

PMTurkeyCOLPEm Resource

From: Franzone, Steve <Steve.Franzone@fpl.com>
Sent: Tuesday, July 26, 2016 12:23 PM
To: Comar, Manny
Cc: TurkeyCOL Resource; Maher, William; Burski, Raymond
Subject: [External_Sender] Chapter 2 ASER
Attachments: Page_402_fromChapter02_ASER.pdf

Manny

During our proprietary review of the Ch. 2 ASER, we had one comment which may need clarification:

The following highlighted statement was found on Page 402 of 458 (of PDF).

"...The applicant conducted microgravity surveys to develop profiles that identify lateral variation in subsurface density. The applicant measured each station along 11 survey lines as part of the microgravity survey, excluding an existing data gap between stations 500 through 640 along line 2. The applicant indicated that the data gap is due to localized flooding. The applicant detected an isolated spherical void 7.6 m (25 ft) in diameter centered within the Key Largo Limestone formation at a depth of 12.2 m (40 ft)."

This statement does not agree with the FSAR (page 2.5.4-59), which states the following in relation to the microgravity:

"...The magnitude of gravity anomalies at the site is dependent on the depth, size, and density contrast of a subsurface feature. Subsurface density variations must be large enough or shallow enough to produce an anomaly above the noise threshold. With repeated measurements at 22 percent (135) of the stations at the site showing an average deviation of approximately ± 3 microgals (μGals), anomalies ≥ 10 μGals should be routinely detectable. Figure 2.5.4-224 shows the magnitude of a low gravity anomaly as a function of depth for the case of various size water-filled spherical cavities in limestone. Figure 2.5.4-224 also illustrates what the measured gravity anomaly would look like for selected diameters and depths. As the figure shows, an isolated spherical void 25 feet in diameter or larger would theoretically be detectable if centered within the Key Largo Limestone at a depth of 40 feet."

Conclusions of the geophysical testing as stated in FSAR (page 2.5.4-65) is as follows:

"...Based on geophysical site characterization data (References 286 and 320), and drilling observations as outlined in Subsection 2.5.4.1.2.1, there is no apparent indication that sinkhole hazards exist at the site. There is also no apparent evidence for the presence of underground openings within the survey area that could result in surface collapse. Large low gravity anomalies with magnitudes less than -30 μGals are only detected outside the power block areas, primarily in areas associated with surface depressions containing vegetation. Once the effects of variations in muck thickness are removed from the residual gravity data, all the remaining low gravity anomalies can be explained by density variations within the Miami Limestone. The results of the drilling program and borehole geophysical data (Subsections 2.5.1.2.4 and 2.5.4.1.2.1) indicate the existence of two preferential secondary porosity flow zones. The extent of rod drops integrated with the field geophysical data supports the interpretation that large voids are absent beneath the footprints of the Units 6 & 7 nuclear islands."

Please note that we are not necessarily relying on findings from geophysical tests, and we will be conducting a grouting program to address any potential voids, though there is no evidence for it.

If further clarification is required, please let me know.

Thanks

Steve Franzone

NNP Licensing Manager - COLA

“For all things difficult to acquire, the intelligent man works with perseverance.” ~ Lao Tzu

561.904.3793 (office)

754.204.5996 (cell)

“This transmission is intended to be delivered only to the named addressee(s) and may contain information that is confidential and /or legally privileged. If this information is received by anyone other than the named addressee(s), the recipient should immediately notify the sender by E-MAIL and by telephone (561.904.3793) and permanently delete the original and any copy, including printout of the information. In no event shall this material be read, used, copied, reproduced, stored or retained by anyone other than the named addressee(s), except with the express consent of the sender or the named addressee(s).

Hearing Identifier: TurkeyPoint_COL_Public
Email Number: 1214

Mail Envelope Properties (DEC707C5CF603B4AA6194131A65C7C525AD79F22)

Subject: [External_Sender] Chapter 2 ASER
Sent Date: 7/26/2016 12:22:38 PM
Received Date: 7/26/2016 12:22:46 PM
From: Franzone, Steve

Created By: Steve.Franzone@fpl.com

Recipients:

"TurkeyCOL Resource" <TurkeyCOL.Resource@nrc.gov>
Tracking Status: None
"Maher, William" <William.Maher@fpl.com>
Tracking Status: None
"Burski, Raymond" <RAYMOND.BURSKI@fpl.com>
Tracking Status: None
"Comar, Manny" <Manny.Comar@nrc.gov>
Tracking Status: None

Post Office: GOXSA1810.fplu.fpl.com

Files	Size	Date & Time
MESSAGE	4114	7/26/2016 12:22:46 PM
Page_402_fromChapter02_ASER.pdf		355507

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

applicant measured borehole wall features using a high resolution acoustic televiwer probe that produces images of the boring wall based on the amplitude and travel time of an ultrasonic beam reflected from the formation wall. The applicant found many borings exhibiting zebra striping caused by rapidly reaming down the boring with new core bits, which may conceal small dikes but does not conceal fractures. The applicant stated that it did not observe any large vugs or cavities in the logs.

The applicant used the suspension logging results summarized in Turkey Point Units 6 and 7 COL FSAR Table 2.5.4-215 to develop the V_s profiles shown in Turkey Point Units 6 and 7 COL FSAR Figure 2.5.4-220. The applicant collected the Turkey Point Unit 6 data to a depth of 137.2m (450 ft), and the Turkey Point Unit 7 V_s data to a depth of 182.9 m (600 ft).

Geophysical Exploration for Possible Dissolution Features

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5 describes the geophysical survey conducted to evaluate the potential for carbonate dissolution features at the site. The applicant applied three non-invasive geophysical techniques including: microgravity, seismic refraction and Multi-channel Analysis of Surfaces Waves (MASW).

The applicant conducted microgravity surveys to develop profiles that identify lateral variation in subsurface density. The applicant measured each station along 11 survey lines as part of the microgravity survey, excluding an existing data gap between stations 500 through 640 along line 2. The applicant indicated that the data gap is due to localized flooding. **The applicant detected an isolated spherical void 7.6 m (25 ft) in diameter centered within the Key Largo Limestone formation at a depth of 12.2 m (40 ft).**

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.2 describes the seismic refraction survey encompassing twenty-three arrays and covering a total length of 70.1 m (230 ft). The applicant developed two-dimensional cross sections using a modeled average V_p for the contact between the muck and Miami Limestone of 1,305 m/s (4,280 fps) and between the Miami Limestone and Key Largo Limestone of 2,917 m/s (9,570 fps). The applicant used a vertical resolution of 20 percent and a lateral resolution of 6.1 m (20 ft).

Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.3 describes the MASW survey as one producing Rayleigh surface waves. Rayleigh surface waves are produced by the interaction of V_p and V_s waves with the earth's surface, which involves both vertical and horizontal particle motion. The applicant collected data along each of the eleven survey lines, excluding the existing data gap between station 460 and 640 along line 2. The applicant developed two-dimensional cross sections using a modeled average P-wave velocity for the contact between the muck and Miami Limestone of 134 m/s (440 fps) and between the Miami Limestone and Key Largo Limestone of 1,116 m/s (3,660 fps). The applicant concluded that the MASW surveys are not accurate at capturing the absolute V_s of the rock, but velocity models are accurate to within 15 percent compared to the borehole measurements.

In Turkey Point Units 6 and 7 COL FSAR Section 2.5.4.4.5.4, the applicant indicated that the three largest low gravity anomalies are centered on the surface depressions containing vegetation outside the Units 6 and 7 power block areas. The applicant concluded that the low density measurements are associated with the presence of peat in shallower depressions and density variations within more weathered Miami Limestone. The applicant also concluded that