Appendix E: Data Summary and Geospatial Databases

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E.1.0 Introduction

NUREG-2117 (NRC, 2012) describes the importance of the TI Team's documentation of the data considered and used and how the data were implemented in the development of the SSC model. An example project that includes the appropriate type of documentation is the seismic source characterization project for the central and eastern United States (CEUS SSC; EPRI, 2012). Documentation for this project included Data Summary tables that documented all data considered by the TI Team, and Data Evaluation tables that documented the TI Team's assessment of the data and its use in the CEUS SSC model (NRC, 2012). Similar documentation, as well as a geospatial database (including legacy geophysical survey datasets) and documentation of newly collected but unpublished data were established to support the development of the Diablo Canyon SSC model. In this appendix, we describe the Data Summary tables (*Section E.2.0*), the GIS geospatial database (*Section E.3.0*), and unpublished data collected at the Memorial Park surface (*Section E.4.0*). The Data Summary tables document the written references and datasets considered by the SSC TI Team, and show how they were used in building the SSC model. The GIS geospatial database contains the geospatial information considered by the SSC TI Team in building the SSC model. The unpublished data collected at the Memorial Park surface includes a description of soil profile development, which was used to support the characterization of the Los Osos fault. The Data Summary tables, summary tables describing the contents of the GIS geospatial database, summary tables of legacy geophysical survey datasets, and a soil profile description at the Memorial Park surface are included in this appendix as *Attachments E-1, E-2, E-3,* and *E-4*, respectively.

E.2.0 Data Summary Tables

References evaluated throughout the building of the SSC model were recorded in a reference library (*Attachment E-1*). Reference evaluations were documented and compiled in a Microsoft Access database. Documentation for each reference includes bibliographic information, check boxes for relevant seismic source model components and faults, and brief descriptions of the reference and its relevance to the SSC model. Components of the seismic source model listed as check boxes include: Seismotectonic Setting, Fault Geometry Model, Fault Slip Rate Model, Rupture Model, Magnitude Distribution Model, and Time Dependency Model. A check box for "Other" references (e.g., a reference that describes the SSHAC methodology) is included as well as a "None" box, which documents that a reference was reviewed but did not contribute to the SSC model. Faults listed as check boxes include: the Hosgri fault, Los Osos fault, Wilmar Avenue fault, San Luis Bay fault zone, Shoreline fault, and the San Miguelito fault. Additional check boxes include All Faults, and Tectonic Setting. In total, 999 references were evaluated, and 313 were directly used and cited in the SSC model and report. Table E-1 provides a summary of the number of references considered in the SSC model by source model component and by fault.

Table E-1. Summary of References Considered in the SSC Model

Relevance	Number Considered
Relevant Seismic Source Model Component	
Seismotectonic Setting	267
Fault Geometry Model	394
Fault Slip Rate Model	180
Rupture Model	149
Magnitude Distribution Model	172
Time Dependency Model	164
Other	84
Relevant Fault	
Hosgri fault	211
Los Osos fault	125
Wilmar Avenue fault	62
San Luis Bay fault zone	72
Shoreline fault	68
San Miguelito fault	32
Other regional faults	347
All faults	250
Tectonic setting	54

E.3.0 GIS Geospatial Database

The purpose of compiling the DCPP SSC GIS geospatial database is to store, organize and document spatial data and resources that have been collected for the SSC TI Team analyses. This database also contains several additional datasets that were inherited from the Long Term Seismic Hazard Program activities such as the Shoreline fault study (PG&E, 2011).

The database contains several types of spatial datasets such as geologic maps, seismic reflection surveys, aerial images, digital elevation models and geophysical datasets that are in various file formats. Due to the complexity, variety, and richness of the data, all datasets are stored in their native file formats in an organized folder structure that is easily accessible from multiple software applications such as ESRI ArcGIS, IHS Kingdom, Global Mapper and ERDAS Imagine. This approach allows efficient data maintenance, version control, documentation, backup, and sharing of the data. It also avoids any loss of resolution that would likely result from changing the file formats. The database currently contains over four terabytes of information.

Figure E-1 illustrates the top two tiers of the folder structures. A complete list of folders that describe the database file structure and short descriptions of what is included in each folder are documented in *Attachment E-2*. Project Data Summary Sheets containing detailed information about each dataset are stored in the original data folders. The folders also include the original data reports, metafiles and/or data transmittal letters where available.

E.3.1 Legacy Geophysical Survey Datasets

The geospatial database includes various legacy geophysical survey datasets that were compiled prior to this study. As described in *Section 4.2.4*, in the late 1980s, PG&E commissioned a multichannel seismic-reflection survey and purchased additional exploration survey seismic-reflection profiles in approximately the same area from north of the Piedras Blancas anticlinorium to south of the DCPP. These data were included in the documentation for the original LTSP study (PG&E, 1988, 1990) and many were included and considered in Willingham et al. (2013) and other recent offshore mapping and interpretation studies (e.g., PG&E 2014, Chapters 2 and 3). This “legacy” database has been supplemented with more recently acquired data (e.g., the 3D/2D low-energy, high-resolution seismic-reflection survey in the Point Buchon study area, collected in 2010 and 2011; *Section 4.3.1.1*). The legacy marine and onshore surveys included in the geospatial database are documented in *Attachment E-3*. For each legacy geophysical survey dataset, *Attachment E-3* includes: survey name and line number designations, navigation data shapefile name, acquisition contractor, client or owner, survey date, survey length, primary energy source, CDP fold or channels, record length, PG&E record type, general survey area, and comments on the survey.

E.4.0 New Data Collected at the Memorial Park Surface

A geomorphic surface within Los Osos Valley, informally named the Memorial Park surface (MPS), was evaluated for this study (*Section 8.2.2.3*). The deposits associated with the MPS were mapped as Paso Robles Formation by Hall (1973) and as fluvial gravels overlain by aeolian sands by Lettis and Hall (1994). This surface crosses the surface projection of the Los Osos fault outboard of the northern range front of the Irish Hills (Figure 8-11 of the report). As described in *Section 8.2.2.3*, this surface was used to constrain the SSC model in two ways:

- Evaluate the uplift rate of the Los Osos Valley, and hence, the vertical separation rate of the Los Osos fault.
- Establish that the Los Osos fault is blind.

Members of the TI Team performed field work to evaluate the likely age and depositional/ erosional history of this surface. A soil profile development description in a road-cut along Los Osos Valley Road near the eastern margin of the Memorial Park terrace (Location –SP1 on Figure 8-11) was completed by John Caskey and Aileen Chea and described in *Section 8.2.2.3*. This description of the soil profile is documented in *Attachment E-4* because it has not been included in any other published or unpublished report. This description includes: horizon and lower boundary characterization, depth, thickness, color, texture, structure, consistency, clay films, percentages of sand, silt, and clay, parent sediment, and additional notes describing horizons.

E.5.0 References

Electric Power Research Institute (EPRI), U.S. Department of Energy, and U.S. Nuclear Regulatory Commission, 2012. *Central and Eastern United States (CEUS) Seismic Source Characterization for Nuclear Facilities*, EPRI Report 1021097/ DOE/NE-0140/.

Hall, C.A., Jr., 1973. Geologic map of the Morro Bay South and Port San Luis quadrangles, San Luis Obispo County, California, U.S. Geological Survey Miscellaneous Field Studies Map MF-511, scale 1:24,000.

Lettis, W.R., and Hall, N.T., 1994. Los Osos fault zone, San Luis Obispo County, California: in Alterman, I.B., McMullen, R.B., Cluff, L.S., and Slemmons, D.B. (editors), Seismotectonics of the Central California Coast Ranges, *Geological Society of America Special Paper* 292, pp. 73–102.

Pacific Gas and Electric Company (PG&E), 1988. Final Report of the Diablo Canyon Long Term Seismic Program, Diablo Canyon Power Plant, U.S. Nuclear Regulatory Commission Docket Nos. 50-275 and 50-323.

Pacific Gas and Electric Company (PG&E), 1990. Montage of geophysical data and interpretations, Hosgri fault zone, eastern offshore Santa Maria Basin data base, interpretational procedures, and key observations: Response to Nuclear Regulatory Commission question GSG-01A, Diablo Canyon Power Plant Long Term Seismic Program, Docket Nos. 50-275 and 50-323.Pacific Gas and Electric Company (PG&E), 2011. Report on the Analysis of the Shoreline Fault Zone, Central Coastal California, report to the U.S. Nuclear Regulatory Commission, January; www.pge.com/myhome/edusafety/systemworks/dcpp/shorelinereport/.

Pacific Gas and Electric Company (PG&E), 2014. Chapter 2: *DCPP 3D/2D Seismic-Reflection Investigation of Structures Associated with the Northern Shoreline Seismicity Sublineament of the Point Buchon Region*, PG&E Technical Report GEO.DCPP.TR.12.01, 53 pages, 3 plates, and 1 appendix: in *Central Coastal California Seismic Imaging Project*, report to the California Public Utilities Commission; available at www.pge.com/en/safety/systemworks/dcpp/seismicsafety/report.page.

Pacific Gas and Electric Company (PG&E), 2014. Chapter 3: *Offshore Low-Energy Seismic-Reflection Studies in Estero Bay, San Luis Obispo Bay, and Point Sal Areas*, PG&E Technical Report GEO.DCPP.TR.14.02, 178 pages, 8 plates, and 1 appendix: in *Central Coastal California Seismic Imaging Project*, report to the California Public Utilities Commission; available at www.pge.com/en/safety/systemworks/dcpp/seismicsafety/report.page.U.S. Nuclear Regulatory Commission. 2012. Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies. NUREG-2117, U.S. Nuclear Regulatory Commission, Washington, DC.

Willingham, C.R., Rietman, J.D., Heck, R.G., and Lettis, W.R., 2013. Characterization of the Hosgri Fault Zone and adjacent structures in the offshore Santa Maria Basin, south-central California: in Keller, M.A. (editor), *Evolution of Sedimentary Basins/Onshore Oil and Gas Investigations—Santa Maria Province*, U.S. Geological Survey Bulletin 1995-CC, 105 pp.

Non-QA Datasets: Data sets that are collected and or published without NQA program

- Aerial_imagery .... *Aerial imagery data*
- DEMs................................ *Digital elevation, LiDAR, Multibeam bathymetry data*
- EQ_catalogs .... *Earthquake catalogs*
- Geographic_features .... *Geographic features, base maps*
- Geology_maps .... *Geology maps*
- Geophysical_data............. *Geophysical data*
- GPS .... *GPS data sets*
- Habitat_maps .... *Habitat maps*
- Hazard .... *Hazard input files*
- LTSP_Archive.................... *LTSP data sets*
- Other_data .... *Other data sets*
- Seismic_Reflection .... *Seismic reflection data*
- Seismic_Stations .... *Seismic stations data*
- Wells_and_Borings............ *Wells and borings*

QA Datasets: Data sets that are produced or verified using PG&E NQA program

- Elevation_data................... *Validated LiDAR data*
- Geology_maps .... *Geology maps*
- Seismic_Reflection .... *Seismic reflection data*

EXT: External drives storing large data sets, such as SSC Workshop video archives, final deliverables of LiDAR surveys etc.

Illustration of the Top Two Tiers of the Geospatial Database Folder Structure

DCPP SSC REPORT

Pacific Gas and Electric Company | Figure **E-1**

File path: S:\1005\GIS\00 database index\Figure_E-01.ai; Date: 01/28/2015; User: Serkan Bozkurt, LCI; Rev.1