Gulf Science Data

Data Publication Summary Report

Water Chemistry

Reference No. W-01v02-02

May 2014

Prepared by BP Exploration & Production Inc. and
BP Gulf Coast Restoration Organization

Version History

Files associated with this data posting are available on BP's Gulf Science Data website (gulfsciencedata.bp.com).

Data Publication Summary Report

Data Posting Version Number	Data Posting Date	Updates since Previous Posting
W-01v01	November 2013	Initial posting of the water chemistry dataset.
W-01v02	May 2014	Update of the water chemistry dataset including the following revisions: 1) Added samples associated with three studies not previously posted for water chemistry, 2) Added samples that were previously excluded due to missing field metadata that have since been populated in the project database, 3) Updated file format, 4) Added field for Cruise ID, 5) Added data verification status and results, and 6) Updated surrogate corrected data to reflect current process.

Associated File Names

Document Type	Folder / Subfolder	File Name
Data File	Water / Water Chemistry	WaterChemistry_W-01v02-01.csv (zipped)
Citation	Water / Water Chemistry	WaterChemistry_W-01v02-01_Citation.pdf
Data Publication Summary Report	Water / Water Chemistry	WaterChemistry_W-01v02-02.pdf (zipped)
Data Posting Sample Summary	Water / Water Chemistry	WaterChemistry_W-01v02-03.xls (zipped)
Station Location Maps	Water / Water Chemistry	WaterChemistry_W-01v02-04.pdf

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Supporting Files

Document Type	Folder / Subfolder	File Name
Study Work Plans and/or Related Documents	Work Plans	Multiple files. (See Appendix A for study reference numbers.)
MC-252 Oil Characterization--Q4000 Data Posting	Oil / Oil Characteristics - oil collected from the vessel Q4000	Multiple files.
MC-252 Oil Characteristics – Additional Reference Oils Data Posting	Oil / Oil Characteristics – additional reference oils	Multiple files.
Laboratory QC Oil Analyses Data Posting	Oil / Oil analyses for water chemistry lab QA/QC calibration	Multiple files.
Query Manager Notification (Errata Report)	Reference Documents	QMErrata_v04.zip

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Attachment 1 Study Descriptions

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Acronyms

AQAP	Analytical Quality Assurance Plan (Natural Resource Damage Assessment)
ARF	analytical request form
ASR	analytical service request
BP	BP Exploration & Production Inc. and BP Gulf Coast Restoration Organization
BTEX	benzene, toluene, ethyl benzene, and xylenes
DOI	U.S. Department of Interior
DWH	Deepwater Horizon
EPA	U.S. Environmental Protection Agency
ERMA	Environmental Response Management Application
GARF	Gulf Coast Incident Management Team analytical request form
GC/FID	gas chromatography/flame ionization detector
GCIMT	Gulf Coast Incident Management Team
GPS	global positioning system
MC252	Mississippi Canyon lease block 252
MDL	method detection limit
n-C9	nonane
n-C40	tetracontane
n-C44	tetratetracontane
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NRDA	natural resource damage assessment
PAH	parent and alkylated polycyclic aromatic hydrocarbons
PIANO	paraffins, isoparaffins, aromatics, naphthenes, and olefins
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan (Response/Incident Management Team)
QM	NOAA's Query Manager database
SHC	saturated hydrocarbons
SPMD	semi-permeable membrane device
SRN	study reference number
TEH	total extractable hydrocarbon

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TEM	total extractable material
TPH	total petroleum hydrocarbons
Trustees	governmental agencies serving as natural resource damage trustees

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Water Chemistry

Introduction

Following the April 20, 2010, Deepwater Horizon (DWH) accident, BP Exploration & Production Inc. and BP Gulf Coast Restoration Organization (BP) and federal and state governmental agencies have engaged in one of the largest environmental data gathering efforts in history. Data have been collected to guide efforts to respond to the accident and remove oil from the environment (Response), assess potential damage to natural resources (natural resource damage assessment [NRDA]), and develop restoration plans that seek to address any natural resource damage resulting from the accident (Restoration). Data have been collected cooperatively by BP and the agencies, including agencies that serve as DWH NRDA (Trustees). Data have also been collected independently by BP and by government agencies. These efforts are ongoing, and include work to analyze and organize data.

To improve public access to these data, and to promote scientific research related to the Gulf of Mexico and these data, BP is posting data in an accessible form on BP's Gulf Science Data website (gulfsciencedata.bp.com)[1].

This report contains water chemistry data, and provides additional context for the posted dataset, including information about the collection, analysis, and organization of the data. This data posting differs from other recently published datasets relating to the Gulf of Mexico in several respects:

- This Water Chemistry dataset focuses only on information related to petroleum-related chemical constituents in water samples. Chemical compounds that are not present in oil (such as polychlorinated biphenyls, pesticides, and halogenated volatiles) are not included in this dataset.
- This dataset includes data from independent studies performed by BP consultants. BP has been working to produce and organize these independent data, and has engaged outside consultants to perform quality assurance and quality control (QA/QC) checks. These data were initially made publically accessible in November 2013 and are updated with additional results in this publication to reflect the results of further QA/QC.
- This dataset combines results from fifty-four NRDA studies and thirteen Response studies to create a unified data file.
- Certain Response data have been reprocessed with lower analytical method detection limits (MDLs) than originally reported, and other data have been adjusted for surrogate recoveries as described below.

[1] The Trustees also have established websites where certain datasets can be accessed, as discussed in greater detail later in this report.

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- Before posting, extensive work was done to verify some aspects of the posted information (e.g., positional coordinates and field data).

Users of the data provided in this posting are encouraged to review the data file(s) with all supporting documentation in order to understand its scope, extent, and limitations. Please direct any questions about this dataset to gulfsciencedata@bp.com.

Data Posting Description

Study List

The focus of this data posting is chemistry data associated with water column samples collected in both federal and state jurisdictional waters in the Gulf of Mexico from May 2010 through July 2012. More than 20,000 water samples with associated chemistry analyses collected at more than 6,300 sampling stations[2] are included in this posting. These samples were collected during 67 studies, using more than 100 sampling cruises and surveys. These studies can be classified into four general categories:

- **NRDA Cooperative**—Studies conducted as part of the NRDA which were agreed to and executed cooperatively by the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Interior (DOI), and/or other Trustees, and BP.
- **BP NRDA Independent**—Studies conducted by BP independently to develop data to support and inform the NRDA.
- **Trustee Independent**—Studies conducted by NOAA, DOI, and/or other Trustees independently to develop data to support and inform the NRDA.
- **Response (non-NRDA)**—Studies conducted by BP and/or government representatives under the direction of the Unified Area Command and in association with activities performed in response to the DWH accident (the Response).

Appendix A lists the studies included in this data posting and provides the study classification, study name, and a study reference number (SRN). The SRN has been assigned by BP for this data posting to provide a link between the study list, work plan, data contained in the dataset, and study descriptions. The study descriptions are provided as Attachment 1 to this report, and the associated work plans are posted on BP's Gulf Science Data website.

Parameter List

The chemical parameters provided in this data posting include:

- Parent and alkylated polycyclic aromatic hydrocarbons (PAHs)

[2] A sampling station is defined in this report and the associated maps as a unique pair of latitude and longitude values. Samples may be collected from multiple depths at a single station.

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- Saturated hydrocarbons (SHC)
- Total petroleum hydrocarbons (TPH), including parameters reported as total extractable material (TEM) and total extractable hydrocarbon (TEH)
- Benzene, toluene, ethyl benzene, and xylenes (BTEX) and other volatile hydrocarbons classified as paraffins, isoparaffins, aromatics, naphthenes, and olefins (PIANO)
- Geochemical biomarkers (sterane and triterpane), where available.

The chemical analyte lists are generally consistent between studies for the standard PAH, SHC, and BTEX compounds. However, portions of the dataset also include analysis of the extended PIANO volatile hydrocarbon list, TPH, or geochemical biomarkers. Additionally, NRDA PAH analyses include an extended list of parent and alkylated decalins, benzothiophenes, naphthobenzothiophenes, and several other PAHs and related chemicals that were not included in Response analyses.[3] Tables 1 through 4 provide the chemical lists.

Surrogate Correction

The analytical methodologies used to produce this dataset are generally consistent with the requirements specified in a document developed by the Trustees and BP to govern sample analysis known as the NRDA Analytical Quality Assurance Plan (AQAP; NOAA 2012[4]). Although the AQAP specifies adjustment to chemical concentrations based on surrogate recovery (also known as surrogate correction), Response data were originally reported without this adjustment.[5] To be consistent with the AQAP and to provide consistent NRDA and BP Response datasets, Response chemistry data included in this posting were adjusted for surrogate recoveries for PAH, SHC, TPH, and biomarker parameters. A detailed discussion of the procedures used to surrogate correct data and methods used to verify the calculations is provided in Appendix B.

Sample Types

This dataset includes data associated with natural field samples for whole water and for Payne filter and filtrate pairs (Payne et al. 1999), along with the associated field-collected quality control samples, such as field replicates[6], equipment blanks, field blanks, and trip blanks.

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3 The NRDA and Response teams developed study designs with chemical lists that varied slightly.

4 Including previous versions of the AQAP.

5 Response data were collected following the guidance of the Response Quality Assurance Project Plan (GCMIT 2011), which does not provide for surrogate correction. Response data (non-surrogate corrected) are publically available at NOAA's National Oceanographic Data Center (NODC) website http://www.nodc.noaa.gov/deepwaterhorizon/specialcollections.html and on the Operational Science Advisory Team (OSAT) website http://www.restorethegulf.gov/release/2011/07/29/osat-summary-report-sub-sea-and-sub-surface-oil-and-dispersant-detection-ecotoxic.

6 Field replicate results may vary from associated samples due to non-homogeneous distribution of oil in water and other reasons.

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Laboratory duplicate sample data are provided, where available. Mississippi Canyon lease block 252 (MC252) control oils[7] analyses associated with water chemistry analyses are provided separately from this data posting (see Version History). No other laboratory quality control samples (e.g., laboratory blanks and spike samples) are included in this data posting.

Non-Detected Values

Chemical results reported by laboratories for analytes which are tested for, but not detected because their concentrations are below the laboratory-reported MDLs, are referred to as non-detects. In the data file, these non-detect results are flagged with a "U" in the "Final Qualifier" field as well as flagged in the "Non-detect" field as "yes". Two concentration fields are included in the data file; one field presents non-detects set at the laboratory-reported MDL[8] which is the reporting convention in accordance with the AQAP. As an aid for data users, a second field presents non-detects set at zero. **The user must look at the complete set of data and carefully consider how to treat non-detects, depending on the intended use.**

Data Exclusions

The following data types have been excluded from this data posting:

- Data collected using semi-permeable membrane devices (SPMDs) since these results do not equate to water column concentrations
- Laboratory created aqueous samples (e.g., water accommodated fractions) because this data posting is focused only on field collected samples
- Filter and filtrate samples collected via large volume sampler under BP chain-of-custody, due to PAH contamination on the polyurethane foam sampling media used by this apparatus
- Water samples collected along with Response studies focused on capturing suspected oil for chemical evaluation since water column sampling was not an objective of these studies
- Samples collected during Response studies that were analyzed by analytical methods that were not consistent with or similar to those required by the NRDA AQAP

[7] MC252 source oil (an aliquot of the oil collected during the DWH oil release) was analyzed as a QC sample by the analytical laboratories along with the analyses of the field collected environmental samples. This QC sample is generally referred to as "MC252 control oil". MC252 control oil analyses were specified as an analytical requirement in the NRDA AQAP (NOAA 2012).

[8] MDLs are statistically derived values that represent the lowest concentration of the chemical that can be detected with 95% confidence. MDLs were not available for all results; in these cases the MDL field may be populated with the reporting limit. In some instances, the laboratory provided the Reporting Limit as the value associated with nondetect results and the database will reflect this.

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- Samples which had a high percentage of results (greater than twenty percent) considered to be unusable (rejected) based on data validation
- Water samples collected in association with sediment cores including supernatant and pore waters
- Samples with missing coordinates and/or upper collection depths, pending resolution of the missing information
- Personal information belonging to study personnel, such as names, telephone numbers, and e-mail addresses.

Data included in this posting may be periodically updated on the website.

Data Use Considerations

To aid users in evaluating the data contained in this data posting, several issues that may impact intended data use are summarized below.

Total Petroleum Hydrocarbon (TPH) Parameters

Several TPH and TPH-like parameters are included in this data posting. These parameters are reported as:

- Total extractable matter (TEM) includes integration of the gas chromatography/flame ionization detector (GC/FID) signal over the hydrocarbon range from nonane (n-C9) to tetratetracontane (n-C44) with no silica gel cleanup of the extract prior to analysis (NOAA 2012).
- Total extractable hydrocarbon (TEH) includes silica gel cleanup of the extract to remove biogenic material prior to analysis followed by integration of the GC/FID signal over the hydrocarbon range from n-C9 to n-C44 (NOAA 2012).
- Total Petroleum Hydrocarbons (TPH) includes integration of the GC/FID signal over the hydrocarbon range of either n-C9 to tetracontane (n-C40) or nC-9 to n-C44, with the range dependent upon the analysis laboratory and/or analytical service request (ASR). The integrated range is specified in the parameter name, when available. The TPH ranges are being verified for all samples and the TPH parameter names will be revised for future data postings to include the alkane range.

Alpha Analytical reported TPH results as "Total Petroleum Hydrocarbons (C9-C44)" in the laboratory data packages and associated electronic data deliverables. During data validation, the name of this parameter was revised to be either TEM or TEH based on whether the sample extract was cleaned using silica gel, as described above and defined in the AQAP (NOAA 2012). This data posting includes the TPH parameter name as originally reported by the laboratory. The TPH parameter names will be revised to capture the data validation revisions and will be available in future data postings.

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Surrogate Results

Surrogate results for many samples were not available in the BP's database for this data posting. These results were reported by the laboratories but due to issues loading these data into the BP's database, the results are not currently available for this data posting. These data will be included in future data postings.

Data Validation and Verification

To verify the quality of these data, data validation and data verification were conducted as discussed below.

Data Validation

Validation of analytical chemistry data is performed to assess the data's completeness, correctness, and compliance with applicable analytical method requirements. Data validation is performed by independent third-party data validators who assess the compliance of a dataset against the analytical method criteria. Typically, field and laboratory quality control analyses and instrument calibrations are the primary focus of validation activities. Deviations from method-specified criteria are reported, and the impact of these deviations on the associated data are evaluated and documented to inform the data users. Data validators assign qualifiers to individual results associated with method deviations to indicate if the results are considered to be estimated, negated, or rejected. Result qualifiers assigned during data validation are included as a separate field in the data file(s) to provide this detailed information to data users. For this posting, the majority of the data was reported without data validation qualifiers, and the data are usable as reported.

Data validation was performed by personnel retained by BP and/or the Trustees in accordance with the U.S. Environmental Protection Agency (EPA) guidelines for data review (U.S. EPA 2002, 2008), including professional judgment in applying the guidelines. Multiple firms conducted data validation in support of the MC252 Response and NRDA studies, and each firm developed and utilized a standard operating procedure to document its application of EPA guidelines.[9,10] Users of the data provided in this posting are encouraged to review the data file(s) in total along with the data validation qualifications to assess the applicability of these data for the intended use.

All of the chemistry data[11] included in this publication have been validated by professional, independent, third-party validation firms.

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[9] All analytical chemistry data received what is known as "Stage 2A" validation, while up to 20% of the data received more comprehensive full "Stage 4" validation.

[10] EPA guidelines for data review (U.S. EPA 2002, 2008) served as the basis for the data validation reviews, details for each firms' approach varied based on their professional interpretation and application of these guidelines.

[11] More than 99.99% of the data are coded in the dataset as being validated.

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Data Verification

Data verification personnel retained by BP have conducted an extensive effort to verify the quality of field sample attributes. To maximize the scientific benefit of data verification efforts, these personnel used methodologies to identify potential errors, such as comparing field sample attributes in BP's database to the associated field data in the Trustee's Query Manager (QM) database.

Initial data verification activities focused on review of the completeness and correctness of each sample's associated latitude, longitude, depth, and sample collection date to accurately place samples in space and time. Sample IDs, study IDs (names), and sample material/matrix fields were also verified as part of this initial effort. The field sample information in BP's database was verified against source documents (e.g., field logs, field datasheets, and/or chain-of-custody forms) and/or instruments such as a global positioning system (GPS) and conductivity, temperature, and density sensor recordings to assess accuracy. Study work plans were also used to corroborate data. Where significant differences in the BP and QM databases[12] were observed, focused data verification reviews were conducted to ascertain the correct entry. Depending on the results of the verification, personnel retained by BP either 1) corrected its database or 2) noted the discrepancy between the BP and QM databases. In cases where the information in QM appears to be inaccurate, BP is providing the information it believes to be correct in this data posting and has summarized the noted discrepancies in the QM Notification (Errata Report) available as part of this data posting (see Version History).

A more detailed description of the data verification approach for this Water Chemistry data posting is provided in Appendix C. The data verification status and results for each sample are noted in the data file(s) in fields labeled "Field Data Verification Status" and "Field Data Verification Results", respectively. "Field Data Verification Status" can be coded as "Not started," "Underway," or "Complete." "Complete" indicates that the initial review has been completed, corrections have been made where possible, and any remaining issues have been flagged for follow-up evaluation. "Field Data Verification Results" are coded when data verification is complete for a sample. Codes indicate either that the field data reflect the source records or that one or more field values cannot be verified based on the available records. At the time of this data posting, 10%[13] of the samples have been completely processed through this data verification process. Verification efforts have been started but not yet completed for approximately 89% of the samples, and < 1% have not yet been reviewed. Data verification

[12] In some cases, minor differences are noted in comparisons of BP and Query Manager data attributable to rounding errors or for other reasons. BP is not addressing such minor differences at this time.

[13] The BP QA team added a data quality objective for latitude and longitude correctness in early 2014. Previously, locational data were verified for completeness and reasonableness. The addition of a check to verify the exact latitude and longitude coordinates vs. source records resulted in a verification status change from "Complete" to "In Process" for sample data verified prior to implementation of this check. This change reduced the number of samples with a field data verification status of "Complete" from 56% in the first version of the data posting to 10% in the current version. Verification of the correctness of the latitude and longitude values is continuing.

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efforts are continuing, and data may be revised and reposted to provide the results of any further data verification work.

Data File Description

To facilitate use of the Water Chemistry dataset, BP is providing data in the form of a single comma-separated value file. This file is very large and contains more than 2.4 million rows of information. Data file handling suggestions are provided in Appendix D to aid data users with importing this file into different software applications. Analytical results for laboratory QC control oils, which were analyzed in conjunction with field samples as part of the QA/QC processes specified in the AQAP, are also provided as part of a separate data posting (see Version History). The format of the data file for laboratory QC control oil data differs slightly from that for field samples. A full description of the file format and a data dictionary are provided in Appendix E.

Supporting Information

This section describes additional information available on the Gulf Science Data website that provides background and context for the Water Chemistry dataset.

Study Descriptions

Study descriptions provide a brief summary of the study plan, objectives, and approach, along with a table summarizing the sample list and available analytical data provided in this data posting. Each has a map attached that presents the locations of the sampling stations to provide the data user with the geographic setting for each study. Every study included in this data posting has been assigned a unique SRN which provides a means of linking the information in the study list (Appendix A), with the data contained in the data file, the study descriptions, and the associated work plans. The relevant study descriptions are provided as an attachment to this report.

NRDA Work Plans

For most studies included in this data posting, the investigators developed work plans prior to the commencement of the study to set forth the study objectives and procedures. The work plans typically contain the study objectives, an overview of the study approach, and descriptions of field methodologies and analytical techniques used to collect and analyze environmental samples and data. The work plans are available on BP's Gulf Science Data website. It is important to note that for some studies where BP and the Trustees agreed to a scope of work and study procedures, work commenced before the work plan was signed.

Response Work Plans and Analytical Request Forms

During the Response, work plans and analytical request forms (ARFs) were prepared, reviewed, and approved prior to field work for most sampling programs. Later variations of the ARF are 1) Gulf Coast Incident Management Team ARFs (GARFs) used after operations were consolidated in New Orleans in mid-September 2010, and 2) ASRs for work conducted by the Gulf Coast Restoration Organization. ARFs, GARFs, and ASRs (collectively referred to as

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ASRs) are concise documents that outline the sampling objectives; key personnel; and sampling, analytical laboratory, analysis methodology, and reporting requirements. For some programs, work plans were not developed and only ASRs are available for a sampling program. In a few cases, the ASR was prepared after sampling and analysis to document the procedures used. ASRs are referenced in some study descriptions and relevant ASRs or similar documents are provided with the work plans as part of this data posting (see Version History).

MC252 Source Oil Characterization

GOM researchers have been interested in the physical and chemical characterization of the MC252 oil and have requested aliquots of this oil from BP in order to determine these characteristics. Since quantities of this oil are limited, BP has prepared summaries to provide researchers with a detailed description of the oil's physical and chemical properties so that they do not have to replicate experimental analyses on the source material. Results from detailed chemical characterization of unweather and weathered MC252 source oil are separate from this data posting, and are discussed in greater detail in the MC-252 Oil Characterization Data Publication Summary Reports (see Version History).

Query Manager Notification (Errata Report)

The QM Notification (Errata Report) conveys interim results of BP's review of completeness and accuracy for NRDA cooperative data posted to NOAA's QM website. The goal of this notification is to facilitate consistency between NOAA's QM and BP's datasets. BP has summarized a detailed list of recommended changes to the QM database based on its review. BP has made these changes to the data contained in the Water Chemistry data posting in an effort to post the most accurate and complete dataset. The QM Notification (Errata Report) will be updated periodically as BP continues its completeness and accuracy review of these data. This report is included as supplemental information to this data posting (see Version History).

Other Data Sources

Some of the data BP is publishing with this report are publically accessible through other sources. These non-BP data sources are discussed below along with distinctions between BP's dataset and these other sources.

NOAA-NODC

NOAA's National Oceanographic Data Center (NODC) has published data associated with the DWH Oil Spill Response online.[14] The Response data available at this website were originally compiled in EPA's Scribe software for the purpose of data sharing and in support of the Operational Science Advisory Team evaluations and reporting.

The Response data provided by BP at gulfsciencedata.bp.com differs from the NODC data posting in four important aspects:

[14] http://www.nodc.noaa.gov/deepwaterhorizon/specialcollections.html

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1. **Focus of Dataset**—This data posting includes information on only those chemical constituents associated with petroleum. Chemical constituents that are not present in MC252 oil (i.e., polychlorinated biphenyls, pesticides, and halogenated volatiles) are provided by NODC but are not included in this Water Chemistry data posting.
2. **Reprocessing of Response Data**—Certain Response data were reprocessed in 2012 to reflect lower analytical detection limits than were initially reported for the samples. In 2010, one laboratory's reported detection limits for PAH and SHC were 20 and 500 ng/L, respectively. Subsequent discussions with the laboratory revealed that the statistically-derived MDLs were closer to 5 ng/L for PAH and 100 ng/L for SHCs. Therefore, in 2012, these data were reprocessed to capture results detected within the range of the statistically-derived MDLs and the previously reported detection limits. These reprocessed results are not currently available at the NODC website.
3. **Surrogate Correction of Response Data**—Response data for selected studies were post-processed in 2013 to adjust PAH, SHC, TPH, and biomarker results based on surrogate recoveries (i.e., surrogate correction) to be consistent with the methodology used for the NRDA datasets. Surrogate-corrected data are not currently available at the NODC website.
4. **Verification of Spatial Data**—In 2012 and 2013, BP teams continued extensive verification of the positional data (i.e., coordinates and depths) associated with Response studies. This dataset includes corrections to these spatial data based on BP's verification.

NOAA-ERMA

Some NRDA Cooperative and Response chemistry data can be accessed via NOAA's Environmental Response Management Application (ERMA) website[15] for the Gulf of Mexico. This data posting is a publicly accessible version of the QM database. The water chemistry data provided by BP at gulfsciencedata.bp.com differs from the ERMA data posting in three important aspects:

1. **Field Collected Blanks**—The data posting on ERMA does not provide access to field collected blanks which provide important information needed by data users interpreting results in the associated field samples. This data posting includes field blank data.
2. **MC252 Control Oils**—The data posting on ERMA does not provide users with the batch-specific MC252 control oil analyses specified in the NRDA AQAP (NOAA 2012). The MC252 control oil analyses provide important information for data users that can be used to assess laboratory performance, inter-laboratory variability, and to aid in the interpretation of sample results.
3. **Improved Spatial Data**—In 2012 and 2013, BP teams continued extensive verification of the positional data (i.e., coordinates and depths) associated with NRDA Cooperative studies. This dataset includes corrections to these spatial data based on BP's verification. Errors noted

[15] http://gomex.erma.noaa.gov

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by BP during the data verification process have been summarized in QM Notification (Errata Report) accessible at gulfsciencedata.bp.com.

Additional Features of BP Dataset

Two additional features distinguish this data posting from other data relating to the Gulf:

1. **BP Independent Data**—BP is providing access to data that have not been released previously to the scientific community. These data are associated with studies performed by BP independent of the Cooperative NRDA investigations.
2. **Compiled Response and NRDA Data**—BP is providing a Water Chemistry dataset containing sample results collected during 67 studies, using more than 100 sampling cruises and surveys, under both the Response and NRDA investigations. Data are provided in a unified database with a consistent format.

Notes

BP is providing the dataset and supplemental information to make data available in a form that can be used in other studies and research. The DWH NRDA Trustees have not participated in the development of the dataset in this form or in production of this document. Data that are the subject of this report may be updated after any further QA/QC reviews. Recommended changes based on QA/QC efforts are discussed in the Query Manager Notification (Errata Report).

Additional information and research, including existing and future research related to the DWH accident, may affect the use and interpretation of this information and the underlying data. BP reserves the right to supplement this document, to provide interpretation and analysis of this document and any data contained herein, and to raise objections to the admission, use, and interpretation of this document in part or in full, and any material described herein, in any legal proceeding.

References

GCIMT (Gulf Coast Incident Management Team). 2011. Deepwater Horizon Quality Assurance Project Plan for the BP MC252 Incident, Sample Management Group. BP-MC252-QAPP. Prepared by the Environmental Unit, Gulf Coast Incident Management Team, New Orleans, LA. May 18, 2011.

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Tables

Table 1. Volatile Organic Parameters

Parameter Type	Parameter Code	Chemical Name	Note
BTEX/PIANO	71-43-2	Benzene	1, 2, 3
BTEX/PIANO	108-88-3	Toluene	1, 2, 3
BTEX/PIANO	100-41-4	Ethylbenzene	1, 2, 3
BTEX/PIANO	95-47-6	o-Xylene	1, 2, 3
BTEX/PIANO	179601-23-1	m&p-Xylenes	1, 2, 3
BTEX/PIANO	100-42-5	Styrene	2, 3
BTEX/PIANO	98-82-8	Isopropylbenzene	2, 3
BTEX/PIANO	103-65-1	n-Propylbenzene	2, 3
BTEX/PIANO	108-67-8	1,3,5-Trimethylbenzene	2, 3
BTEX/PIANO	99-87-6	1-Methyl-4-Isopropylbenzene	2, 3
BTEX/PIANO	95-63-6	1,2,4-Trimethylbenzene	2, 3
BTEX/PIANO	135-98-8	sec-Butylbenzene	2, 3
BTEX/PIANO	104-51-8	n-Butylbenzene	2, 3
BTEX/PIANO	98-06-6	tert-Butylbenzene	2, 3
BTEX/PIANO	91-20-3	Naphthalene	2, 3
BTEX/PIANO	78-78-4	2-Methylbutane	3
BTEX/PIANO	109-67-1	1-Pentene	3
BTEX/PIANO	563-46-2	2-Methyl-1-Butene	3
BTEX/PIANO	109-66-0	n-Pentane (C5)	3
BTEX/PIANO	646-04-8	trans-2-Pentene	3
BTEX/PIANO	627-20-3	cis-2-Pentene	3
BTEX/PIANO	75-65-0	t-Butyl Alcohol	3
BTEX/PIANO	287-92-3	Cyclopentane	3
BTEX/PIANO	79-29-8	2,3-Dimethylbutane	3
BTEX/PIANO	107-83-5	2-Methylpentane	3
BTEX/PIANO	1634-04-4	Methyl Tert-Butyl Ether	3
BTEX/PIANO	96-14-0	3-Methylpentane	3
BTEX/PIANO	592-41-6	1-Hexene	3
BTEX/PIANO	110-54-3	n-Hexane (C6)	3

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Table 1. Volatile Organic Parameters

Parameter Type	Parameter Code	Chemical Name	Note
BTEX/PIANO	108-20-3	Di-Isopropyl Ether	3
BTEX/PIANO	637-92-3	Ethyl Tert-Butyl Ether	3
BTEX/PIANO	590-35-2	2,2-Dimethylpentane	3
BTEX/PIANO	96-37-7	Methylcyclopentane	3
BTEX/PIANO	108-08-7	2,4-Dimethylpentane	3
BTEX/PIANO	110-82-7	Cyclohexane	3
BTEX/PIANO	591-76-4	2-Methylhexane	3
BTEX/PIANO	565-59-3	2,3-Dimethylpentane	3
BTEX/PIANO	110-02-1	Thiophene	3
BTEX/PIANO	589-34-4	3-Methylhexane	3
BTEX/PIANO	994-05-8	Tert-Amyl Methyl Ether	3
BTEX/PIANO	1HEP_t12dmcPEN	1-Heptene/1,2-DMCP (trans)	3
BTEX/PIANO	540-84-1	2,2,4-Trimethylpentane	3
BTEX/PIANO	142-82-5	Heptane (C7)	3
BTEX/PIANO	108-87-2	Methylcyclohexane	3
BTEX/PIANO	592-13-2	2,5-Dimethylhexane	3
BTEX/PIANO	589-43-5	2,4-Dimethylhexane	3
BTEX/PIANO	564-02-3	2,2,3-Trimethylpentane	3
BTEX/PIANO	565-75-3	2,3,4-Trimethylpentane	3
BTEX/PIANO	560-21-4	2,3,3-Trimethylpentane	3
BTEX/PIANO	584-94-1	2,3-Dimethylhexane	3
BTEX/PIANO	619-99-8	3-Ethylhexane	3
BTEX/PIANO	592-27-8	2-Methylheptane	3
BTEX/PIANO	589-81-1	3-Methylheptane	3
BTEX/PIANO	554-14-3	2-Methylthiophene	3
BTEX/PIANO	616-44-4	3-Methylthiophene	3
BTEX/PIANO	111-66-0	1-Octene	3
BTEX/PIANO	111-65-9	n-Octane (C8)	3
BTEX/PIANO	872-55-9	2-Ethylthiophene	3
BTEX/PIANO	124-11-8	1-Nonene	3
BTEX/PIANO	620-14-4	1-Methyl-3-Ethylbenzene	3
BTEX/PIANO	611-14-3	1-Methyl-2-Ethylbenzene	3

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Table 1. Volatile Organic Parameters

Parameter Type	Parameter Code	Chemical Name	Note
BTEX/PIANO	622-96-8	1-Methyl-4-Ethylbenzene	3
BTEX/PIANO	872-05-9	1-Decene	3
BTEX/PIANO	535-77-3	1-Methyl-3-isopropylbenzene	3
BTEX/PIANO	95-63-6	1,2,4-Trimethylbenzene	3
BTEX/PIANO	1074-17-5	1-Methyl-2-Propylbenzene	3
BTEX/PIANO	496-11-7	Indane	3
BTEX/PIANO	1074-43-7	1-Methyl-3-Propylbenzene	3
BTEX/PIANO	1074-55-1	1-Methyl-4-propylbenzene	3
BTEX/PIANO	104-51-8	n-Butylbenzene	3
BTEX/PIANO	934-80-5	1,2-Dimethyl-4-Ethylbenzene	3
BTEX/PIANO	135-01-3	1,2-Diethylbenzene	3
BTEX/PIANO	1758-88-9	1,4-Dimethyl-2-Ethylbenzene	3
BTEX/PIANO	933-98-2	1,2-Dimethyl-3-Ethylbenzene	3
BTEX/PIANO	2870-04-4	1,3-Dimethyl-2-Ethylbenzene	3
BTEX/PIANO	874-41-9	1,3-Dimethyl-4-Ethylbenzene	3
BTEX/PIANO	934-74-7	1,3-Dimethyl-5-Ethylbenzene	3
BTEX/PIANO	95-93-2	1,2,4,5-Tetramethylbenzene	3
BTEX/PIANO	538-68-1	n-Pentylbenzene	3
BTEX/PIANO	12108-13-3	MMT	3
BTEX/PIANO	107-06-2	1,2-Dichloroethane	3
BTEX/PIANO	106-93-4	1,2-Dibromoethane	3
BTEX/PIANO	527-84-4	1-Methyl-2-isopropylbenzene	3
BTEX/PIANO	95-15-8	Benzo(b)thiophene	3
BTEX/PIANO	111-84-2	n-Nonane (C9)	3
BTEX/PIANO	124-18-5	n-Decane (C10)	3
BTEX/PIANO	1120-21-4	n-Undecane (C11)	3
BTEX/PIANO	112-40-3	n-Dodecane (C12)	3
BTEX/PIANO	629-50-5	n-Tridecane (C13)	3
BTEX/PIANO	90-12-0	1-Methylnaphthalene	3
BTEX/PIANO	91-57-6	2-Methylnaphthalene	3

Notes: Note 1. Included in the short list of volatile compounds for Response.
Note 2. Included in standard volatile organic compound list specified in NRDA AQAP.
Note 3. Included in the C5-C13 volatile compounds for PIANO forensic assessment compound list specified in NRDA AQAP.

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Table 2. Parent and Alkylated Polycyclic Aromatic Hydrocarbon (PAH) and Other Related Parameters

Parameter	Chemical Code	Chemical Name	Note
PAH/aPAH	493-01-6	cis-Decalin	1
PAH/aPAH	493-02-7	trans-Decalin	1
PAH/aPAH	91-17-8-CT	cis/trans-Decalins	1
PAH/aPAH	91-17-8-C1	C1-Decalins	1
PAH/aPAH	91-17-8-C2	C2-Decalins	1
PAH/aPAH	91-17-8-C3	C3-Decalins	1
PAH/aPAH	91-17-8-C4	C4-Decalins	1
PAH/aPAH	95-15-8	Benzo(b)thiophene	1
PAH/aPAH	95-15-8-C1	C1-Benzo(b)thiophenes	1
PAH/aPAH	95-15-8-C2	C2-Benzo(b)thiophenes	1
PAH/aPAH	95-15-8-C3	C3-Benzo(b)thiophenes	1
PAH/aPAH	95-15-8-C4	C4-Benzo(b)thiophenes	1
PAH/aPAH	91-20-3	Naphthalene	1, 2
PAH/aPAH	91-20-3-C1	C1-Naphthalenes	1, 2
PAH/aPAH	91-20-3-C2	C2-Naphthalenes	1, 2
PAH/aPAH	91-20-3-C3	C3-Naphthalenes	1, 2
PAH/aPAH	91-20-3-C4	C4-Naphthalenes	1, 2
PAH/aPAH	92-52-4	Biphenyl	1, 2
PAH/aPAH	132-64-9	Dibenzofuran	1, 2
PAH/aPAH	208-96-8	Acenaphthylene	1, 2
PAH/aPAH	83-32-9	Acenaphthene	1, 2
PAH/aPAH	86-73-7	Fluorene	1, 2
PAH/aPAH	86-73-7-C1	C1-Fluorenes	1, 2
PAH/aPAH	86-73-7-C2	C2-Fluorenes	1, 2
PAH/aPAH	86-73-7-C3	C3-Fluorenes	1, 2
PAH/aPAH	120-12-7	Anthracene	1, 2
PAH/aPAH	85-01-8	Phenanthrene	1, 2
PAH/aPAH	85-01-8-C1	C1-Phenanthrenes/Anthracenes	1, 2
PAH/aPAH	85-01-8-C2	C2-Phenanthrenes/Anthracenes	1, 2
PAH/aPAH	85-01-8-C3	C3-Phenanthrenes/Anthracenes	1, 2
PAH/aPAH	85-01-8-C4	C4-Phenanthrenes/Anthracenes	1, 2
PAH/aPAH	483-65-8	Retene	1

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Table 2. Parent and Alkylated Polycyclic Aromatic Hydrocarbon (PAH) and Other Related Parameters

Parameter	Chemical Code	Chemical Name	Note
PAH/aPAH	132-65-0	Dibenzothiophene	1, 2
PAH/aPAH	132-65-0-C1	C1-Dibenzothiophenes	1, 2
PAH/aPAH	132-65-0-C2	C2-Dibenzothiophenes	1, 2
PAH/aPAH	132-65-0-C3	C3-Dibenzothiophenes	1, 2
PAH/aPAH	132-65-0-C4	C4-Dibenzothiophenes	1, 2
PAH/aPAH	243-17-4	Benzo(b)fluorene	1
PAH/aPAH	206-44-0	Fluoranthene	1, 2
PAH/aPAH	129-00-0	Pyrene	1, 2
PAH/aPAH	206-44-0-C1	C1-Fluoranthenes/Pyrenes	1, 2
PAH/aPAH	206-44-0-C2	C2-Fluoranthenes/Pyrenes	1, 2
PAH/aPAH	206-44-0-C3	C3-Fluoranthenes/Pyrenes	1, 2
PAH/aPAH	206-44-0-C4	C4-Fluoranthenes/Pyrenes	1, 2
PAH/aPAH	224-10-2	Naphthobenzothiophene	1
PAH/aPAH	224-10-2-C1	C1-Naphthobenzothiophenes	1
PAH/aPAH	224-10-2-C2	C2-Naphthobenzothiophenes	1
PAH/aPAH	224-10-2-C3	C3-Naphthobenzothiophenes	1
PAH/aPAH	224-10-2-C4	C4-Naphthobenzothiophenes	1
PAH/aPAH	56-55-3	Benz(a)anthracene	1, 2
PAH/aPAH	CHR_tPHE	Chrysene/Triphenylene	1, 2
PAH/aPAH	218-01-9-C1	C1-Chrysenes	1, 2
PAH/aPAH	218-01-9-C2	C2-Chrysenes	1, 2
PAH/aPAH	218-01-9-C3	C3-Chrysenes	1, 2
PAH/aPAH	218-01-9-C4	C4-Chrysenes	1, 2
PAH/aPAH	205-99-2	Benzo(b)fluoranthene	1, 2
PAH/aPAH	205-99-2_205-82-3	Benzo(b/j)fluoranthene	1, 2
PAH/aPAH	207-08-9	Benzo(k)fluoranthene	1, 2
PAH/aPAH	203-33-8	Benzo(a)fluoranthene	1
PAH/aPAH	192-97-2	Benzo(e)pyrene	1, 2
PAH/aPAH	50-32-8	Benzo(a)pyrene	1, 2
PAH/aPAH	198-55-0	Perylene	1, 2
PAH/aPAH	193-39-5	Indeno(1,2,3-cd) Pyrene	1, 2
PAH/aPAH	dbhANT_dbcANT	Dibenz(a,h+a,c)anthracene	1, 2

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Table 2. Parent and Alkylated Polycyclic Aromatic Hydrocarbon (PAH) and Other Related Parameters

Parameter	Chemical Code	Chemical Name	Note
PAH/aPAH	191-24-2	Benzo(g,h,i)perylene	1, 2
Other PAH	90-12-0	1-Methylnaphthalene	1
Other PAH	91-57-6	2-Methylnaphthalene	1
Other PAH	581-42-0	2,6-Dimethylnaphthalene	1
Other PAH	2245-38-7	1,6,7-Trimethylnaphthalene	1
Other PAH	613-12-7	2-Methylanthracene	1
Other PAH	832-69-9	1-Methylphenanthrene	1
Other PAH	2531-84-2	2-Methylphenanthrene	1
Other PAH	832-71-3	3-Methylphenanthrene	1
Other PAH	4mpANT_9mpANT	4-Methylphenanthrene and 9-Methylphenanthrene	1
Other PAH	31317-07-4	1-Methyldibenzothiophene	1
Other PAH	2mdbTHI_3mdbTHI	2/3-Methyldibenzothiophene	1
Other PAH	7372-88-5	4-Methyldibenzothiophene	1
Other PAH	86-74-8	Carbazole	1

Notes: Note 1. Included in compound list specified in NRDA AQAP.
Note 2. Included in compound list for Response related analyses.

Table 3. Saturated Hydrocarbon and Extractable Hydrocarbon Parameters

Parameter	Chemical Code	Chemical Name	Note
SHC	111-84-2	n-Nonane (C9)	1, 2
SHC	124-18-5	n-Decane (C10)	1, 2
SHC	1120-21-4	n-Undecane (C11)	1, 2
SHC	112-40-3	n-Dodecane (C12)	1, 2
SHC	629-50-5	n-Tridecane (C13)	1, 2
SHC	3891-98-3	2,6,10 Trimethyldodecane (1380)	1, 2
SHC	629-59-4	n-Tetradecane (C14)	1, 2
SHC	3891-99-4	2,6,10 Trimethyltridecane (1470)	1, 2
SHC	629-62-9	n-Pentadecane (C15)	1, 2
SHC	544-76-3	n-Hexadecane (C16)	1, 2
SHC	3892-00-0	Norpristane (1650)	1, 2
SHC	629-78-7	n-Heptadecane (C17)	1, 2
SHC	1921-70-6	Pristane	1, 2

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Table 3. Saturated Hydrocarbon and Extractable Hydrocarbon Parameters

Parameter	Chemical Code	Chemical Name	Note
SHC	593-45-3	n-Octadecane (C18)	1, 2
SHC	638-36-8	Phytane	1, 2
SHC	629-92-5	n-Nonadecane (C19)	1, 2
SHC	112-95-8	n-Eicosane (C20)	1, 2
SHC	629-94-7	n-Heneicosane (C21)	1, 2
SHC	629-97-0	n-Docosane (C22)	1, 2
SHC	638-67-5	n-Tricosane (C23)	1, 2
SHC	646-31-1	n-Tetracosane (C24)	1, 2
SHC	629-99-2	n-Pentacosane (C25)	1, 2
SHC	630-01-3	n-Hexacosane (C26)	1, 2
SHC	593-49-7	n-Heptacosane (C27)	1, 2
SHC	630-02-4	n-Octacosane (C28)	1, 2
SHC	630-03-5	n-Nonacosane (C29)	1, 2
SHC	638-68-6	n-Triacontane (C30)	1, 2
SHC	630-04-6	n-Hentriacontane (C31)	1, 2
SHC	544-85-4	n-Dotriacontane (C32)	1, 2
SHC	630-05-7	n-Tritriacontane (C33)	1, 2
SHC	14167-59-0	n-Tetratriacontane (C34)	1, 2
SHC	630-07-9	n-Pentatriacontane (C35)	1, 2
SHC	630-06-8	n-Hexatriacontane (C36)	1, 2
SHC	7194-84-5	n-Heptatriacontane (C37)	1, 2
SHC	7194-85-6	n-Octatriacontane (C38)	1, 2
SHC	7194-86-7	n-Nonatriacontane (C39)	1, 2
SHC	4181-95-7	n-Tetracontane (C40)	1, 2
TPH	TEH	Total Extractable Hydrocarbons (TEH)	1
TPH	TEM	Total Extractable Matter (TEM)	1
TPH	TPH	TPH, Total	2
TPH	TPH_C9C40	TPH, Total (C9-C40)	2
TPH	TPH_C9C44	Total Petroleum Hydrocarbons (C9-C44)	2

Notes: Note 1. Included in compound list specified in NRDA AQAP.
Note 2. Included in compound list for Response related analyses.

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Table 4. Geochemical Biomarker Parameters

Parameter Type	Chemical Code	Chemical Name	Biomarker Abbreviation	Note
Biomarker	81943-50-2	C20-Triaromatic Sterane	C20-TAS	2
Biomarker	C21TAS	C21-Triaromatic Sterane	C21-TAS	2
Biomarker	C26TASR_C27TASS	C26-Triaromatic Sterane-20R + C27-Triaromatic Sterane-20S	C26,C27-TAS	1, 2
Biomarker	80382-29-2-S	C26-Triaromatic Sterane-20S	C26-TAS (20S)	1, 2
Biomarker	C27TASR	C27-Triaromatic Sterane-20R	C27-TAS	1, 2
Biomarker	80382-33-8-R	C28-Triaromatic Sterane-20R	C28-TAS (20R)	1, 2
Biomarker	80382-33-8-S	C28-Triaromatic Sterane-20S	C28-TAS (20S)	1, 2
Biomarker	C27_DIA1_S	D1-Diasterane-27S	D1	2
Biomarker	C27_DIA2_R	D2-Diasterane-27R	D2	2
Biomarker	C28_DIA3_S	D3-Diasterane-28S	D3	2
Biomarker	C28_DIA3a_S	D3a-Diasterane-28S	D3a	2
Biomarker	C28_DIA4_R	D4-Diasterane-28R	D4	2
Biomarker	C28_DIA4a_R	D4a-Diasterane-28R	D4a	2
Biomarker	C29_DIA5_S	D5-Diasterane-29S	D5	2
Biomarker	C29_DIA6_R	D6-Diasterane-29R	D6	2
Biomarker	C21_DIA	C21-Diasterane	Sa	2
Biomarker	S21	C21 Sterane	Sb	2
Biomarker	C22_DIA	Sc-C22Diasterane	Sc	2
Biomarker	S22	C22 Sterane	Sd	2
Biomarker	24909-91-9	5a(H)-pregnane	S01	2
Biomarker	641-85-0	S2-Pregnane	S02	2
Biomarker	DIA27S	13b(H),17a(H)-20S-Diacholestane	S04	1, 2
Biomarker	DIA27R	13b(H),17a(H)-20R-Diacholestane	S05	1, 2
Biomarker	DIA27S2	13a(H),17b(H)-20S-Diacholestane	S06	2
Biomarker	DIA27R2	13a(H),17b(H)-20R-Diacholestane	S07	2
Biomarker	DIA28S	13b(H),17a(H)-20S-Methyldiacholestane	S08	1, 2
Biomarker	DIA28R2	13a(H),17b(H)-Methyldiacholestane-20R	S10	2

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Table 4. Geochemical Biomarker Parameters

Parameter Type	Chemical Code	Chemical Name	Biomarker Abbreviation	Note
Biomarker	DIA28S2	13a(H),17b(H)-Methyldiacholestane-20S	S11	2
Biomarker	14a17aCHO_13b17aedCHOs	14a(H),17a(H)-20S-Cholestane/13b(H),17a(H)-20S-Ethyldiacholestane (S12)	S12	1, 2
Biomarker	41083-75-4	14a(H),17a(H)-20S-Cholestane	S12	1, 2
Biomarker	69483-47-2	14b(H),17b(H)-20R-Cholestane	S14	1, 2
Biomarker	C27bbS	14b(H),17b(H)-20S-Cholestane	S15	1, 2
Biomarker	14a17aCHO_13b17aedCHOr	14a(H),17a(H)-20R-Cholestane/13b(H),17a(H)-20R-Ethyldiacholestane (S17)	S17	1, 2
Biomarker	481-21-0	14a(H),17a(H)-20R-cholestane	S17	1, 2
Biomarker	DIA29R	13b(H),17a(H)-20R-Ethyldiacholestane	S18	2
Biomarker	UnkSTERANE	Unknown Sterane	unk Sterane	1, 2
Biomarker	DIA29S2	13a(H),17b(H)-20S-Ethyldiacholestane	S19	1, 2
Biomarker	C28S	14a(H),17a(H)-20S-Methylcholestane	S20	1, 2
Biomarker	71117-90-3	14b(H),17b(H)-20R-Methylcholestane	S22	1, 2
Biomarker	C28bbS	14b(H),17b(H)-20S-Methylcholestane	S23	1, 2
Biomarker	C28R	14a(H),17a(H)-20R-Methylcholestane	S24	1, 2
Biomarker	78392-20-8-S	14a(H),17a(H)-20S-Ethylcholestane	S25	1, 2
Biomarker	71117-92-5	14b(H),17b(H)-20R-Ethylcholestane	S26	1, 2
Biomarker	C29bbS	14b(H),17b(H)-20S-Ethylcholestane	S27	1, 2
Biomarker	62446-14-4	14a(H),17a(H)-20R-Ethylcholestane	S28	1, 2
Biomarker	C30R	C30-Steranes-20R	S29	2
Biomarker	C30S	C30-Steranes-20S	S30	2
Biomarker	TR19	C19 Tricyclic Terpane	T00	2
Biomarker	TR20	C20 Tricyclic Terpane	T01	2
Biomarker	TR21	C21 Tricyclic Terpane	T02	2
Biomarker	TR22	C22 Tricyclic Terpane	T03	2
Biomarker	TR23	C23 Tricyclic Terpane	T04	1, 2
Biomarker	TR24	C24 Tricyclic Terpane	T05	1, 2
Biomarker	TR25A	C25 Tricyclic Terpane-22S	T06	1, 2
Biomarker	TET24	C24 Tetracyclic Terpane	T06a	1, 2

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Table 4. Geochemical Biomarker Parameters

Parameter Type	Chemical Code	Chemical Name	Biomarker Abbreviation	Note
Biomarker	TR26A	C26 Tricyclic Terpane-22S	T06b	1, 2
Biomarker	TR26B	C26 Tricyclic Terpane-22R	T06c	1, 2
Biomarker	TR28A	C28 Tricyclictriterpane-22S	T07	1, 2
Biomarker	TR28B	C28 Tricyclictriterpane-22R	T08	1, 2
Biomarker	TR29A	C29 Tricyclictriterpane-22S	T09	1, 2
Biomarker	TR29B	C29 Tricyclictriterpane-22R	T10	1, 2
Biomarker	Ts	18a(H),21b(H)-22,29,30-Trisnorhopane	T11	1, 2
Biomarker	TR30A	C30 Tricyclic Terpane-22S	T11a	1, 2
Biomarker	TR30B	C30 Tricyclic Terpane-22R	T11b	1, 2
Biomarker	53584-59-1	17a(H)-22,29,30-Trisnorhopane	T12	1, 2
Biomarker	51271-94-4	17b-22,29,30-Trisnorhopane	T13	2
Biomarker	29BNH	29,30-Bisnorhopane	T13a	2
Biomarker	28abBNH	17a(H),21b(H)-28,30-Bisnorhopane	T14	2
Biomarker	28BNH	28,30-Bisnorhopane	T14a	1, 2
Biomarker	NOR25H	25-Norhopane	T14b	1, 2
Biomarker	53584-60-4	30-Norhopane	T15	1, 2
Biomarker	119613-71-7	30-Norneohopane	T16	1, 2
Biomarker	3258-87-5	Normoretane	T17	1, 2
Biomarker	DH30	17a(H)-Diahopane	X	1, 2
Biomarker	OL	18a(H)+18b(H)-Oleananes	T18	1, 2
Biomarker	13849-96-2	17a(H),21b(H)-Hopane	T19	1, 2
Biomarker	1176-44-9	Moretane	T20	1, 2
Biomarker	60305-22-8	30-Homohopane-22R	T21	1, 2
Biomarker	60305-23-9	30-Homohopane-22S	T22	1, 2
Biomarker	gCER_dHOP	T22a-Gammacerane/C32-diahopane	T22a	2
Biomarker	559-65-9	Gammacerane	T22a	1, 2
Biomarker	471-62-5	17b(H),21b(H)-hopane		2
Biomarker	30MMTR	C30-Homomoretane-22R	T24	2
Biomarker	1615-91-4	Diploptene	T25	2
Biomarker	54352-50-0-S	30,31-Bishomohopane-22S	T26	1, 2
Biomarker	54352-50-0-R	30,31-Bishomohopane-22R	T27	1, 2

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Table 4. Geochemical Biomarker Parameters

Parameter Type	Chemical Code	Chemical Name	Biomarker Abbreviation	Note
Biomarker	M32R	30,31-Bishomomoretane-22R	T28	2
Biomarker	53584-62-6-R	17b(H),21b(H)-Homohopane-22R	T29	2
Biomarker	54340-13-5-S	30,31,32-Trishomohopane-22S	T30	1, 2
Biomarker	54340-13-5-R	30,31,32-Trishomohopane-22R	T31	1, 2
Biomarker	67069-13-0	30,31,32,33-Tetrakishomohopane-22S	T32	1, 2
Biomarker	67069-14-1	30,31,32,33-Tetrakishomohopane-22R	T33	1, 2
Biomarker	54370-82-0-S	30,31,32,33,34-Pentakishomohopane-22S	T34	1, 2
Biomarker	54370-82-0-R	30,31,32,33,34-Pentakishomohopane-22R	T35	1, 2
Biomarker	54370-82-0-S	30,31,32,33,34-Pentakishomohopane-22S	T34	1, 2
Biomarker	54370-82-0-R	30,31,32,33,34-Pentakishomohopane-22R	T35	1, 2
Biomarker	UnkSTERANE	Unknown Sterane	unk Sterane	1
Biomarker	DH30	17a(H)-Diahopane	X	1, 2

Notes: Note 1. Included in compound list specified in NRDA QAP.
Note 2. Included in compound list for Response related analyses.

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Appendices

Appendix A

Water Chemistry Study List

Study Type	SRN	Study Name in the Database	Study Description Title
BP NRDA Independent	1	Berm	Shallow Subtidal and Intertidal Benthic and Epibenthic Baseline Sampling Plan for the Louisiana Barrier Island Project
NRDA Cooperative	26	Shallow Coral Tier 1 Baseline	Mississippi Canyon 252 Incident Shallow Coral Tier 1 Plan and NRDA Plan for Samples of Opportunity in Support of the Water Column Baseline
NRDA Cooperative	29	Nearshore Submerged Oil Characterization: 2010	Nearshore Ephemeral Data Collections: Submerged Oil Characterization across Multiple Habitats
NRDA Cooperative	30	Nearshore Fish Kill	Investigative Plan for Fish and Invertebrate Kills in the Northern Gulf of Mexico
BP NRDA Independent	32.1	State Fisheries Monitoring - LDWF Inshore: 2010	Opportunistic Sampling during the LDWF Inshore Fisheries Monitoring Surveys
BP NRDA Independent	33	State Fisheries Monitoring - LDWF Nearshore	Opportunistic Sampling During the LDWF Nearshore Fisheries Monitoring Surveys
BP NRDA Independent	34	State Fisheries Monitoring - LDWF Offshore	Opportunistic Sampling During the LDWF Offshore Fisheries Monitoring Surveys
BP NRDA Independent	37.1	Shallow Subtidal Benthic Baseline	Shallow Subtidal Benthic and Water Baseline Plan for MC 252 NRDA
BP NRDA Independent	37.2	Nearshore Water Sampling (NGOM)	Nearshore Surface Water and Sediment Sampling Plan for MC 252 NRDA
NRDA Cooperative	71	SAV Tier 1 Baseline	Submerged Aquatic Vegetation Tier 1 Pre-Assessment Plan, Pre-Impact Baseline Characterization
NRDA Cooperative	72	SAV Tier 2 Pre-Assessment	Submerged Aquatic Vegetation Tier 2 Pre-Assessment, Post Spill Exposure Characterization Plan
NRDA Cooperative	76.1	SAV JELA 2010	Sampling and Analysis Plan for Jean Lafitte National Historic Park and Preserve Submerged Aquatic Vegetation Natural Resource Damage Assessment

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Study Type	SRN	Study Name in the Database	Study Description Title
NRDA Cooperative	77	LDEQ Nearshore Sediment Baseline	Work Plan for Sediment and Water Collection and Analyses for Baseline NRDA Purposes in Louisiana
NRDA Cooperative	78	LDEQ Nearshore Sediment Pre-Assessment	Pre-Assessment Phase Water Sampling for NRDA Purposes in Louisiana
BP NRDA Independent	87	Intertidal Baseline Sediment and Water Sampling	Deepwater Horizon Sediment, Water Chemistry, and Benthic Infauna Sampling Plan
NRDA Cooperative	88	Beach Baseline: Texas	Texas Baseline Survey and Sampling Plan
NRDA Cooperative	89.1	Beach Baseline: Florida Keys	Florida Keys Baseline Sampling Plan for Water and Sediment
NRDA Cooperative	89.2	Beach Baseline: West Florida	NRDA Pre-Impact Sampling Plan for West Coast of Florida: Hernando County through Collier County
NRDA Cooperative	89.3	Beach Baseline: Southeast Florida	Southeast Florida Water and Sediment Baseline Sampling Plan
NRDA Cooperative	104	Plankton Imaging SIPPER: September 2010 (Specialty Diver 1)	NRDA Plankton Sampling Plan & Fall 2010 Cruise Plan: *Specialty Diver* 1 – September 2010 SIPPER Cruise
NRDA Cooperative	105	Plankton Imaging SIPPER: May/June 2010 (Gordon Gunter)	Proposal for NRDA Data Collection for Deepwater Horizon Oil Spill, NOAA Vessel *Gordon Gunter*, May–June 2010 SIPPER Cruise
NRDA Cooperative	106	Plankton Imaging SIPPER: May 2010 (Weatherbird II)	Field Plan for Cooperative Research Cruise to Document Biotic Effects of the Deepwater Horizon Oil Spill – May 2010
NRDA Cooperative	113	1-meter MOCNESS Plankton: September 2010 (Walton Smith I)	NRDA Plankton Sampling Plan and Fall 2010 Cruise Plan – *Walton Smith* 1
Trustee NRDA Independent	115	Water Column Processes: Spring 2011 (Walton Smith IV)	NRDA Spring 2011 Water Column Processes Cruise Plan (M/V *Walton Smith* Cruise 4)
NRDA Cooperative	116	1-meter MOCNESS Plankton: September/October 2010 (Walton Smith III)	NRDA Plankton Sampling Plan & Fall 2010 Cruise Plan – *Walton Smith* 3
BP NRDA Independent	133.1	Broader Gulf (BGOM) Water Chemistry Pilot Survey (Rachel Bordelon)	Broader Gulf of Mexico Water Column Study—Pilot Survey
BP NRDA Independent	133.3	Broader Gulf (BGOM) Water Chemistry Cruise 1	Broader Gulf of Mexico Water Column Study—Cruise 1

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Study Type	SRN	Study Name in the Database	Study Description Title
NRDA Cooperative	134	Ephemeral Offshore Water Chemistry: Jack Fitz 1	Field Plan for Water-Column Profiling to Measure Dissolved-Phase Aromatic Hydrocarbons and Free Oil Droplets as a Function of Depth and Location Relative to the Subsurface Oil Release
NRDA Cooperative	135	Offshore Water Chemistry: Cooperative December 2010	NOAA/BP-Cardno ENTRIX NRDA Cooperative Deep Tow Cruise 2, December 2010 Arctic-*HOS Davis* 5-*Sarah Bordelon* Cruise Plan
BP NRDA Independent	136	Broader Gulf (BGOM) Water Chemistry Cruise 2	Broader Gulf of Mexico Water Column Study—Cruise 2
NRDA Cooperative	137	Offshore Water Chemistry: American Diver 1	Water Column Injury Ephemeral Data Collections: Deepwater Horizon Oil Spill (DWHOS) Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS) Cruise Plan–*American Diver* 1 and *Ocean Veritas* 9
BP NRDA Independent	138	Broader Gulf (BGOM) Water Chemistry Cruise 3	Broader Gulf of Mexico Water Column Study—Cruise 3
NRDA Cooperative	139	Offshore Water Chemistry: American Diver 2	Water Column Injury Ephemeral Data Collections: Deepwater Horizon Oil Spill (DWHOS) Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS) Cruise Plan—*American Diver* 2
NRDA Cooperative	140	Offshore Water Chemistry: Cooperative November 2010	NOAA/BP-ENTRIX NRDA Cooperative Deep Tow Cruise 1, November *2010 Arctic-HOS Davis* 4 Cruise Plan
NRDA Cooperative	141	Ephemeral Offshore Water Chemistry: Jack Fitz 2	Water Column Injury Ephemeral Data Collections: Cruise 2: Surface Water Sampling Plan Deepwater Horizon Oil Spill (DWHOS)
NRDA Cooperative	142	Ephemeral Offshore Water Chemistry: Jack Fitz 3	Water Column Injury Ephemeral Data Collections: NRDA Cruise 4: *Jack Fitz* 3 Water Sampling Plan Deepwater Horizon Oil Spill (DWHOS)
NRDA Cooperative	143	Ephemeral Offshore Water Chemistry: Bunny Bordelon 1	Water Column Injury Ephemeral Data Collections: Cruise 3: Surface Water Sampling Plan for Dispersant Treated Oil Deepwater Horizon Oil Spill (DWHOS)
BP NRDA Independent	145	Broader Gulf (BGOM) Water Chemistry Cruise 4	Broader Gulf of Mexico Water Column Study—Cruise 4
NRDA Cooperative	146	Adaptive Water Column Chemistry (Hos Davis 1)	Water Column Injury Ephemeral Data Collections: Deepwater Horizon Oil Spill (DWHOS) Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS) Cruise Plan—*HOS Davis* 1

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Study Type	SRN	Study Name in the Database	Study Description Title
NRDA Cooperative	147	Adaptive Water Column Chemistry (Hos Davis 2)	Water Column Injury Ephemeral Data Collections: Deepwater Horizon Oil Spill (DWHOS) Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS) Cruise Plan—*HOS Davis* 2
BP NRDA Independent	148	Broader Gulf (BGOM) Water Chemistry Cruise 5	Broader Gulf of Mexico Water Column Study—Cruise 5
NRDA Cooperative	149	Adaptive Water Column Chemistry (Hos Davis 3)	Water Column Injury Ephemeral Data Collections: Deepwater Horizon Oil Spill (DWHOS) Plan for Adaptive Water Column NOAA-NRDA Sampling (PAWNNS) Cruise Plan—*HOS Davis* 3
NRDA Cooperative	153	Deepwater Sediment ROV: Spring 2011 (Hos Sweetwater 2)	MC252 Deepwater Horizon Oil Spill Deep Benthic Communities and Water Column Data Collection March–April 2011 *HOS Sweetwater* ROV Sediment and Bottom Water Sampling Cruise Plan
NRDA Cooperative	154	Deepwater Sediment ROV: Summer 2011 (Hos Sweetwater 4/6)	MC252 Deepwater Horizon Oil Spill Deep Benthic Communities and Water Column Data Collection July–September 2011 *HOS Sweetwater* ROV Sediment and Bottom-Water Sampling Cruise Plan
BP NRDA Independent	156.1	Offshore Natural Hydrocarbon Seeps: Cruise 1	Deepwater Horizon Accident, NRDA Sampling Plan: Natural Hydrocarbon Seeps Cruise 1 Plan
BP NRDA Independent	156.2	Offshore Natural Hydrocarbon Seeps: Cruise 2	Deepwater Horizon Accident, NRDA Sampling Plan: Natural Hydrocarbon Seeps Cruise 2 Plan
BP NRDA Independent	160	2011 Mississippi River Flood	Assessment of the May 2011 Mississippi River Flood Event
NRDA Cooperative	192	NOAA Offshore Water Chemistry: Brooks McCall 2	NRDA Plan for Samples of Opportunity in Support of the Water Column Injury
Trustee Independent	312	Mussel Watch May 2010	Mussel Watch May 2010
BP Non-NRDA Independent	316	2012 GCIMT Surface Slick Sampling: MC-20	BP Wave Glider Gen2–HBOI Water Sampling Plan
Non-NRDA Response	328	Skandi-Neptune Deepwater Chemistry	Subsea Sample Collection Using ROV
NOAA Non-NRDA Independent	934	NOAA offshore water chemistry sampling on NOAA vessels	NOAA Sampling on NOAA Vessels

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Study Type	SRN	Study Name in the Database	Study Description Title
Non-NRDA Response	935	NOAA Offshore Water Chemistry Sampling on Response Vessels	NOAA Sampling on Response Vessels
Trustee Non-NRDA Independent	936	Gordon Gunter Opportunistic Water Chemistry Sampling	Opportunistic Water Chemistry Sampling aboard the R/V *Gordon Gunter*
Non-NRDA Response	1008	Natural Seep Water Sampling	Natural Seep Water Sampling
Non-NRDA Response	1012	Fate of Oil Response Team	Fate of Oil Response Team
Non-NRDA Response	1018	Dispersant Environmental Effects Program	Dispersant Environmental Effects Program
Non-NRDA Response	1018.2	CSIRO	Commonwealth Scientific and Industrial Research Organisation Water Sampling
Non-NRDA Response	1018.3	EcoRigs Water Quality Sampling	EcoRigs Water Quality Sampling
Non-NRDA Response	1019	Dispersant Reconnaissance Surveys	Dispersant Reconnaissance Surveys
Non-NRDA Response	1020	Deep Sea Sediments and Operational Annex	Deep Sea Sediments and Operational Annex
Non-NRDA Response	1022	Deepwater Dispersant Sampling Program	Deepwater Dispersant Sampling Program
Non-NRDA Response	1031	R/V Ferrel Sampling Transects	R/V *Ferrel* Sampling Transects
Non-NRDA Response	1035	Near Shore Water and Sediment	Near Shore Water and Sediments
Non-NRDA Response	1039	Special Request Turtle Mortality Investigation	Special Request Turtle Mortality Investigation
Non-NRDA Response	1050	Offshore Volatile Organic Compounds	Offshore Volatile Organic Compounds
Non-NRDA Response	1051	Near Field Water Sampling	Near Field Water Sampling

SRN: Study Reference Number

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Appendix B

Surrogate Correction Procedure

The analytical methodologies used to produce this dataset were generally consistent with the requirements specified in a document developed by the Trustees and BP to govern sample analysis known as the NRDA AQAP (NOAA 2012). Although the AQAP specifies adjustment to chemical concentration based on surrogate recovery (also known as surrogate correction), the Response Quality Assurance Project Plan (QAPP) (GCIMT 2011[16]) did not require this approach and the Response datasets were reported without this adjustment[17], as discussed below. To develop a response dataset that is consistent with the AQAP, and to provide consistent NRDA and BP Response datasets, the Response chemistry data included in this posting were adjusted for surrogate recoveries for PAH, SHC, and biomarker parameters.

Surrogates are chemicals added in known quantities to each sample in the laboratory to monitor how completely chemicals are extracted from the sample during analysis. Surrogate results are reported as percent recovery — the amount of surrogate recovered compared to the amount added to the sample. During sample handling, extraction, and other procedures performed in an analytical laboratory, it is possible that quantities of some analytes are lost or not completely extracted from the sample matrix, or that the sample measurement methodology otherwise systemically under- or overestimates analyte concentrations. As a result of these factors, the measured concentration of an analyte may not be perfectly representative of its concentration in the environment. Recovery of surrogate is determined by comparing the measured concentration of the surrogate to the quantity added to the sample. This result provides an indication of extraction efficiency and method performance. Measured concentrations of target analytes related to the surrogate can then be adjusted or "corrected" by the ratio of added surrogate to measured surrogate.

The utility of surrogate recovery is based on the theory that the surrogate behaves in a manner similar to target compounds. Ideally, surrogates are chemically similar to the compounds of interest such that the surrogates chemically mimic the target analytes but are compounds not found in nature. For example, surrogates are often deuterated forms of naturally-occurring target compounds. Differences between the surrogate and target compounds are a limitation of surrogate correction. As a result of this limitation, some sampling programs apply surrogate correction methodologies, while others do not. EPA methods and programs that call for the use of surrogates to monitor extraction efficiency do not require that measured concentrations be corrected for surrogate recovery.

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[16] GCIMT (Gulf Coast Incident Management Team). 2011. Deepwater Horizon Quality Assurance Project Plan for the BP MC252 Incident, Sample Management Group. BP-MC252-QAPP. Prepared by the Environmental Unit, Gulf Coast Incident Management Team, New Orleans, LA. May 18, 2011.

[17] Response data are publically available at NOAA's National Oceanographic Data Center (NODC) website and on the Operational Science Advisory Team (OSAT) website.

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The NRDA AQAP calls for surrogate correction to be performed by the analytical laboratories prior to data reporting. However, the QAPP governing Response sample analysis (GCIMT 2011) did not require surrogate correction. To promote consistency between these sample types, a surrogate corrected set of laboratory results has been developed for Response samples, after initial data reporting by the laboratories. The procedure used to accomplish surrogate correction is detailed below. In general, PAHs, SHC, TPH, and biomarker data were surrogate corrected. The AQAP did not specify surrogate correction for the following data types: volatiles (BTEX, PIANOs), MC252 control oil, detection limits, and laboratory quality control data.

Prior to beginning the surrogate correction process, a detailed protocol was developed that defined which chemicals would be surrogate corrected, the surrogates that should be applied to each chemical, the criteria for surrogate correction, and the QA/QC procedures that would be implemented to verify the data processing and resulting data. Table B-1 identifies the surrogates assigned based on the analytical laboratory for each Parameter Class.

Table B-1. Surrogates Applied to Parameter Classes

Parameter Type/Method	Battelle	Lancaster Laboratories, Inc.
Biomarkers/8270	5b(H)-Cholane	-
PAHs/8270	Naphthalene-d8 Acenaphthene-d10 Phenanthrene-d10 Benzo(a)pyrene-d12	Terphenyl-d14
SHC/8270	-	Terphenyl-d14
SHC and TPH/8015	o-Terphenyl	o-Terphenyl

Whenever possible, the same surrogates used to correct NRDA data were used for this Response data correction. For some biomarker analyses, appropriate surrogates were not spiked into the sample by the laboratory and, therefore, biomarker data for these samples were not surrogate corrected. Consistent with the AQAP, if any surrogate recovery in a sample was less than 10% or greater than 200% then the data were not surrogate corrected for sample analyses associated with these surrogate results (i.e., extracted on the same date using the same extraction method). Surrogate correction was accomplished using automated procedures and checks for traceability. The original concentration was divided by the surrogate recovery fraction to develop the surrogate-corrected concentration. MDL values associated with analytes that were not detected were not adjusted for surrogate recovery. Final concentrations were reported to the same number of significant figures as the original results. The laboratory, validation, and final qualifiers, and the MDLs and reporting limits were not altered during the surrogate correction process.

Rigorous QA/QC procedures were implemented to verify the correctness of the surrogate-adjusted data. The automated database processing procedures were verified prior to use. A pilot audit was conducted to verify that the database routines were producing accurate results. An audit of the full database of approximately one-half million data rows was conducted using a statistically derived random audit based on the Modified British Standard 6001. During

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the data audit, auditors generated independent results and compared them to the reported values. Data audits verified that only the chemicals meeting the chemical type and surrogate recovery range criteria were surrogate adjusted, that the assigned surrogate compounds were used to perform the adjustment, that data were reported to the appropriate number of significant figures, and that the final concentrations were accurate. In addition, data management tools were used to identify systematic process errors or anomalies. Throughout the audit, errors or anomalies were reported to the database team, investigated, and the database routines were revised. The revised database output was then verified to ensure that errors were resolved and no new errors were introduced in the process.

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Appendix C

Data Verification Procedure

Data verification personnel retained by BP have established a rigorous QA/QC data verification process to assess the completeness and correctness of field sample attributes. Field sample attributes, also known as field metadata, link chemical results to the specific sample collected at a specific date and location, and are used to accurately place samples in space and time. Field sample attributes verified in this process include sample location (latitude, longitude, and depth), sample collection date, and key sample data (sample material/matrix, sample type, and the unique sample identifier). Data verification procedures include comparison of field sample attributes in the BP database with those provided in NOAA's QM, and with reliable source documentation. Data verification is conducted by BP contractors who are QA professionals familiar with the BP Gulf of Mexico sampling program. To-date, this data verification process has identified inconsistencies that are believed to be related to transcription, transposition, and loading errors that can occur during the transfer of data from hand-written records or instrument files to spreadsheets and databases.

This data verification was conducted using automated comparisons of BP's database with NOAA's QM and field documentation for the following field sample attributes:

- Sampling date
- Upper and lower depth
- Latitude
- Longitude
- Sample material/matrix
- Sample type.

Using the comparison of the BP and QM databases to highlight differences that needed to be resolved, the data verification team established tolerances for the review process to focus data verification efforts on samples with potentially significant differences. Upper and lower sample collection depths were considered to be accurate if the results were within ±1 m for depths greater than 1 m and within ± 0.1 m for depths between 0–1 m of source documentation. Latitude and longitude were considered acceptable if values were within <0.0001 decimal degrees or <50 m of source documentation. When database differences were noted, comparisons with source documents were performed to determine accurate sample attributes. Source documents included field logs, datasheets, and/or chain-of-custody forms, where available. If source records were not available or in conclusive, the study work plan and subject matter experts were consulted to resolve apparent discrepancies. In addition to these comparisons, data management tools and geographic plots were used to identify potential errors and anomalies.

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The following 15 data quality objectives (DQOs) have been established under this process for data verification of field sample attributes:

1. The Survey/Study ID is complete for each sample
2. The Survey/Study ID is correct for each sample
3. The sample collection date is complete for each sample
4. The sample collection date is correct for each sample
5. Upper and lower sampling depth interval and units are complete for each sample
6. Upper and lower sampling depth interval and units are correct for each sample
7. Upper and lower sampling depth interval and units are within tolerance for each sample
8. Latitude and longitudes are complete for each sample
9. Latitude and longitudes are correct for each sample
10. Latitude and longitudes are within tolerance for each sample
11. Sample identifiers are correct for each sample
12. Sample identifier associations are correct for each sample
13. Sample material/matrix is complete for each sample
14. Sample material/matrix is correct for each sample
15. Sample type is correct in the database for each sample.

Study work plans were consulted during data verification to assess sample data in the context of the intended study area, scope, methods, and sampling design.

Data verification is an ongoing process and has not been completed for all posted data. The data verification status for each sample is noted in the data files in a field labeled "Field Data Verification Status" and is coded as "Not started," "Underway," or "Complete." "Complete" indicates that initial review has been completed, corrections have been made where possible, and remaining issues have been flagged for follow-up evaluation. The results of data verification process for each sample are noted in the data files in a field labeled "Field Data Verification Result." If the data verification status is "Not started" or "Underway", the data verification result is coded "Unassigned." When verification is complete, the verification result is reported as "Meets DQOs" or indicates which of the 15 DQOs could not be verified. Discrepancies found in the QM database are documented in the QM Notification (Errata Report) (see Version History). This report identifies the QM field at issue, the current and recommended revised value,

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justification for the change(s), and documents reviewed to support the recommended change(s). If QM is found to be in error, field sample attribute data included in BP's database are reported rather than data included in NOAA's QM.

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Appendix D

Data File Handling Suggestions

File Type and Size

A large volume of data is included in this publication in a single comma-separated value (CSV) file. In an effort to assist the user, software and file handling suggestions are presented below.

File Handling

The size of the data file(s) may be large so data users are urged to first save the file to their computer and then open using one of the options presented below. The CSV data files can be imported into Microsoft Excel or to a database program such as Microsoft SQL for use. Current versions of Excel have row limitations of 1.04 million rows per worksheet. In order to import directly into Excel, the data file will need to be split into manageable blocks prior to import. Alternatively, the Excel add-in "PowerPivot" can be used with Excel 2013 to import the data file without splitting. Tips for handling the CSV file using these software options are described below.

The steps are:

1. Save zip file to a local hard drive.
2. Open zip file from the hard drive.
3. Unzip and extract the files to a local hard drive.

Option 1: Split the CSV

Steps to split the CSV file for use with Spreadsheet Software

1. Determine the maximum number of rows supported by your version of Excel or other spreadsheet software.
2. Use a CSV Splitter to split the CSV file into smaller CSVs (ex. Free Huge CSV Splitter software is available at http://sourceforge.net/projects/splitcsv/).
3. CSV Splitter will produce multiple files with a sequential value appended to the end of the file name. Only the first file will contain the header row.
4. Open the first CSV file in Excel or other spreadsheet software.
5. Copy and paste the header row from the first CSV file into each of the other split CSV files.

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Option 2: Load to Database Server

Steps to import the CSV file to a Database Server (ex. Microsoft SQL)

1. Create an empty "Chemistry Data" table with the desired column types (in the zipped data file there is an example create table script for users with a database server such as SQL).
2. Import the CSV file using the SQL Import Wizard with a field DataType of string [DT_STR] (255) for all the columns to a new table. Tip: if you select multiple columns in the advanced dialog, you can change their width at the same time.
3. Insert into the "Chemistry Data" table all the rows from the imported table to covert the columns to the appropriate data types.

Option 3: Link CSV file to Microsoft Access database

Steps to link the CSV file to an Access database

1. Create and open a new blank database in Access
2. Select External Data>Text File (in Import & Link section)
3. Specify the CSV file as the data source and select the "Link to the data source by creating a linked table."
4. Select Next
5. Toggle "First Row Contains Field Names" and select Advanced options
6. Specify date order as "YMD" and update Data Types within the Field Information section.
7. Select OK and then finish
8. CSV file is now linked to Access database and can be queried.

Option 4: PowerPivot

Steps to load the CSV file to PowerPivot for Excel 2013

1. Activate the Add-in "PowerPivot" in Excel 2013.
2. Select PowerPivot > Data Model > Manage.
3. Select Get External Data > From Other Sources.
4. Select Text File, and then click Next.
5. Type in the File Path, and then click Finish.

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Appendix E

Data File Dictionary

The water chemistry data are published in a single comma-separated value (CSV) file for portability among data systems. Data file handling suggestions are provided in Appendix D to aid data users with importing this file into different software applications. The CSV file consists of a well-defined set of data columns. The following section describes the columns in the data file. The column name is shown as it appears in the first row of the CSV file, the description defines the values in that column, and the data type identifies whether the column contains text, a date, or a numeric value.

Analytical Chemistry for Field Samples

The following table describes the columns in the CSV file containing analytical chemistry data for field samples.

Column Name	Description	Data Type
Data Publication Date	Date associated with the current data posting date.	Date
Data Publication Reference	A general description of data provided in the data posting and a version control number.	Text
Study Reference Number	Study reference number (SRN) assigned by BP to provide a link between the data provided in the data file and the associated work plans and study descriptions provided on the Gulf Science Data website (gulfsciencedata.bp.com).	Text
Study Name	The study name used by the original investigator or by NOAA. Related studies are also grouped together under a single harmonized group study name (the next column). Some independent BP studies have only a single harmonized study name. This study name may be referenced by some documentation and other data systems.	Text
Harmonized Study Name	A BP assigned name to a group of related sample collection efforts to aid with organization of the data. This name is part of the primary key of this table and is used within other documents provided at gulfsciencedata.bp.com.	Text
Harmonized Cruise ID	A BP assigned name to a sampling cruise and coded as the name of the vessel, cruise sequence number, and date range of sample collection activities. This information is provided to aid with organization of the data and association of the chemistry data with other data types collected during each cruise.	Text
ASR Number	Analytical Request Form or Analytical Service Request number associated with dataset. Not all samples have an ASR or related number.	Text
Location or Station ID	A name given to the location where samples were collected. Many samples were collected opportunistically in the field, targeting observed or suspected oil presence, and the locations were not assigned a name. Therefore, not all samples have a location ID.	Text
Interpretive	The identifier given to represent a unique combination of location, date (and time) and depth.	Text

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Column Name	Description	Data Type
Sample ID	This identifier is part of the primary key of this table.	
Sample Date	The date on which the sample was collected.	Date
Sample Time	The time at which the sample was collected. Times were not recorded for all samples.	Time
Spatial Zone	Short coded descriptor to indicate general location of the samples. Seven zones have been assigned. Five zones are coded to capture water samples located within the state jurisdictional boundaries of Louisiana (LA), Alabama (AL), Mississippi (MS), Texas (TX) and Florida (FL). Two zones are coded to capture water sample located within the federal waters outside of the state jurisdictions. The code "Wellhead" is assigned to samples collected within a 10 nautical miles (nmi) radius of the DWH wellhead and the code "Federal" is assigned to samples collected beyond the 10 nmi radius.	Text
Latitude	The north latitude, in decimal degrees, where the sample was collected. This coordinate (with the corresponding longitude) may be either the specific location of the sample or the location assigned to the station where sampling was conducted. See the text for a discussion of sample coordinates and the selection of data from either the BP or Query Manager database systems.	Numeric
Longitude	The west longitude, in decimal degrees, where the sample was collected. See the description of the latitude column.	Numeric
Upper Depth	The upper depth of the sample in the water column.	Numeric
Lower Depth	The lower depth of the sample in the water column.	Numeric
Depth Unit	The units for sample upper and lower depths. Depth values for water samples are converted to meters as a rule.	Text
Field Fraction	Indicates whether the dissolved fraction, the particulate fraction, or the total sample was collected and submitted for analysis.	Text
Sample Type	Indicates whether the sample is a natural environmental sample, a field QC sample (i.e., a blank), or a lab QC sample.	Text
Field Matrix	The most general description of the substance collected and submitted for analysis.	Text
Field Sample Material	The most specific description of the substance collected and submitted for analysis. Only the matrix is reported for samples with attributes taken from Query Manager.	Text
Analytical Sample ID	The client sample identifier given to a portion of the interpretive sample, or to the whole interpretive sample, when submitted to a laboratory for analysis. There may be one or several analytical sample IDs for each interpretive sample ID.	Text
Lab	The laboratory generating analytical chemistry data for the sample.	Text
Laboratory Sample ID	The internal laboratory sample identifier for the sample.	Text
SDG	The Sample Delivery Group: an identifier for a batch of samples (typically 20 samples) that are simultaneously prepared, analyzed, and reported by the laboratory.	Text
Lab Matrix	The most general description of the substance, or fraction thereof that is analyzed.	Text
Lab Material	The most specific description of the substance, or fraction thereof that is analyzed.	Text
Parameter Type	The basic group to which the chemical belongs: PAH, SHC, TPH, PIANO, biomarkers, and others.	Text

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Column Name	Description	Data Type
Chemical Name	The name of the chemical analyzed. An effort has been made to harmonize the chemical naming conventions, where possible. During the ongoing QA process, this harmonization will be further refined and provided in subsequent versions of this database.	Text
Chemical Code	A standardized system-specific code to uniquely identify each chemical. Chemical codes are one-to-one homologous with chemical names.	Text
Chemical Type	Indicates whether the chemical is a target analyte or an added standard (e.g., surrogate).	Text
Concentration – NDs at MDLs	The reported concentration of the chemical in the sample, or the detection limit for non-detect results.	Numeric
Concentration – NDs at Zero	The reported concentration of the chemical in the sample, or a zero value for non-detect results.	Numeric
Unit	The units of the associated concentration value.	Text
Final Qualifiers	The data qualifiers that should be used with the concentration value for data analysis and interpretation. This column may contain a packed string of the qualifiers "U", "J", "R", "T", and "F", which are defined in the AQAP.	Text
Validation Qualifiers	Qualifiers applied by the data validation firm.	Text
Lab Qualifiers	The data qualifiers originally applied by the analytical laboratory.	Text
Nondetect Flag	Indicates whether or not the analyte was detected in a sample. This is equivalent to a final qualifier that includes "U".	Text
Field Data Verification Status	Summary of the field data verification process status described in Appendix B. Valid entries - Not started, Underway, and Complete.	Text
Field Data Verification Result	Summary of the field data verification process results as described in Appendix B for samples which have a field data verification status of "Complete".	Text
Validation Level	The type and amount of data validation performed; see the AQAP for a description of the validation levels used.	Text
Reporting Limit	The laboratory determined reporting limit associated with each chemical result.	Numeric
Method Detection Limit	The laboratory determined method detection limit associated with each chemical result.	Numeric
Measurement Basis	Indicates whether a concentration value is expressed in terms of the wet weight or dry weight of the environmental medium.	Text
Lab Fraction	Indicates whether the sample was filtered in the laboratory prior to analysis to obtain the dissolved fraction. This field does not capture information related to field filtration.	Text
Preparation Method	Method used to prepare the sample for analysis and as reported by the laboratory.	Text
Analytical Method	Method used to produce the measured concentration and as reported by the laboratory.	Text
Base Analytical	A generalization of the analytical method, standardized across laboratory-specific variations in	Text

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Column Name	Description	Data Type
Method	the specific analytical method to aid the data user with categorizing samples by analysis type.	
Lab Replicate	Code to distinguish multiple measurements when all other identifying attributes are identical	Text
Dilution Factor	The factor by which the sample was diluted for analysis.	Numeric
Date Extracted	The date that the sample was extracted at the laboratory	Date
Date Analyzed	The date that the sample was analyzed to produce the reported concentration.	Date

Valid Values

Most of the information in this data posting is presented in the form of valid values, which are standardized codes or descriptions. Exceptions include identifiers, dates, binary (Y/N) flags, and numeric values. The data posting format (described in the previous section) contains both the code and the full name for chemical parameters. The non-chemical valid values included in the data posting are listed in the following tables, along with definitions.

Depth Unit

Valid Value	Definition
m	Meter

Zone

Valid Value	Definition
AL	Alabama state zone
Federal	Federal zone
FL	Florida state zone
LA	Louisiana state zone
MS	Mississippi state zone
NA	Not within state, federal, or wellhead zones
TX	Texas state zone
Wellhead	Within 10 nmi of the MC252 wellhead

Field and Laboratory Fraction

Valid Value	Definition
Dissolved	Dissolved fraction

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Suspended particulate	Suspended particulate
Total	Total

Sample Type

Valid Value	Definition
Equipment blank	Equipment blank; to assess contamination from sampling or processing equipment and subsequent activities, such as shipping.
Field blank	Field blank, non-specific; to assess contamination from field sample handling and subsequent activities, such as shipping.
Field duplicate	Duplicate sample collected to assess sampling and analysis precision.
Natural sample	Normal environmental sample.
Rinsate blank	Rinsate water blank.
Trip blank	Trip blank; to assess contamination during shipping.

Field and Laboratory Sample Material

Valid Value	Definition
Deionized water	Deionized water used for field quality control samples
Filter from the Payne filtration method, 0.7 um fiberglass	Filter from the Payne filtration method, 0.7 um fiberglass
Filter (liquid)	Filter, reported in terms of the volume of water filtered
Filtrate from the Payne filtration method	Filtrate from the Payne filtration method
Ocean water	Marine water
Surface water	Surface water
Water	Water

Field and Laboratory Sample Matrix

Valid Value	Description
Liquid (non-specific)	Liquid
Solid (non-specific)	Solid
Water	Water
Water Filter (Solid Material used to filter Water)	Filter, reported in terms of the volume of water filtered

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Parameter Type

Valid Value	Description
Biomarker	Petroleum biomarker compounds
BTEX/PIANO	Benzene, toluene, ethylbenzene, xylenes, and paraffins, isoparaffins, aromatics, naphthalenes (cycloalkanes), and olefins
Other PAH	Other polycyclic aromatic hydrocarbon compounds
PAH/aPAH	Polycyclic aromatic hydrocarbons—parent and alkylated compounds
SHC	Saturated hydrocarbons
Surrogate	Surrogate compound added during laboratory analysis as a yield tracer
TPH	Total petroleum hydrocarbons including parameters reported as total extractable material [TEM] and total extractable hydrocarbon [TEH]
TSS	Total suspended solids

Concentration Unit

Valid Value	Description
pct	Percent
ug/L	Micrograms per liter

Measurement Basis

Valid Value	Description
WET	Wet basis

Base Analytical Method

Valid Value	Description
2540	Total solids
8015	Saturated hydrocarbons by GC/FID
8260	Volatile organic compounds by GC/MS
8270	Semi-volatile organic compounds by GC/MS

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Validation Level

Valid Value	Description
Validated Level1	A verification and validation based only on completeness and compliance of sample receipt condition checks.
Validated Level2a	A verification and validation based on completeness and compliance checks of sample receipt conditions and ONLY sample-related QC results.
Validated Level2b	A verification and validation based on completeness and compliance checks of sample receipt conditions and BOTH sample-related and instrument-related QC results.
Validated Level3	A verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, AND recalculation checks.
Validated Level4	A verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, recalculation checks, AND the review of actual instrument outputs.
Not validated	Not validated
Validation Level Unknown	Unknown level/stage of validation

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