

# **OIL AND GAS WELLS IN WASHINGTON STATE**

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Peter Goldmark - Commissioner of Public Lands

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## INTRODUCTION

The accompanying Microsoft Excel file contains location and other information about oil and gas well test sites in Washington State from 1890 to present. These data are also available in spatial (GIS) form through either our Washington State Geologic Information Portal at <http://www.dnr.wa.gov/geologyportal> or through our GIS data page at [http://www.dnr.wa.gov/ResearchScience/Topics/GeosciencesData/Pages/gis\\_data.aspx](http://www.dnr.wa.gov/ResearchScience/Topics/GeosciencesData/Pages/gis_data.aspx). These data will be regularly updated with every new version of the GIS data and are therefore subject to change without notice. These data are intended to update and correct data found within Information Circular 75 and its Addendum (McFarland, 1983a,b), but do not supersede them. Neither this document nor the tabular data contain maps showing locations of these wells.

There are two worksheets in this Excel file: *oil\_gas\_well\_data* and *scanned\_documents*. The former displays identification, location, and other specific information pertaining to each oil and gas well (see Table 1 for full list of attributes). The latter provides a descriptive inventory of documents pertaining to each well that were scanned (Table 2). Documents include many types of geophysical logs as well as permitting documents (documentation of oil and gas wells drilled after 1954 must be kept on file with the Washington State Department of Natural Resources). Examples of geophysical logs might include: gamma ray logs, electrical logs, and cement bond logs. Examples of permitting documents include: Oil and Gas Drilling Permit Application, Well Record and History, and driller's logs. This worksheet includes a hyperlink to each scanned document as well as other pertinent information, including log date, temperature, logged depth, and circulating fluid. The *scanned\_documents* worksheet is keyed to the *oil\_gas\_well\_data* worksheet through the *WA\_FILE\_NUMBER* column.

## DATASET CREATION METHOD

These data consist of recompiled information regarding oil and gas wells drilled in Washington State, both before and after the Oil and Gas Conservation Act of 1954 went into effect. Pursuant to this Act, (Chapter 146 [RCW 78.52.001 to 78.52.550]), hard copies of well records must be provided to and kept on file by the Washington State Department of Natural Resources (DNR). From these records, beginning in 1947, Information Circulars summarizing the wells were created (Livingston, 1958; McFarland, 1981; McFarland, 1983a,b). For most records, the location of the wells in the original hard-copy files is in the form of township, range, section, distance from the north or south section line, and distance from the east or west section line. For wells drilled prior to the Oil and Gas Conservation Act, that degree of detail is not available.

Well locations in spatial (GIS) datasets were originally created and attributed from information contained in these Information Circulars and addendums. Several different methods were used to generate these points. Some latitude/longitude coordinates were programmatically generated from township/section/range (TSR) coordinates, some were approximated using the centers of section divisions, and others were placed using distances from section lines provided in the Information Circulars. It was known that some of the well locations reported in the original dataset were in error for two reasons. Firstly, the spreadsheet data came from sources one or more iterations removed from the original data kept on file at the DNR. Consequently, typographic errors were found in the data, not only for location, but for other attributes. Secondly, the program used to generate the initial latitude-longitude locations did not yield locations as precise as the original file information would allow. Lack of precision, at times compounded with typographical errors in the original TSR data, created significant inaccuracies in well locations when compared to the locations generated from the original information recorded in the hard-copy files. Therefore, we reviewed the location information in the hard-copy files and corrected the TSR, within-section location data, and verified the accuracy of other related attribute information in the spreadsheet.

We also added information for wells that had been permitted under the Oil and Gas Conservation Act but were not drilled.

The spreadsheet with the corrected TSR and within-section information was used to adjust the locations generated initially from the inaccurate latitude and longitude information using GIS; new latitudes and longitudes were then calculated. Data were then exported back into Excel format for this publication.

## Geographic Coordinate System

*Projection:* Lambert Conformal Conic

*Coordinate system:* Washington State Plane

*Zone:* South (FIPS 4602)

*Datum:* NAD83 HARN

*Units:* Feet

*Spheroid:* Geodetic Reference System (GRS80)

## Using the Database

The data herein are provided in spreadsheet format, which may be used in Microsoft Excel; other spreadsheet software may also be able to use this file format. If you do not own software that can use this file, you may be able to use free software such as Open Office (<http://www.openoffice.org/>) to view this dataset.

A couple of tools available through Microsoft Excel are useful in classifying, viewing, and analyzing tabular data:

- Data filters enable the user to view only records containing or excluding user-defined attributes. To learn how to apply filters to data, go to: <http://office.microsoft.com/en-us/excel-help/filter-data-in-a-range-or-table-HP010073941.aspx>.
- Sorting can allow the user a better understanding of the data as well, while maintaining visibility of all records. To learn more about sorting, go to: <http://office.microsoft.com/en-us/excel-help/sort-data-in-a-range-or-table-HP010073947.aspx>.

## ATTRIBUTE DEFINITIONS

The definitions for attributes in the *oil\_gas\_well\_data* and *scanned\_documents* worksheets are shown in Tables 1 and 2, respectively.

**Table 1.** Attribute definitions for the *oil\_gas\_well\_data* worksheet.

| Attribute Name      | Description  |
|---------------------|--|
| OIL_GAS_ID          | Unique numerical identifier  |
| API_NUMBER          | American Petroleum Institute's nationwide system for identifying all oil and gas wells in the country  |
| WA_FILE_NUMBER      | Internal Washington Division of Geology and Earth Resources file number  |
| WELL_NAME           | Name given to well, if any   |
| ALTERNATE_NAMES     | Alternate names give to well, if any   |
| COMPANY_NAME        | The person or company, either proprietor or lessee, actually operating a well or lease, generally the oil or gas company that engages the drilling, service, and work of contractors |
| COUNTY_NAME         | The county in which the site is located  |
| ELEVATION_REFERENCE | Point of reference used to determine elevation   |
| ELEVATION_FEET      | Elevation of the well in feet; a value of -9999 indicates no data  |
| DEPTH_FEET          | Total drilled depth measured in feet; a value of -9999 represents a lack of data   |
| PERMIT_DATE         | Date permit was issued   |
| DRILL_START_DATE    | Date drilling started; also known as the spud date   |
| DATE_COMMENTS       | General information about the drill start date   |
| DRILL_STOP_DATE     | Date drilling ended  |

| Attribute Name            | Description  |
|---------------------------|--|
| HYDROCARBON_SHOW          | Whether oil and/or gas were found in the well  |
| LATITUDE_DECIMAL_DEGREES  | Latitude (north/south) coordinate; positive values indicate north latitudes  |
| LONGITUDE_DECIMAL_DEGREES | Longitude (east/west) coordinate; negative longitudes indicate west longitudes   |
| TOWNSHIP                  | Township coordinate  |
| RANGE                     | Range coordinate   |
| SECTION                   | Section coordinate   |
| LOCATION_DESCRIPTION      | Textual description of site location as recorded in the permit files   |
| WELL_STATUS               | Status of the well   |
| ARCHIVED_SAMPLES          | Identifies cuttings and core sampled from borehole during drilling and stored at a Washington Division of Geology and Earth Resources storage facility |
| SCANNED_DOCUMENTS_FLAG    | Indicates the availability of scanned documents pertaining to the permitted borehole, either geophysical logs or permit documents                      |
| PERMIT_FLAG               | Indicates whether or not the borehole was permitted by the Washington State Department of Natural Resources, Division of Geology and Earth Resources   |
| COMMENTS                  | Other pertinent information for wells  |

**Table 2.** Attribute definitions for the *scanned\_documents* worksheet.

| Attribute Name         | Description  |
|------------------------|--|
| LOG_ID_NUMBER          | Identification number of the scanned document  |
| WA_FILE_NUMBER         | Unique identification number of the oil and gas well location used to link the <i>scanned_documents</i> worksheet to the <i>oil_gas_well_data</i> worksheet  |
| FILE_NAME              | Name of scanned file   |
| LOG_TYPE_CODE          | Code indicating the type of document represented by scanned file; codes are defined within the LOG_TYPE field  |
| LOG_TYPE               | Text description of type of document represented by scanned file   |
| DEPTH_DATUM            | Reference point used by geophysical logging company from which logs depths are measured  |
| LOG_START_DEPTH_FEET   | Highest logged level in borehole, in feet  |
| LOG_END_DEPTH_FEET     | Lowest logged level in borehole, in feet   |
| TEMPERATURE_FAHRENHEIT | Temperature in degrees Fahrenheit recorded on the geophysical log within the logged interval. Note that in the case of multiple runs displayed on a single log, the latest (most recent) recorded temperature was reported   |
| TEMPERATURE_TYPE       | Indicates type of temperature recorded; MAX = maximum recorded temperature measured within logged interval; BHT = Temperature recorded at or near the bottom of the drilled interval; this value is temporally sensitive, and may be reported numerous times before drilling is complete. BHCT = Bottom-hole circulating temperature; the temperature at or near the bottom of the borehole after fluid has been circulating for several hours. Where temperatures are recorded numerous times on the same log, the latest temperature was taken |
| TIME_SINCE_CIRC_HRS    | Duration of time in hours between the end of fluid circulation and geophysical logging   |
| FLUID_TYPE             | Fluid in borehole at the time of logging; no effort was made to interpret what was meant by the fluid type recorded on the logs, such that abbreviations and shorthand were maintained from the scanned documents for this attribute   |
| LOG_DATE               | Date of geophysical logging; note that in the case of multiple runs reported on one log having more than one date, the latest (most recent) date was reported  |
| COMMENTS               | Additional description of contents of scanned documents, such as additional measured parameters, run number, or indication of a composite log  |
| DOCUMENT_URL           | Hyperlink to scanned document  |

## ATTACHED DOCUMENTS

Geophysical logs in the original hard-copy files were inventoried in the *scanned\_documents* worksheet, linked by WA\_FILE\_NUMBER to the *oil\_gas\_well\_data* worksheet, and scanned using dedicated log-scanning equipment. Pertinent information regarding each document was recorded into the Excel spreadsheet along with the resulting PDF-format file name. In addition, permitting documents were also scanned and inventoried using a standard letter scanner. In general, with few exceptions, documents were scanned at a resolution of 300 ppi. These logs and permitting documents are not included within this publication; they are instead accessed online through links provided in the spreadsheet.

## REFERENCES CITED

- Livingston, V. E., Jr., 1958, Oil and gas exploration in Washington, 1900-1957: Washington Division of Mines and Geology Information Circular 29, 61 p., 1 plate.
- McFarland, C. R., 1981, Oil and gas exploration in Washington, 1900-1981: Washington Division of Geology and Earth Resources Information Circular 67R, 119 p.
- McFarland, C. R., 1983a, Oil and gas exploration in Washington, 1900-1982: Washington Division of Geology and Earth Resources Information Circular 75, 119 p.
- McFarland, C. R., 1983b, Oil and gas exploration in Washington, 1900-1982—Addendum, 1982-2009: Washington Division of Geology and Earth Resources Information Circular 75.

