

**Performance Measures for Safety and  
Environmental Management Systems  
for OCS E&P Operations**

October 24, 1997

## **PREFACE**

The U.S. Minerals Management Service (MMS) thanks all of the companies, organizations, and members of the Performance Measures Work Group for developing the information contained in this report. The following members contributed to the development of the information contained in this report.

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## *EXECUTIVE SUMMARY*

In 1991, MMS announced its Safety and Environmental Management Program (SEMP) initiative, which consists of a series of management systems designed to prevent accidental releases from offshore facilities and to improve the ability of these facilities to operate in a safe and environmentally responsible manner. SEMP consists of the following elements:

- General management program elements and principles
- Safety and environmental information
- Hazards analysis
- Management of change
- Operating procedures
- Safe work practices
- Training
- Ensurance of quality and mechanical integrity of critical equipment
- Pre-startup review
- Emergency response and control
- Investigation of incidents
- Audits of SEMP elements

Beginning in 1995, the American Petroleum Institute (API) began sponsoring evaluations of industry implementation of the SEMP initiative for outer continental shelf (OCS) operators. As a result of these results and other reasons, MMS became interested in finding a way to measure the actual effectiveness of SEMP implementation. MMS and the offshore industry formed a work group to investigate development of such performance measures. This report documents the results of the work group's efforts.

The work group has established the following set of performance measures based on a series of facilitated working meetings.

1. Production operations employees' (company and contractor) total recordable and lost workdays incident rates
2. Drilling operations employees' (company and contractor) total recordable and lost workdays incident rates
3. Construction operations employees' (company and contractor) total recordable and lost workdays incident rates
4. Fire/explosion incident rate
5. Blow-out incident rate
6. EPA NPDES discharge exceedence rate
7. Oil spill incident rate — number of spills and volume of spills ( $\geq 1$  barrel)
8. Oil spill incident rate — number and volume of oil spills ( $< 1$  barrel)
9. MMS production incidents of non-compliance (INCs) rate
10. MMS drilling, workover, completion, and well plugging and abandonment incidents of non-compliance (INCs) rate

A pilot test of the Performance Measures was conducted in 1997. The MMS will begin an OCS-wide implementation of the Performance Measures in 1998.

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## 1. INTRODUCTION

For several years the U.S. Minerals Management Service (MMS) has worked with representatives of the offshore oil and gas industry to promote voluntary adoption of its Safety and Environmental Management Program (SEMP) initiative. The offshore industry has responded with the development of guidance for SEMF implementation and the sharing of good practices among companies. The American Petroleum Institute (API) developed *Recommended Practices for Development of a Safety and Environmental Management Program for Outer Continental Shelf (OCS) Operations and Facilities* (RP 75). In addition, beginning in 1995, API has sponsored several independent assessments of SEMF implementation surveys completed by OCS operators. As a result of these assessments, MMS, API, the Offshore Operators Committee (OOC), and others have collaborated on workshops to help share good practices on SEMF activities where the surveys indicated areas for improvement.

Following these extensive, mutually beneficial efforts, MMS and the offshore industry began a follow-on project to develop an initial set of performance measures to help determine the effectiveness of company implementation of SEMF initiatives. Begun in 1996, the objective of this effort was to develop a plan for scoping, implementing, gathering, reporting, and benchmarking a defined set of offshore safety and environmental performance measures. This project had several overall purposes:

- To determine if OCS safety and environmental performance is improving after implementation of RP 75 at OCS operations
- To provide the average and range for various quantitative measures against which companies can compare themselves
- To give MMS assurance that an operator's safety and environmental performance is improving
- To provide background data upon which companies that have implemented RP 75 programs and have demonstrated good performance can base requests to MMS for specific regulatory relief

MMS and representatives of the offshore industry formed a Performance Measure Work Group (PMWG) to develop an initial set of measures. Agreement was reached between MMS and industry representatives that the work product of the effort would not be used for direct enforcement actions, setting of mandatory industry-wide performance targets, or to reveal confidential and company-specific information.

The PMWG consists of the members and organizations listed in the Preface to this report. It is a broad-based group involving a wide range of government and industry stakeholders; large and independent operators are both represented.

MMS saw the following benefits accruing from this activity.

### ***Benchmarking***

MMS will work with industry representatives to identify "pacesetter" companies for each performance measure. These companies would be requested to make presentations at periodic workshops sponsored by MMS and industry on how they achieved their performance.

### *Relative Perspective*

Knowing how offshore operators as a group are faring, and where their own company/facility fits in the range of performance for each measure, company management will be better able to focus their continuous improvement efforts. This should also lead to more cost-effective corrective actions that will prevent accidents and thereby protect people and the environment. This perspective could also better help industry focus its research and audit efforts to have maximum value.

### Regulatory and Research Perspective

Knowing how offshore operators as a group are faring across the range of performance for each measure will allow MMS to focus better its regulatory and research programs. MMS will be able to focus on areas where the performance measures indicate that operators are having difficulty meeting MMS expectations. MMS will be better able to leverage its limited resources by redirecting research efforts, promoting appropriate regulatory initiatives, and shifting inspection program emphasis.

### Public Information and Relations

Offshore operators and organizations will have a credible data source that will enable them to demonstrate better the long-held opinion that OCS operators have an excellent safety and environmental record. These data will be normalized, where appropriate, to account for known uncontrollable external factors that affect the performance measures, thereby providing more consistent information that is comparable across the companies operating on the OCS.

### Requests for Specific Regulatory Relief

Many operators have expressed a desire to see MMS grant permission for justified and specific requests for regulatory relief to solid performers — perhaps as partial recognition that those companies are acting responsibly. The performance measures will be a verifiable gauge of the reasonableness of such requests and will be a starting point for dialog with MMS. MMS expects that operators will want to use additional performance indicators and information related to management's proactive policy/commitment to safe and environmentally sound operations to support each specific request. Such "leading" indicators of performance could focus MMS on the "quality" of the implementation of SEMP elements.

The following sections document the initial results of this SEMP performance measurement project.

## **2. PROCESS FOR DEVELOPING PERFORMANCE MEASURES**

The following process was used by the PMWG to develop the initial set of performance measures.

- A steering committee was created among interested parties. The steering committee held several meetings and conference calls to discuss safety and environmental performance measures and agree on a development process.
- PMWG meetings were held during 1996 to brainstorm and develop a strawman list of possible performance indicators.
- A meeting of the PMWG was held at MMS offices in New Orleans, Louisiana, on December 5-6, 1996, to discuss performance measurement concepts and the strawman performance measures.
- Three PMWG subcommittees held several conference calls to finalize the draft performance measures. Each subcommittee included members from major operating companies, independent operating companies, industry organizations, and regulators.
- The PMWG met again on February 20-21, 1997, at MMS offices in New Orleans, Louisiana, to critique the work products of the three subcommittees and to agree on the final set of measures.
- A draft report was reviewed by the PMWG. Comments were resolved and improvements were integrated into the final report.
- A pilot survey was performed among the PMWG member companies to validate the process.
- Two workshops were held, one each in New Orleans and Houston in September 1997, to introduce the performance measures to the other members of industry and to solicit comments and suggestions.
- A final report was developed incorporating comments and suggestions that were made at the workshops.

This report summarizes the deliberations of the SEMP PMWG. The following sections discuss the various performance measures. An appendix gives detailed descriptions of each measure including the following items: formula, description of measure numerator and denominator, location of currently collected data, and definition and issues. The "definitions and issues" sections in the appendix discuss alternative items that were considered by the PMWG for use in the measures, but were eliminated from further consideration.

The PMWG expended a significant amount of effort during 1996 and 1997 to develop this material. This report is unable to capture adequately all of the detailed discussions that led to the product of their efforts. However, the identified measures have been thoroughly vetted by a large group of experts representing a broad spectrum of companies, industry organizations, and regulatory authorities, all committed to excellence in safety and environmental performance in E&P operations in the OCS. To help ensure that the identified measures are useful for their intended purposes, the draft measures were piloted during the summer of 1997 to ensure reasonableness and practicality.

### **3. SUMMARY OF SAFETY PERFORMANCE MEASURES**

The following are the safety-related performance measures established by the PMWG. These measures deal with the occurrence rate of relatively minor illness and injury incidents as well as more severe accidents associated with production, drilling, and construction activities on the OCS. Most of the data for these measures are available from existing sources. The appendix provides a more detailed description of the performance measures, identifies the location of currently collected data, and discusses outstanding issues that could affect implementation of the measures.

#### **1. PRODUCTION OPERATIONS EMPLOYEES' (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAY INCIDENT RATES**

- 1.1  $[(\text{Annual number of production operations employees' OSHA recordable injuries and illnesses})/(\text{Annual total number of production operations employee hours worked})] \times 200,000.$
- 1.2  $[(\text{Annual number of production operations employees' OSHA injuries and illnesses for which there were lost workdays})/(\text{Annual total number of production operations employee hours worked})] \times 200,000.$

#### **2. DRILLING OPERATIONS EMPLOYEES' (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAYS INCIDENT RATES**

- 2.1  $[(\text{Annual number of drilling operations employees' OSHA recordable injuries and illnesses by operator})/(\text{Annual total number of drilling operations employee hours worked for operator})] \times 200,000.$
- 2.2  $[(\text{Annual number of drilling operations employees' OSHA injuries and illnesses by operator for which there were lost workdays})/(\text{Annual total number of drilling operations employee hours worked for operator})] \times 200,000.$

#### **3. CONSTRUCTION OPERATIONS EMPLOYEES' (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAYS INCIDENT RATES**

- 3.1  $[(\text{Annual number of construction operations employees' OSHA recordable injuries and illnesses by operator})/(\text{Annual total number of drilling construction operations employee hours worked for operator})] \times 200,000.$
- 3.2  $[(\text{Annual number of construction operations employees' OSHA injuries and illnesses by operator for which there were lost workdays})/(\text{Annual total number of drilling construction operations employee hours worked for operator})] \times 200,000.$

#### **4. FIRE/EXPLOSION INCIDENT RATE**

- 4.1  $[(\text{Annual number of fires and explosions})/(\text{Number of major platforms} + 0.5(\text{Number of minor platforms}) + (\text{Number of wells spudded for drilling during the year}))]$ .

#### **5. BLOW-OUT INCIDENT RATE**

- 5.1 Annual number of blow-outs by operating company.
- 5.2  $(\text{Annual number of total industry blow-outs})/(\text{Total wells spudded for drilling by industry during the year})$ .

## ***SUMMARY OF ENVIRONMENTAL PERFORMANCE MEASURES***

The following are the environmentally-related performance measures established by the PMWG. These measures deal with accidental release incident rates and spill volumes associated with production, drilling, and construction activities on the OCS. Most of the data for these measures are available from existing sources. The appendix provides a more detailed description of the performance measures, identifies the location of currently collected data, and discusses outstanding issues that could affect implementation of the measures.

### ***6. EPA NPDES DISCHARGE EXCEEDENCE RATE***

- 6.1  $[(\text{Number of reported exceedences on EPA NPDES Discharge Monitoring Reports (DMR's) on the OCS for the reporting year}) / ((\text{Number of major platforms on the OCS}) + (\text{Number of wells spudded for drilling during the year}))]$ .

### ***7. OIL SPILL INCIDENT RATE — NUMBER OF SPILLS AND VOLUME OF SPILLS (≥ 1 BARREL)***

- 7.1  $[(\text{Annual number of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year}) / ((\text{Number of major platforms}) + 0.5(\text{Number of minor platforms}) + (\text{Number of wells spudded for drilling during the year}))]$ .
- 7.2  $[(\text{Annual number of all oil spills greater than or equal to 10 barrels for the calendar year}) / ((\text{Number of major platforms}) + 0.5(\text{Number of minor platforms}) + (\text{Number of wells spudded for drilling during the year}))]$ .
- 7.3  $(\text{Annual total volume of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year}) / (\text{Gross operated crude oil and condensate production on the OCS in millions of barrels})$ .
- 7.4  $(\text{Annual total volume of all oil spills greater than or equal to 10 barrels for the calendar year}) / (\text{Gross operated crude oil and condensate production on the OCS in millions of barrels})$ .

### ***8. OIL SPILL INCIDENT RATE — NUMBER AND VOLUME OF OIL SPILLS < 1 BARREL***

- 8.1  $[(\text{Annual number of oil spills less than 1 barrel on the OCS}) / ((\text{Number of major platforms}) + 0.5(\text{Number of minor platforms}) + (\text{Number of wells spudded for drilling during the year}))]$ .
- 8.2  $(\text{Annual total volume of all oil spills less than 1 barrel}) / (\text{Gross operated crude oil and condensate production on the OCS in millions of barrels})$ .

## ***SUMMARY OF REGULATORY PERFORMANCE MEASURES***

The following are the MMS regulatory-related performance measures established by the PMWG. These measures deal with rate of non-compliance violations found by MMS during routine inspection activities of OCS operations. The data for the measures are available from existing sources. The appendix provides a more detailed description of the performance measures, identifies the location of currently collected data, and discusses outstanding issues that could affect implementation of the measures. Various options that were considered, but were rejected, for the numerators and denominators of the various measures are also discussed in the appendix.

### **9. MMS PRODUCTION INCIDENTS OF NON-COMPLIANCE (INCS) RATE**

9.1 (Annual number of MMS production INCs)/(Annual number of components inspected by MMS).

### **10. MMS DRILLING, WORKOVER, COMPLETION, AND WELL PLUGGING AND ABANDONMENT INCIDENTS OF NON-COMPLIANCE (INCS) RATE**

10.1 (Annual number of MMS drilling, workover, completion and well plugging and abandonment INCs)/(Annual number of MMS rig inspections).

*APPENDIX*

**Detailed Performance Measure Descriptions**

# 1. PRODUCTION OPERATIONS EMPLOYEES ‘ (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAYS INCIDENT RATES

## *Formula*

- 1.1 [(Annual number of production operations employees’ OSHA recordable injuries and illnesses)/(Annual total number of production operations employee hours worked)] x 200,000.
- 1.2 [(Annual number of production operations employees’ OSHA injuries and illnesses for which there were lost workdays)/(Annual total number of production operations employee hours worked)] x 200,000.

Please provide the contractor work force percentage (i.e., 20% or 75%) for your production operations employees who are included in the above man-hour count.

## *Description*

### *Numerator*

- 1.1 This value includes all company and contractor recordable injuries and illnesses using the Bureau of Labor Statistics (BLS) Record Keeping Guidelines for Occupational Injuries and Illnesses, September 1986 edition (or latest edition) from January 1 through December 31 for all production (i.e., production, wireline, maintenance, associated transportation, associated catering) operations employees that are assigned to the operator's OCS locations. It also includes restricted activity cases that are associated with no-days-away-from-work incidents. Transportation of personnel (e.g., helicopter, boat) injuries and illnesses incurred while supporting OCS activities should be included regardless of the occurrence location (e.g., shore base, OCS, transit). If transportation services are shared between OCS operators and others, only appropriate injuries and illnesses (i.e., those for which the operator is accountable) should be included with the operator’s records. Office staff and management who are located onshore should not be included unless the company has an established process to include only the time they spend offshore and any associated offshore injury/illness.

The only performance measure that includes incidents and work hours outside the OCS is the safety performance measure which for the transportation component only includes incidents at the shore base and during transit from the shore base to the OCS location. All other safety performance measure components are for OCS-only activities. The transportation exception for safety was included as a convenience for data collection to avoid determining how many transportation incidents occurred in OCS waters only and the corresponding work hours.

- 1.2 This value is the number of production operations employee (company and contractor) injuries and illnesses on the OCS for which there were lost workdays as defined by BLS guidelines on the OSHA 200 log (or latest edition). It includes injuries and illnesses involving both days away from work and restricted duty situations.

### *Denominator*

This is the number of **actual** hours worked during the calendar year on the OCS by those producing operations employees (i.e., company and contractor) assigned to an operator's

OCS locations. Hours worked should be determined per the Bureau of Labor Statistics *Record Keeping Guidelines for Occupational Injuries and Illnesses*, September 1986 edition (or latest edition). Transportation employee hours worked should include all time worked regardless of location (exclude office staff and management), but allocated among operators if the services are shared. Do not include hours for which the employee is off-work or sleeping while at an OCS location. Therefore, record 24 hours only in the unusual event that an employee works through a full day. The number 200,000 is the normalization factor (i.e., 200,000 employee hours/year per 100 employees).

#### Location of Currently Collected Data

##### **Numerator**

Information per the (BLS) *Record Keeping Guidelines for Occupational Injuries and Illnesses*, September, 1986 edition on the OSHA 200 log (or latest edition) that is kept by the employer at the work location for company employees. The operator will need to combine the information for contractor employees involved in production operations with the data for company employees to calculate the numerator. This requirement can be found in 29 CFR 1904. OSHA periodically and randomly checks the OSHA 200 logs, but this does not happen annually and OSHA does not maintain a comprehensive data base. Many oil and gas companies voluntarily submit their OSHA 200 (or similar) log data to API for statistical comparison and analysis (mostly major companies and large independent operators; information for company employees only is submitted to API). Information will need to be collected from each operating company to develop this performance measure.

1.1 Same as 1.1

##### **Denominator**

This information will need to be collected from each operator. See numerator discussion.

##### ***Definitions and Issues***

BLS guidelines define recordable occupational injuries or illnesses as any occupational injuries or illnesses that result in: (1) fatalities, regardless of the time between the injury and death, or the length of the illness; or (2) lost workday cases, other than fatalities, that result in lost workdays; or (3) nonfatal cases without lost workdays but that result in transfer to another job or termination of employment, or require medical treatment (other than first aid) or involve loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses that are reported to the employer but are not classified as fatalities or lost workday cases. Medical treatment includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even though provided by a physician or registered professional personnel. In summary, lost time accidents include fatalities and those that involve days away from work.

Recordable accidents include (1) those classified as lost time plus those that require medical treatment (except first aid) and (2) restricted activity cases (staff assigned to another job while the injury/illness improves but have not lost time from work).

## 2. DRILLING OPERATIONS EMPLOYEES' (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAYS INCIDENT RATES

### *Formula*

- 2.1  $[(\text{Annual number of drilling operations employees' OSHA recordable injuries and illnesses by operator})/(\text{Annual total number of drilling operations employee hours worked})] \times 200,000.$
- 2.2  $[(\text{Annual number of drilling operations employees' OSHA injuries and illnesses by operator for which there were lost workdays})/(\text{Annual total number of drilling operations employee hours worked for operator})] \times 200,000.$

Please provide the contractor work force percentage (i.e., 20% or 75%) for drilling operations employees who are included in the above man-hour count.

### *Description*

#### *Numerator*

- 2.1 This value includes all company and contractor OSHA recordable injuries and illnesses using the Bureau of Labor Statistics (BLS) Record Keeping Guidelines for Occupational Injuries and Illnesses, September 1986 edition (or latest edition) from January 1 through December 31 for all drilling (i.e., exploration, development and production) operations employees (includes drilling, well workover/completion/service, plugging and abandonment, maintenance, associated transportation, associated catering, diving, etc.) that are assigned to the operator's OCS locations. It also includes restricted activity cases that are associated with no-days-away-from-work incidents. Transportation of personnel (e.g., helicopters, boats) injuries and illnesses incurred while supporting OCS activities should be included regardless of the occurrence location (e.g., shore base, OCS, transit). If transportation services are shared between OCS operators and others, only appropriate injuries and illnesses (i.e., those for which the operator is accountable) should be included with the operator's records. Office staff and management who are located onshore should not be included unless the company has an established process to include only the time they spend offshore and any associated offshore injury/illness.

The only performance measure that includes incidents and work hours outside the OCS is safety performance measures that for the transportation component includes only incidents at the shore base and during transit from the shore base to the OCS location. All other safety performance measure components are for OCS-only activities. The transportation exception for safety was included as a convenience for data collection to avoid determining how many transportation incidents occurred in OCS waters only and the corresponding work hours.

- 2.2 This value is the number of injuries and illnesses for which there were lost workdays as defined by BLS guidelines for drilling (i.e., exploration, development, and production) employees who are assigned to the operator's OCS locations. Includes injuries and illnesses with both days away from work and restricted duty.

## **Denominator**

This is the number of actual hours worked during the calendar year on the OCS by those drilling operations employees (i.e., company and contractor) assigned to an operator's OCS locations. Hours worked should be determined per the Bureau of Labor Statistics *Record Keeping Guidelines for Occupational Injuries and Illnesses*, September 1986 edition (or latest edition). Transportation employee hours worked should include all time worked regardless of location (exclude office staff and management), but allocated among operators if the services are shared. Do not include hours for which the employee is off-work or sleeping while at an OCS location. Therefore, record 24 hours only in the unusual event that an employee works through a full day. The number 200,000 is the normalization factor (i.e., 200,000 employees hours/year per 100 employees).

### ***Location of Currently Collected Data***

## **Numerator**

Injuries and illnesses are reported per the BLS guidelines; however, these are not collected centrally and some work may be needed by each operator to aggregate drilling injuries and illnesses. (See Item 1.)

## **Denominator**

See numerator.

### 3. CONSTRUCTION OPERATIONS EMPLOYEES' (COMPANY AND CONTRACTOR) TOTAL RECORDABLE AND LOST WORKDAYS INCIDENT RATES

#### *Formula*

- 3.1  $[(\text{Annual number of construction operations employees' OSHA recordable injuries and illnesses by operator})/(\text{Annual total number of construction operations employee hours worked for operator})] \times 200,000.$
- 3.2  $[(\text{Annual number of construction operations employees' OSHA injuries and illnesses by operator}) \text{ for which there were lost workdays}/(\text{Annual total number of construction operations employee hours worked for operator})] \times 200,000.$

Please provide the contractor work force percentage (i.e., 20% or 75%) for your construction operations employees who are included in the above man-hour count.

#### *Description*

##### **Numerator**

- 3.1 This value includes all company and contractor recordable injuries and illnesses using the Bureau of Labor Statistics (BLS) Record Keeping Guidelines for Occupational Injuries and Illnesses, September 1986 edition, (or latest edition) from January 1 through December 31 for construction operations employees (includes offshore construction, piping, platform structural modifications, major equipment additions, pipelines, major painting activities, platform installations and decommissioning, maintenance, associated transportation, associated catering, diving, etc.) that are assigned to the operator's OCS locations. These activities are usually directed by a construction inspector or supervisor and are larger projects, in most cases. It also includes restricted activity cases that are associated with no-days-away-from-work incidents. Transportation of personnel (e.g., helicopters, boats) injuries and illnesses incurred while supporting OCS activities should be included regardless of occurrence location (i.e., OCS, shore base, transit). If transportation services are shared between OCS operators or others, only appropriate injuries and illnesses (those for which the operator is accountable) should be included with the operator's records. Office staff and management who are located onshore should not be included unless the company has an established process to include only the time they spend offshore and any associated offshore injury/illness.
- 3.2 This value is the number of injuries and illnesses for which there were lost workdays as defined per BLS guidelines on the OSHA 200 log (or latest edition) for construction operations employees who are assigned to the operator's OCS locations. Includes injuries and illnesses with both days away from work and restricted duty.

##### **Denominator**

This value is the number of actual hours worked during the calendar year on the OCS by those construction operations employees (i.e., company and contractor employees) assigned to an operator's OCS locations. Transportation employee hours worked should include all time worked regardless of location (excluding office staff and management), but allocated among operators if the services are shared. Do not include hours for which

the employee is off-work or sleeping. Therefore, record 24 hours only in the unusual event that an employee works through a full day. The number 200,000 is a normalization factor (i.e., 200,000 employee hours/year per 100 employees).

***Location of Currently Collected Data***

**Numerator**

Injuries and illnesses are reported per BLS guidelines; however, these are not collected centrally and some work may be needed by each operator to aggregate construction injuries and illnesses. (See Item 1.)

**Denominator**

See numerator.

#### 4. FIRE/EXPLOSION INCIDENT RATE

##### *Formula*

4.1  $(\text{Annual number of fires and explosions}) / [(\text{Number of major platforms}) + 0.5(\text{Number of minor platforms}) + (\text{Number of wells spudded for drilling during the year})]$ .

##### *Description*

##### **Numerator**

This value includes the annual number of fires and explosions reported to MMS for a calendar year.

##### **Denominator**

This value is a weighted factor that takes into account production and drilling operations. The MMS definitions will be used for the following:

- Major platforms contain at least six or more completions **or** two or more pieces of production equipment.
- Minor platforms contain fewer than six completions **and** fewer than two pieces of production equipment.

##### *Location of Currently Collected Data*

##### **Numerator**

The total number of fires and explosions are reported to MMS.

##### **Denominator**

The number of major and minor platforms, and wells spudded for drilling are available from the MMS.

##### *Definitions and Issues*

MMS requires that *"...the lessee shall notify the district supervisor of all serious accidents, any death or serious injury, and all fires, explosions, and blowouts connected with any activities or operations on the lease. [30 CFR 250.19(a)]*

An explosion is the bursting or rupture of a building or a container due to development of internal pressure. Two types of reactions that may generate this seemingly instantaneous release of energy are detonations and deflagrations. A detonation is commonly accepted as being created by a material that contains its own oxidant, such as explosives used in commercial applications. Detonations may also occur when the combustion process takes place at a velocity that is greater than the speed of sound in the unburned medium. Deflagration is a propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted medium. (From NFPA 69, Explosion Prevention Systems, 1986)

A fire is the phenomenon of combustion manifested in light, flame, and heat. Fires can be classified into categories:

- Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics. Materials commonly found on offshore platforms are construction materials and supplies (e.g., wood decking, framework, skids, shipping containers, and fiber ropes), operational materials and supplies (e.g., plastic coverings, rubber tires), and waste materials (e.g., used paper and rags).
- Class B fires are fires in flammable liquids, gases, and greases such as produced fluids (e.g., oil and condensate, gas and vapors, residue from produced or stored hydrocarbons), construction materials and supplies (e.g., paints, welding and cutting gases), operational materials and supplies (e.g., heat transfer fluids, glycols, hydraulic fluids, lubricants, and fuels), miscellaneous liquids (e.g., cleaning compounds and cooking oils and greases).
- Class C fires are fires that involve energized electrical equipment.
- Class D fires are fires of combustible metals, such as magnesium, zirconium, sodium, and potassium.

The source of ignition occurs when sufficient heat is produced to cause combustion. Ignition sources that may be present in offshore operations are

- Chemical reactions
- Flame
- Electric sparks and arcs
- Hot surfaces
- Lightning
- Heat of compression
- Static electrical sparks

(From NFPA 69, Explosion Prevention Systems, 1986 and API RP 14G, December 1993)

## 5. BLOW-OUT INCIDENT RATE

### Formula

- 5.1 Annual number of blow-outs by operating company.
- 5.2  $(\text{Annual number of total industry blow-outs}) / (\text{Total wells spudded for drilling by industry during the year})$ .

### Description

- 5.1 This is the annual calendar year number of blow-outs (during exploration, development, or production) associated with a loss of control or uncontrolled flow to surface as reported to MMS for each operating company. The data will be collected for each operating company over the entire OCS since the number of incidents is small.
- 5.2 The second measure looks at the total number of blow-outs for all companies operating on the OCS to get a measure of blow-outs per well spudded for drilling.

### Location of Currently Collected Data

MMS Regions collect the incidents of blow-outs and wells spudded for drilling information.

### Definitions and Issues

A blow-out, surface or underwater, is an uncontrolled flow of gas, oil, or other well fluids into the atmosphere or between the sea floor and the water surface. A blow-out occurs when formation pressure exceeds the pressure applied to it by the column of drilling or other fluids in the wellbore.

## 6. EPA NPDES DISCHARGE EXCEEDENCE RATE

### *Formula*

6.1  $(\text{Number of reported exceedences on EPA NPDES DMR's on the OCS for the reporting year}) / [(\text{Number of major platforms on the OCS}) + (\text{Number of wells spudded for drilling during the year})]$ .

### *Description*

#### *Numerator*

This is the Discharge Monitoring Report (DMR) annual number of discharge exceedences from OCS leases as reported to the EPA. Although most discharge monitoring reports are made annually by all companies, the reporting periods are staggered quarterly. Although some exceedences may have occurred in the previous calendar year and different reporting cycles are used, the data are verifiable and readily available. The different conditions that may be encountered due to weather or other cyclical circumstances because of the varying reporting cycles should balance out over time. For discharge monitoring reports submitted monthly, include exceedences from OCS leases that occurred only in the calendar/year.

#### *Denominator*

This value is a weighted factor that takes into account production and drilling operations. The MMS definitions will be used for the following:

- Major platforms contain at least six or more completions or two or more pieces of production equipment.
- Wells drilled are the number of wells spudded for drilling operations during the year.

This is the number of major platforms located on the OCS for the calendar year. The denominator also includes the number of wells spudded for drilling during the year. These types of facilities typically are associated with discharge points required to be reported on DMRs.

### *Location of Currently Collected Data*

#### *Numerator*

The number of NPDES exceedences is submitted to the EPA annually on a staggered quarterly DMR schedule per operator. Operators should include all the exceedences from OCS leases reported on all DMR's submitted during the applicable *calendar year*.

#### *Denominator*

The total number of major platforms on the OCS and the number of wells spudded for drilling during the year are determined by the MMS on an annual basis.

### *Definitions and Issues*

Covers production, exploration and production drilling and workover activities performed on the operator's leases.

A column for exceedences is provided for each discharge criterion on the DMR. The operator is responsible for summarizing data for the reporting cycle and providing this information to EPA.

For this measure, the severity of the exceedence is not quantified; e.g., a test result that may only be slightly above that which is allowed is counted the same as a missing test.

A major platform is defined by the MMS as a platform that has typically six or more completions or more than two pieces of production equipment. Drilling introduces additional effluents; drilling done on exploratory leases may be the only source of discharges. Other factors considered are production rate, all platforms, number of wells, and number of leases. These factors are not necessarily directly associated with discharge points. OCS DMR reporting is typically done on a lease by lease basis and includes all associated discharge points. Many leases do not have discharges.

The category of other than major platforms includes platforms having individual wells that typically do not have discharge points unless workover/drilling activity is conducted.

Production rate is not associated with discharge points and would not provide normalized comparisons. Workover activity is difficult to quantify.

An activity associated with a facility may involve more than one EPA NPDES permit. This measure would include all OCS permits (i.e., general and individual) submitted anytime during the reporting year.

MMS will provide annual platform and drilling data for each operator.

**7. OIL SPILL INCIDENT RATE — NUMBER OF SPILLS AND VOLUME OF SPILLS (> 1 BARREL)**

***Formula***

- 7.1 (Annual number of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year)/[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)].
- 7.2 (Annual number of all oil spills greater than or equal to 10 barrels for the calendar year) /[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)].
- 7.3 (Annual total volume of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year)/(Gross-operated crude oil and condensate production on the OCS in millions of barrels).
- 7.4 (Annual total volume of all oil spills greater than or equal to 10 barrels for the calendar year)/(Gross-operated crude oil and condensate production on the OCS in millions of barrels).

***Description***

**Numerator**

- 7.1 This value is the annual calendar-year total number of oil spills from production, construction and drilling-related operations on the OCS in the quantity indicated above. Includes lessee's spills and contractor spills directly involved in supporting lessee's operations. Includes spills from (1) pipelines within the facility where operator had/should have had containment and (2) pipeline company-owned pipelines, operated by the facility. Does not include sightings. Does not include shipping-related incidents such as non-lease related shipping spills. Does not include hazardous substance spills.
- 7.2 Same as 7.1.
- 7.3 This value is the annual calendar-year total volume of oil spills from production- and drilling-related operations on the OCS corresponding to 7.1.
- 7.4 This value is the annual calendar-year total volume of oil spills from production and drilling-related operations on the OCS corresponding to 7.2.

**Denominator**

- 7.1 This value is a weighted factor that takes into account production and drilling operations. The MMS definitions will be used for the following:
- Major platforms contain at least six or more completions or two or more pieces of production equipment.
  - Minor platforms contain fewer than six completions and fewer than two pieces of production equipment.

- Wells drilled is the number of wells spudded for drilling operations during the year.
- 7.2 Same as 7.1.
- 7.3 This value is the annual gross-operated production of crude oil and condensate on the OCS in millions of barrels. For example, if the annual gross-operated production of crude oil and condensate is 5,000,000 barrels, the denominator is 5.
- 7.4 Same as 7.3.

### ***Location of Currently Collected Data***

#### **Numerator**

MMS collects and maintains data for all spills greater than or equal to 1 barrel.

#### **Denominator**

The number of major and minor platforms, and wells spudded for drilling are available from the MMS.

MMS maintains data on crude oil and condensate production.

### ***Definitions and Issues***

In addition to reports to the National Response Center, Regulation 30 CFR 254.46 requires that all oil spills greater than or equal to 1 barrel be reported to the appropriate MMS District Supervisor.

Spills resulting from vessels and contractors directly involved in drilling, construction and production activities are usually the responsibility of the operator and should be counted. Marine equipment that may be impacted are derrick barges, pipe-laying barges, lift barges, etc. Spills from operations that are more traditionally the responsibility of the vessel/marine contractor (e.g., vessel pumping bilge in the vicinity of lessee's facility, contractor's crane on derrick barge leaks motor oil) are not counted. Many vessels are ~~now~~ shared by multiple operators to reduce expenses making specific operator responsibility difficult. Marine equipment contracted for may not be under the operator's responsibility until on location and performing the specific tasks. All spills from MODUs at the well location, whether anchored, spudded, or dynamically positioned, are counted.

Spills or sheens from NPDES point sources that are included as an exceedence on DMR's are not counted. Spills or sheens from a point source NPDES permitted discharge that are in compliance with the NPDES permit are not counted.

Spills from any pipeline or flowline operated by the lessee is are counted.

Since the MMS maintains and tracks data for spills of this size, no additional reporting would be required by the operator.

**8. OIL SPILL INCIDENT RATE — NUMBER AND VOLUME OF OIL SPILLS < 1 BARREL**

***Formula***

- 8.1 (Annual number of oil spills less than 1 barrel on the OCS)/[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)].
- 8.2 (Annual total volume of all oil spills less than 1 barrel)/(Crude oil and condensate production on the OCS).

***Description***

**Numerator**

- 8.1 This value is the annual calendar-year total number of oil spills of less than 1 barrel from production, construction and drilling-related operations on the OCS. Includes lessee spills and contractor spills directly involved in supporting lessee's operations. Includes spills from (1) pipelines within the facility where operator had/should have had containment and (2) pipeline company-owned pipelines, operated by the facility. Does not include sightings. Does not include shipping-related incidents such as non-lease-related shipping spills. Does not include hazardous substance spills. Does not include NPDES-related spills or sheens.
- 8.2 This value is the total volume of spills from 8.1.

**Denominator**

- 8.1 This value is a weighted factor that takes into account production and drilling operations. The MMS definitions will be used for the following:
- Major platforms contain at least six or more completions or two or more pieces of production equipment
  - Minor platforms contain fewer than six completions and fewer than two pieces of production equipment.
  - Wells drilled is the number of wells spudded for drilling operations during the year
- 8.2 This value is the annual gross-operated production of crude oil and condensate on the OCS in millions of barrels. For example, if the annual gross-operated production of crude oil and condensate is 5,000,000 barrels, the denominator is 5.

***Location of Currently Collected Data***

**Numerator**

USCG receives reports for all spills. Each company will report number and volume of spills < 1 barrel on an annual basis.

## **Denominator**

- 8.1 The number of major and minor platforms, and wells spudded for drilling are available from the MMS.
- 8.2 MMS maintains data on crude oil and condensate production.

## ***Definitions and Issues***

All spills are reported to the National Response Center.

USCG regulations specify the process for reporting. *"Any person in charge of a vessel or of an onshore or offshore facility shall, as soon as they have knowledge of any discharge of oil or a hazardous substance from such vessel or facility in violation of section 311(b)(3) of the Act, immediately notify the National Response Center (NRC)..."* (33 CFR §153.203)

EPA regulations implementing Clean Water Act require reporting of spills. *"Any person in charge of a vessel or of an onshore or offshore facility shall, as soon as he or she has knowledge of any discharge of oil from such vessel or facility in violation of section 311(b)(3) of the Act, immediately notify the National Response Center (NRC)..."* (40 CFR §110.6)

Questions concerning the minimum quantity of oil discharged that triggers the need to report are answered in EPA regulations that define the "harmful" quantity.

Discharge of oil in such quantities as "may be harmful" pursuant to section 311(b)(4) of the Clean Water Act. For purposes of §311(b)(4) of the Clean Water Act, discharges of oil in such quantities that the Administrator has determined may be harmful to the public health or welfare or the environment of the United States include discharges of oil that: (a) violate applicable water quality standards; or (b) cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. (40 CFR §110.3)

Spills resulting from vessels and contractors directly involved in drilling, construction and production activities are usually the responsibility of the operator and should be counted. Marine equipment that may be impacted are derrick barges, pipe-laying barges, lift barges, etc. Spills from operations that are more traditionally the responsibility of the vessel/marine contractor may be difficult to distinguish from more traditional contractor/vessel responsibility (e.g., vessel pumping bilge in the vicinity of lessee's facility, contractor's crane on derrick barge leaks motor oil) are not counted. Additionally, many vessels are now shared by multiple operators to reduce expenses making specific operator responsibility difficult. Marine equipment contracted for may not be under the operator's responsibility until on location and performing the specific tasks. All spills from MODUs at the well location, whether anchored, spudded, or dynamically positioned, are counted.

Spills or sheens from NPDES point sources that are included as an exceedence on DMR's are not counted. Spills or sheens from a point source NPDES-permitted discharge that are in compliance with the NPDES permit are not counted.

Spills from any pipeline or flowline operated by the lessee are counted. Includes spills from all pipelines with the facility where operator had/should have had containment.

Appropriate choice of denominator for normalizing generated much discussion. Flowlines and pipelines are not quantified. Other options discussed were throughput, leases (producing), and number of wells.

Due to present moratoria in some OCS areas, public misinterpretation/misuse of these data is a major concern.

Not all companies may track small spills. Although the USCG receives all reports, it is unclear how these data are maintained. NRC typically does not update spill volume changes; therefore, the accuracy of volume data for small spills, typically less than a gallon, will be difficult to validate.

## 9. MMS PRODUCTION INCIDENTS OF NON-COMPLIANCE (INCs) RATE

### *Formula*

9.1 (Annual MMS production INCs)/(Annual components inspected by MMS).

### *Description*

#### **Numerator**

This value is the annual calendar-year total number of MMS INCs issued to operators for production operations. The production INCs are associated with non-rig production activities including those from full site inspections, sample site inspections, spot site inspections, as well as construction, decommissioning and production-related MMS office-issued INCs. INCs are issued in the following severity levels: Warning (W), Component Shut-Ins (C), and Facility Shut-Ins (S).

There are three major subsets of production INCs — component INCs, non-component INCs, and MMS office-issued INCs. Component INCs are those associated with line items on the facility-specific MMS Production Inspection Form. Component INCs include surface safety valve leaks, check valves exceeding allowable leak rate, pressure safety devices out of tolerance, etc. Non-component INCs are all other site inspection INCs not included in the line items of the MMS Production Inspection Form, and they include corroded hand rails and grating, lack of equipment marking, lack of diesel engine air intake shut-down devices, etc. MMS office-issued INCs are not associated with a site inspection and they usually are related to lack of proper documentation. These three subsets of INCs should be tracked separately as supplementary information to the total production INC performance measure for additional analysis.

#### **Denominator**

This value is the annual calendar-year number of components inspected by MMS during full site inspections, sample site inspections and spot site inspections. Components are the line items on the facility-specific MMS Production Inspection Form. Components include items such as wellheads, flowlines, vessels, compressors, pumps, etc. A component typically has several safety devices associated with it; when a component is inspected, all of the associated safety devices are inspected.

During full site inspections all components at the facility are inspected. During sample site inspections only randomly selected components are inspected. (Typically about 18% of the components are randomly selected for sample inspections.) If any INC occurs as a result of the sample inspection, it becomes a full inspection in which all components are inspected. During spot site inspections the inspector chooses which components to inspect, and an INC during the spot site inspection does not cause it to become a full site inspection. All safety devices (surface safety valves, check valves, pressure safety devices, etc.) associated with each targeted component are tested during the full and sample site inspections. Spot inspections may target individual safety devices and do not necessarily inspect all safety devices on each component inspected; however, if a safety device is inspected on a component during the spot site inspection, the component is counted as being inspected even though all safety devices associated with it are not inspected.

Even though non-component and MMS office-issued INCs are not directly normalized by the denominator, the number of components inspected is generally believed to be indicative of the exposure for non-component and MMS office issued INCs and, therefore, the indirect normalization by components appears valid. As mentioned above, the component, non-component, and MMS office-issued INCs should be tracked in addition to the total production INC performance measure. The hypothesis is that the

number of components inspected is indicative of the exposure for non-component and MMS office-issued INCs and should be tested after several years of data collection and reporting.

### ***Location of Currently Collected Data***

#### **Numerator**

MMS regional offices keep production INC data and it is readily available. However, some additional MMS work may be needed to determine accurately the number of INCs from full, sample, and spot site inspections as well as MMS office-issued INCs.

#### **Denominator**

MMS regional offices currently collect data associated with the number of components inspected and it is generally available. However, some additional MMS work is needed to determine accurately the number of components inspected during full, sample, and spot site inspections.

**10. MMS DRILLING, WORKOVER, COMPLETION, AND WELL PLUGGING AND ABANDONMENT INCIDENTS OF NON-COMPLIANCE (INCs) RATE**

***Formula***

10.1 (Annual number of MMS drilling, workover, completion and well plugging and abandonment INCs)/(Annual number of MMS rig inspections).

***Description***

**Numerator**

This value is the annual calendar-year total number of MMS exploration and production INCs issued during drilling, workover, completion, and well plugging and abandonment inspections as well as related MMS office-issued INCs.

**Denominator**

This value is the annual calendar-year number of MMS exploration and production rig inspections performed on drilling, workover, completion, and well plugging and abandonment activities. Typically, MMS inspects each operating drilling, workover, completion and well plugging and abandonment location monthly.

***Location of Currently Collected Data***

**Numerator**

MMS regional offices keep the drilling, workover, completion and well plug and abandonment INC data, and it is readily available. However, some additional MMS work may be needed to determine accurately the number of rig inspection INCs and MMS office-issued INCs.

**Denominator**

MMS regional offices keep the number of drilling, workover, completion and well plug and abandonment inspections, and it is readily available.