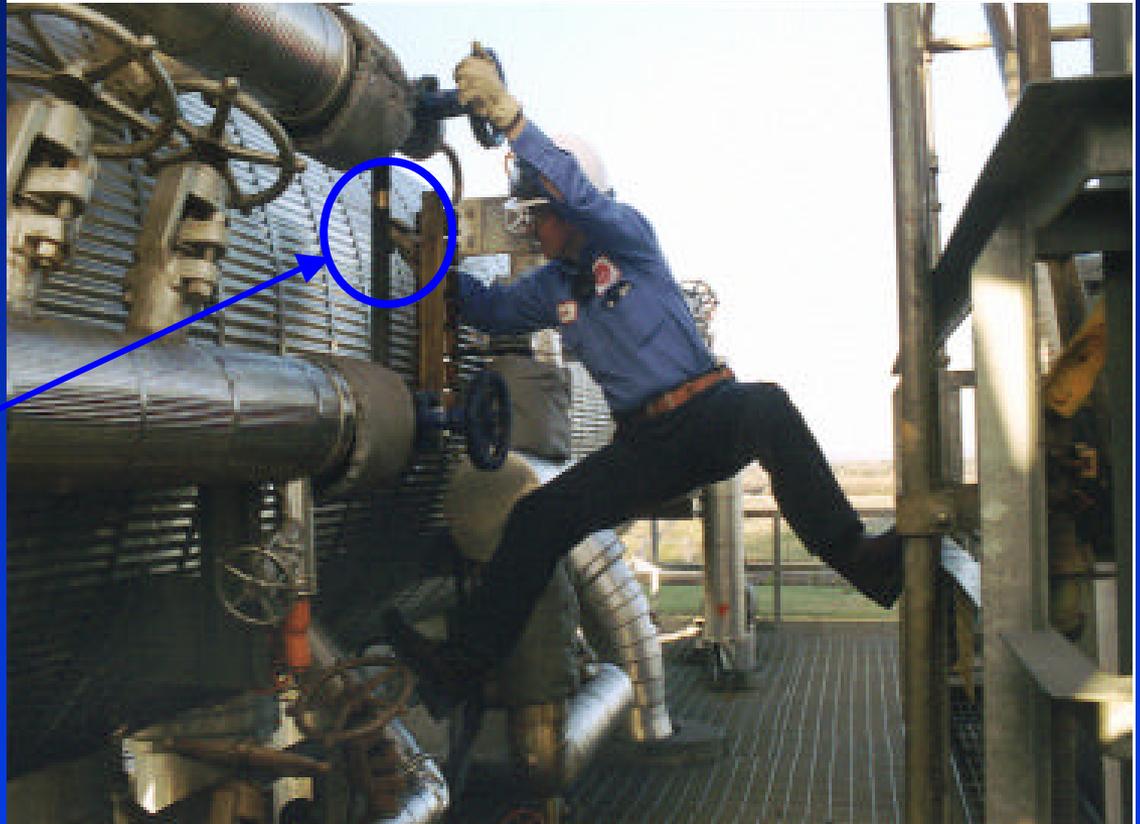


**Display layout should be compatible with
the equipment that is being controlled**

SEP Human Machine Interface Equipment Design

Field displays should be located to ensure that they can be easily read

Note flashlight in his right hand. The light is used to more easily see the liquid level

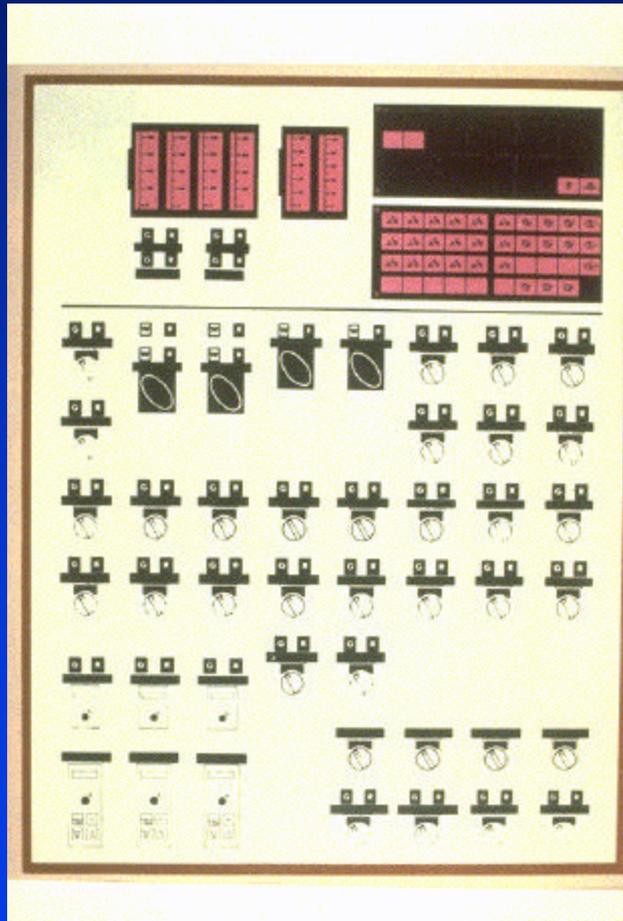




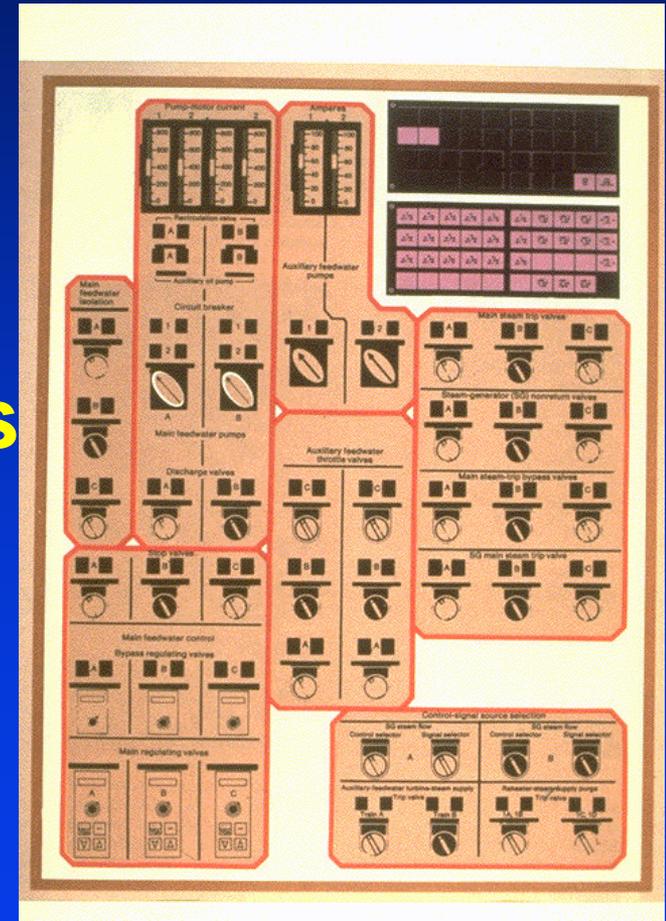
Human Machine Interface Equipment Design

Functional Grouping: *Related functions are located together in an easily identifiable fashion*

Not
this

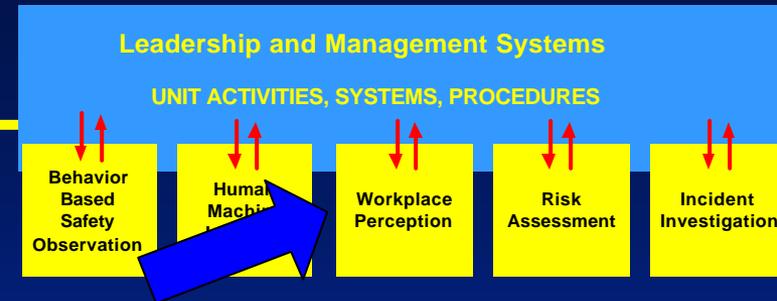


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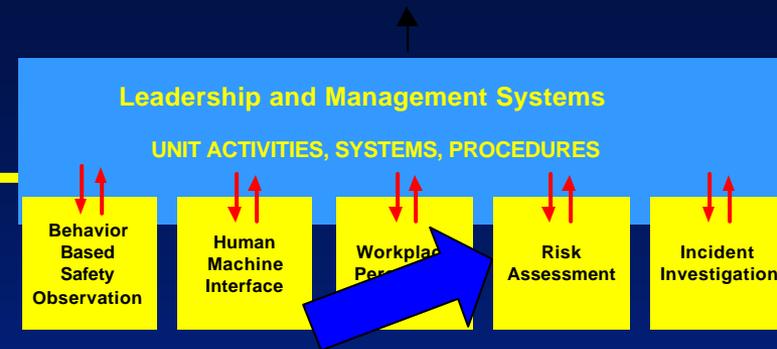
SEP Workplace Perception

ExxonMobil Management System Performance



- A systematic process for collecting worker input regarding the strengths and areas for improvement.

SEP Risk Assessment



- **Risk analysis tools are used to identify and address HF issues associated with**
 - Facilities
 - Critical Task Analysis (CTA)
 - Process Hazard Analysis (PHAs)
 - Planned tasks and procedures
 - Job Safety Analysis (JSA) or Task Risk Analysis (TRA)
 - Real-time actions
 - Last Minute Risk Assessment - a simple memory based process that is used by the workers prior to starting an activity



Last Minute Risk Assessment (LMRA)

Examples

5 STEP PLANNING PROCESS

WHAT AM I ABOUT TO DO?

HOW AM I GOING TO DO IT?

WHAT DO I NEED TO DO THE JOB?

HOW CAN I BE INJURED?

WHAT AM I GOING TO DO ABOUT IT?

DO THE JOB RIGHT

SAFE PERFORMANCE SELF ASSESSMENT

BEFORE BEGINNING ANY ACTIVITY/TASK/JOB:



ASSESS the risk!

What could go wrong?

What is the worst thing that could happen if something does go wrong?

ANALYZE how to reduce the risk!

Do I have all the necessary *Training* and *Knowledge* to do this job safely?

Do I have all the proper *Tools* and *Personal* protective equipment?

ACT to ensure safe operations!

Take necessary *Action* to ensure the job is done safely!

Follow written procedures! Ask for assistance, if needed!

DO NOT PROCEED UNLESS EVERYTHING IS SAFE!

For Everyone • Every Day • All the Time

LPS Inc.

Before You Start that task.....

Survey your surroundings for potential hazards,

Consider how your actions could create a potential hazard,

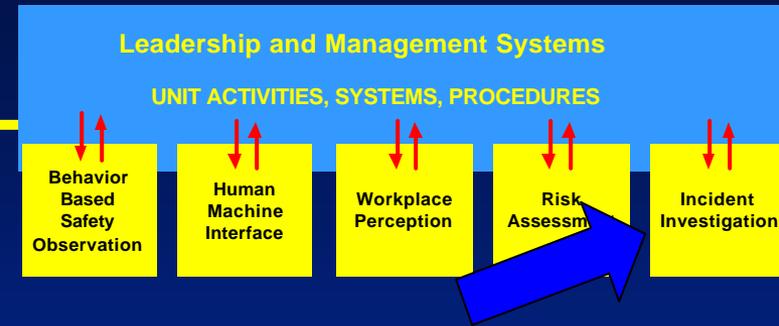


Analyze "What Could Go Wrong?"

Notify Supervisor if unable to correct or eliminate the hazard.

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Chemical

SEP Incident Investigation



- Incidents and near-misses are investigated using Root Cause Analysis Tools
- Individual incident and common cause analyses include identifying Human Factors issues
- Belief that

“Human error is a result, not the cause”

Safety Excellence Process (SEP)

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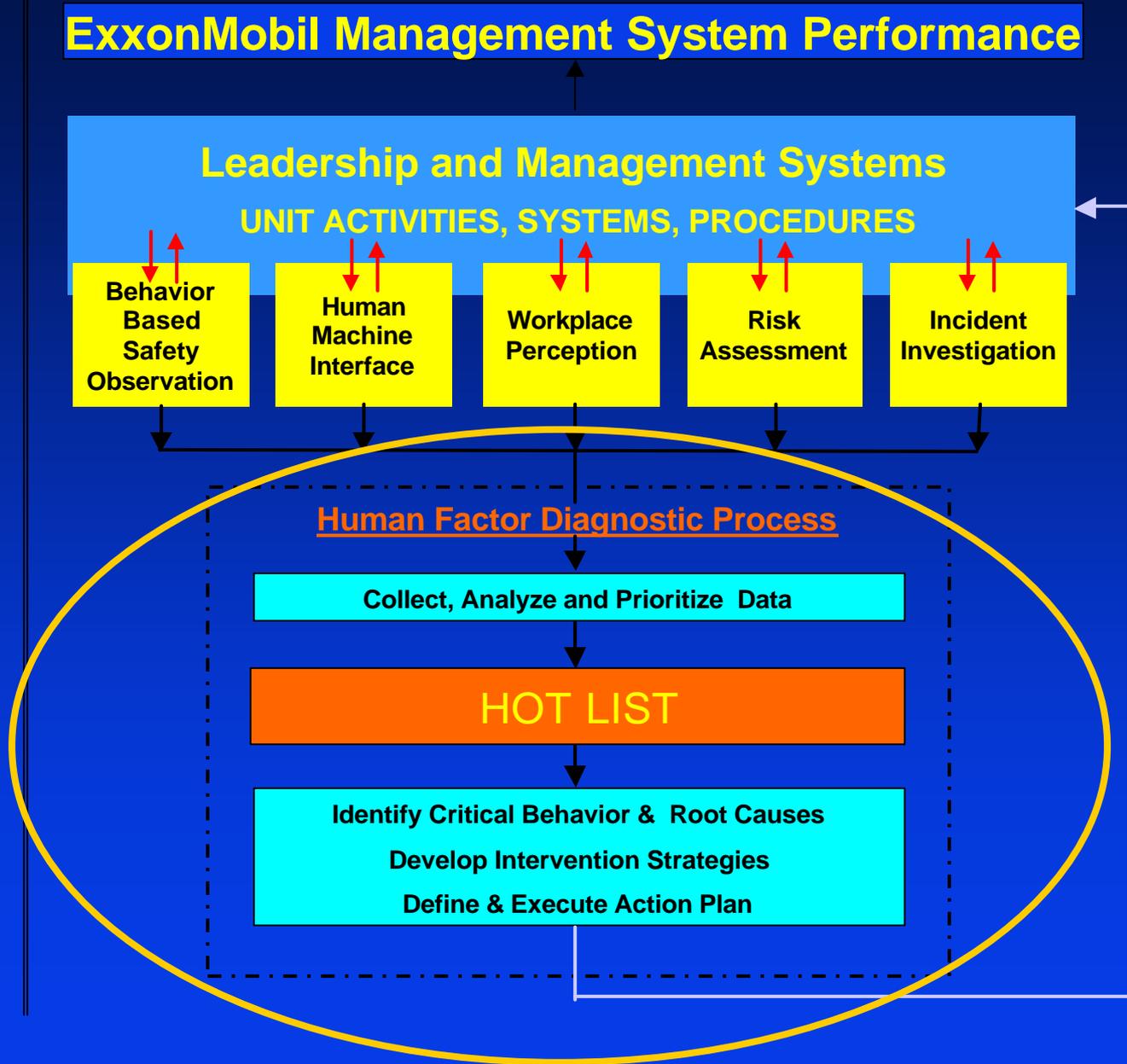
Periodic analysis and longer term interventions

Human Factor Diagnostic Process

Collect, Analyze and Prioritize Data

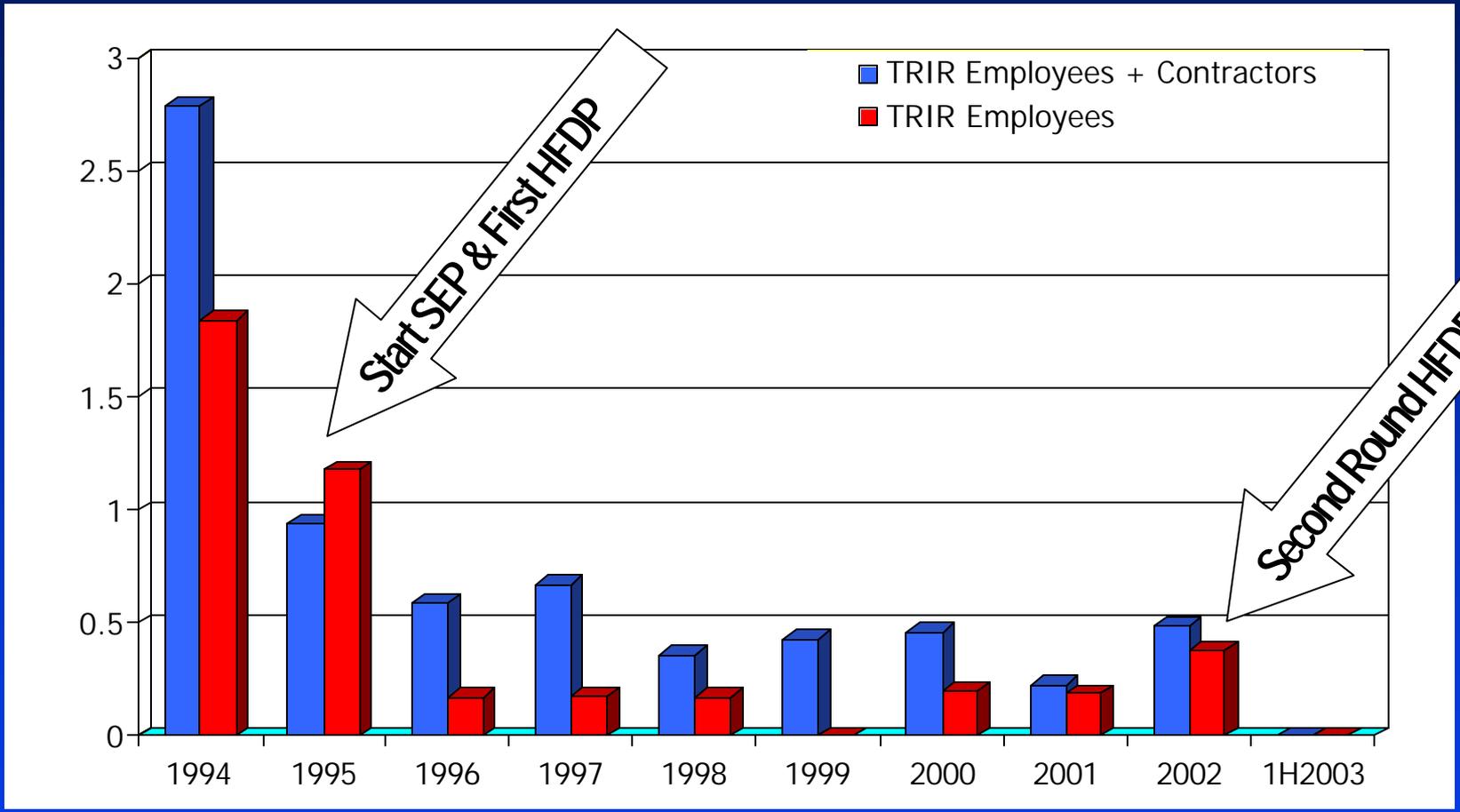
HOT LIST

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Safety Excellence Result

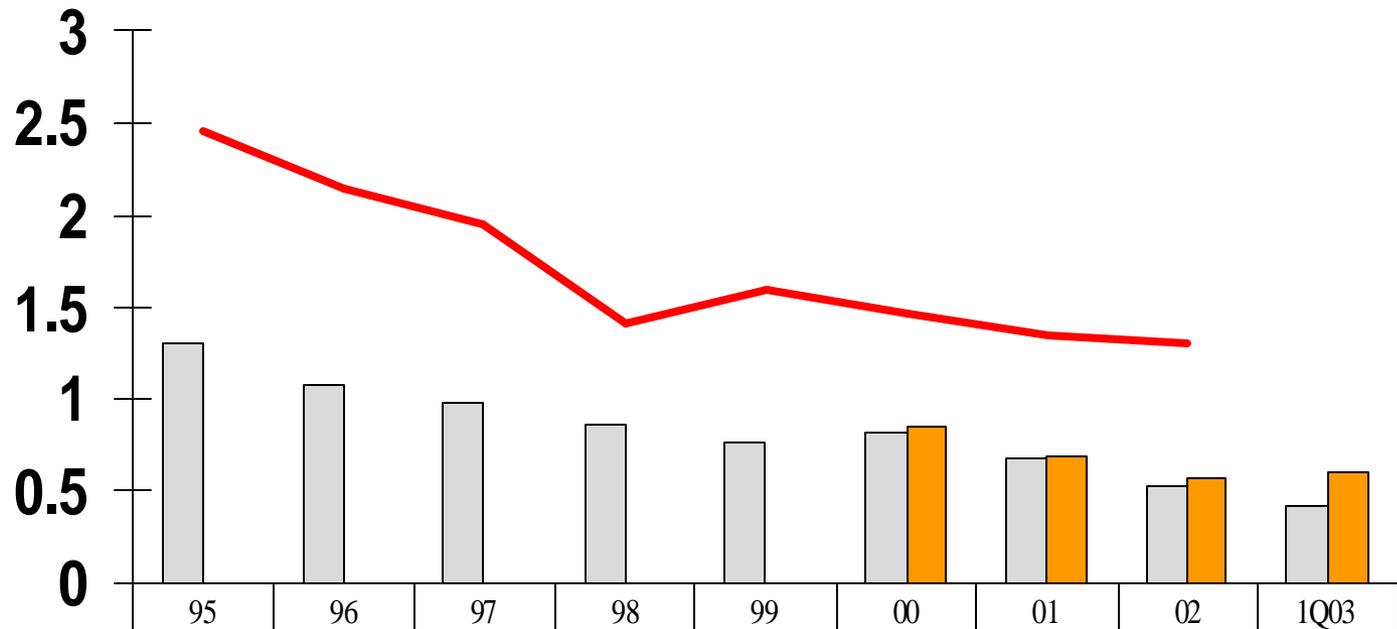




Exxon Mobil Corporate

Total Recordable Injuries and Illnesses

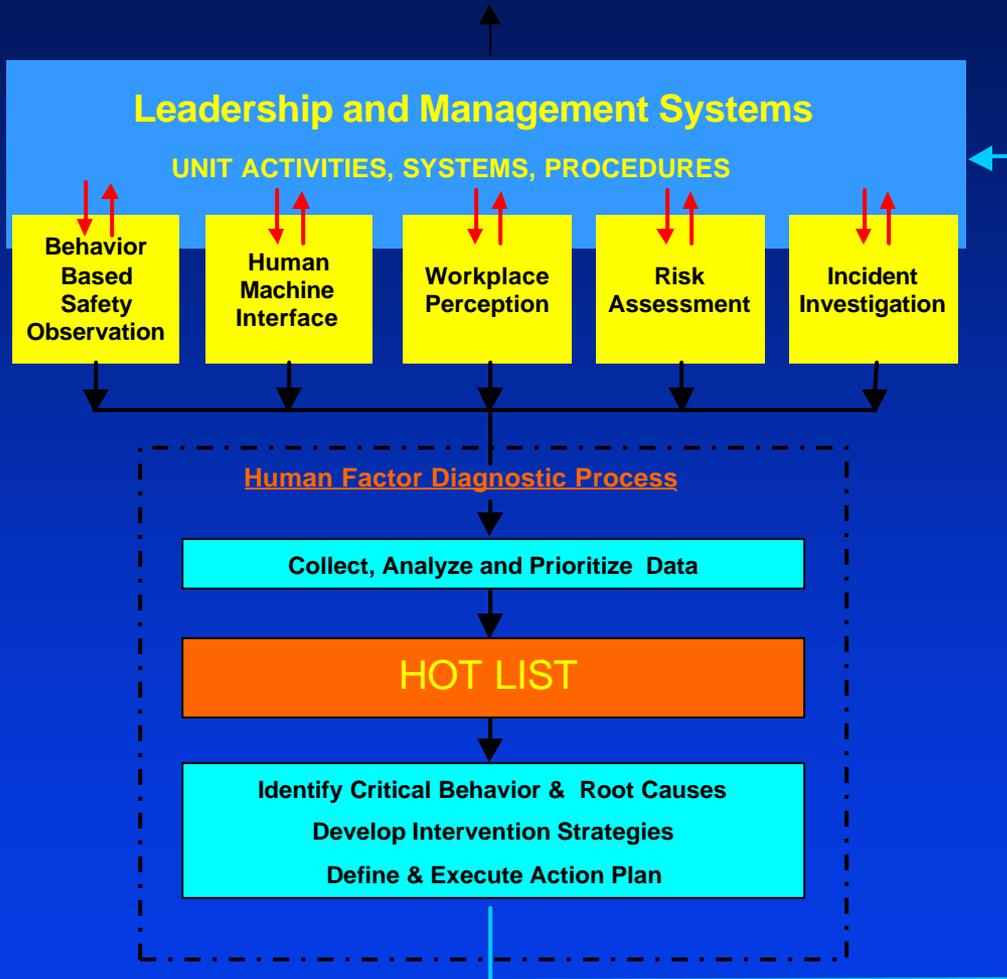
incidents per 200,000 work hours



Employees	1.31	1.07	0.97	0.86	0.76	0.825	0.674	0.53	0.412
Contractors						0.84	0.693	0.575	0.61
US Petroleum Industry Benchmark	2.45	2.14	1.95	1.4	1.6	1.46	1.35	1.3	

Safety Excellence Process

ExxonMobil Management System Performance



Strengths

1. Breadth of Human Factors - All 5 level 1 processes
2. Raising the Human Factors Bar within each Level I area
3. Conducting the Human Factors Diagnostic Process to identify and work the site's most important issues.