

STUDY OF THE LOW VELOCITY ZONES IN THE TERRITORY OF GOBU REGION (AN EXAMPLE OF THE GOBU POWER STATION)

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The territory of Gobu is located in the south-western part of the Western-Absheron anticlinorium and there are small mountain range in the east-west - north-south direction, here. There are numerous cones of the mud volcanoes in the hills of this area. The absolute height of the area varies between 120-160 meters and there is the tendency to gradual grounding in the south-west direction.

Territory of “Gobu” Electric Station located approximately 2.5-3 km from Gobu-Bozdagh mud volcano and about 6 km from Guzdek-Bozdagh mud volcano is the research area. Although mud mass erupting out of the both volcanoes are less likely to reach to the living area, the Gobu-Bozdagh mud volcano generates the shakes always noticeable with dynamic activity and seismological signs and it caused serious damage in nearby houses.

The above-mentioned are the indications of complex seismological conditions of the “Gobu” Electric Station area and its dynamic activity.

This volcano erupted in 1827, then in 1974 and last time in 1999 year. When the volcano erupted, the flame height was 400 meters, and the temperature was more than 1,000 degrees. At the same time, 300,000 thousand cubic meters of volcanic mud have been erupted and spread around. The central part of the volcano’s crater rose to 6-7 m height and many broken blocks have been formed there during the last eruption of this volcano in 1999 year. As the result of this, the large cracks that depth is 2 m up to Hokmeli region and approximately 1200 m length have been formed.



Figure 1. Relief changes in the western-Sonali residential area from the Gobu-Bozdagh volcano

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Figure 2. The crater of the Gobu-Bozdagh volcano

In the area where the “Gobu” electric station considered to be built in Gobu region, part of the transect up to 10.0 m depth consists of the sediments of Paleogene Koun floor (P2k) based on the materials of previous geological and engineer-geological researches. These sediments involves to surface in the research area and consist of clays in terms of lithology. There are sandstones, schists and occasionally marl gasket in these sediments. The layer of soil-plant which thickness is 0.1-0.3 meters is observed above the sediment of the Koun floor.

As mentioned above, the Gobu area is an area characterized by complex geological features. Therefore, the research of small velocity zones during the construction-designing works in these areas is very important. For the purpose of research a small velocity zone of this area, the “Broken Microtremor” (Broken Microseisms) method of seismic exploration have been used (Loui, 2001). This method is considered to be a profitable seismic method to establish a wide wave profile in the research area in terms of substance and finance. Conducting such research will provide useful seismic data in the areas of noisy urbanization. The phase data of wave area mentioned in the “Broken Microtremor” (broken microseisms) is used.

The GEODE-24 engineering-seismic station, 24 seismic receiver for record the signals, seismic exploration wire with 115 meter and hammer with 11 kg have been used for the purpose of research of broken microseisms. Seismic source is the microshakes created by noise from the environment and shake method.

In the area where the substation to be built, 18 seismic profiles have been established (preliminary materials of profile № 15 were unsatisfactory) and total amount of done works are 1955 linear meter.

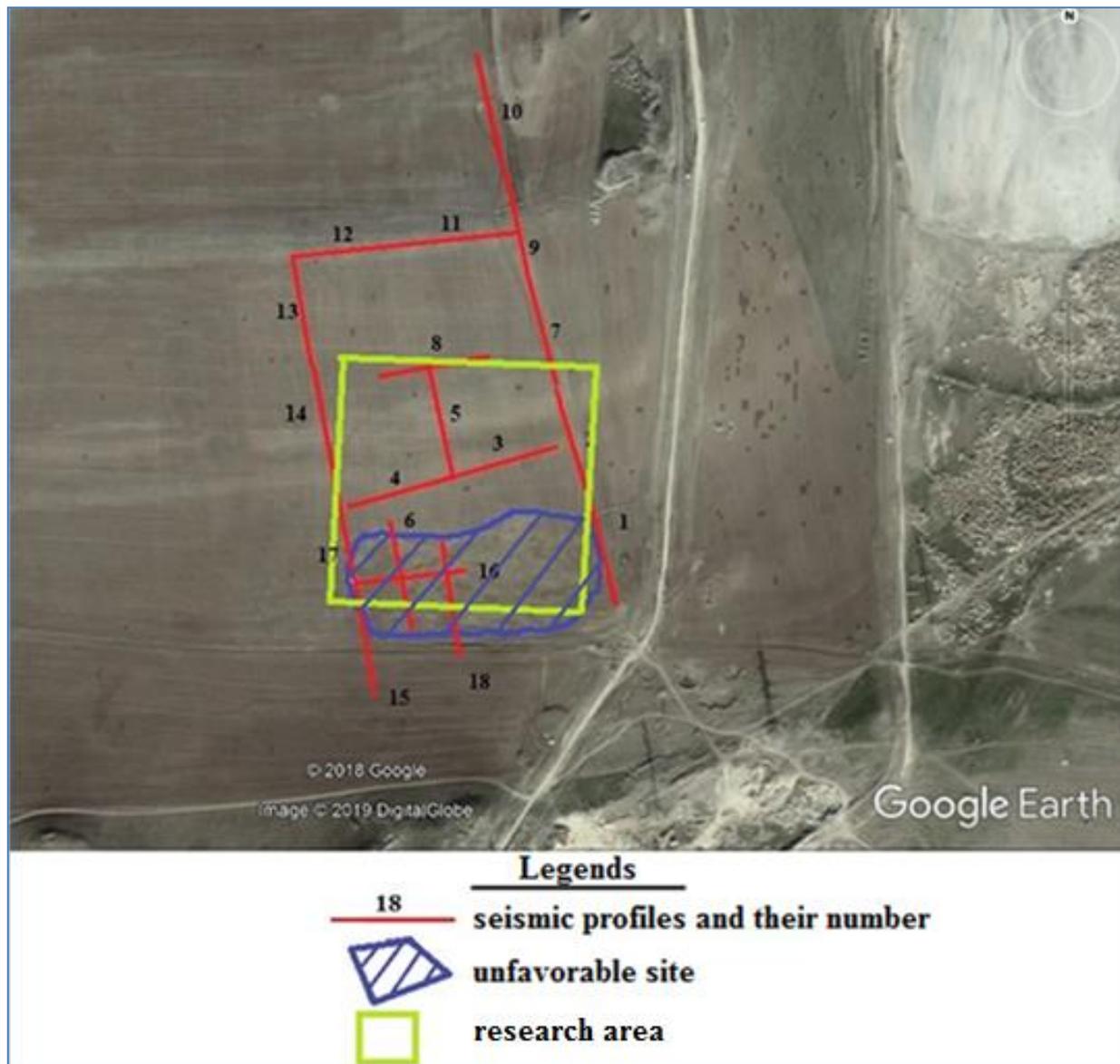


Figure 3. Geometric dimensions of the research area (250 x250 m) and the location scheme of the seismic profiles in the site

Based on the obtained materials, there is a tectonic disturbance in the south of the “Gobu” Electric Station with 385 MVt to be built in Gobu district (I.A. Israfilbeyov and V.A.Listerengarten. Hydrological and Engineering Geology methods in the Absheron peninsula. Album of the Hydrogeological and Engineering Geological Map of the Absheron Peninsula M 1: 50000, General Directorate of Geodesy and Cartography of the Council of Ministers of the USSR, M.: 1983, s. 23-70).

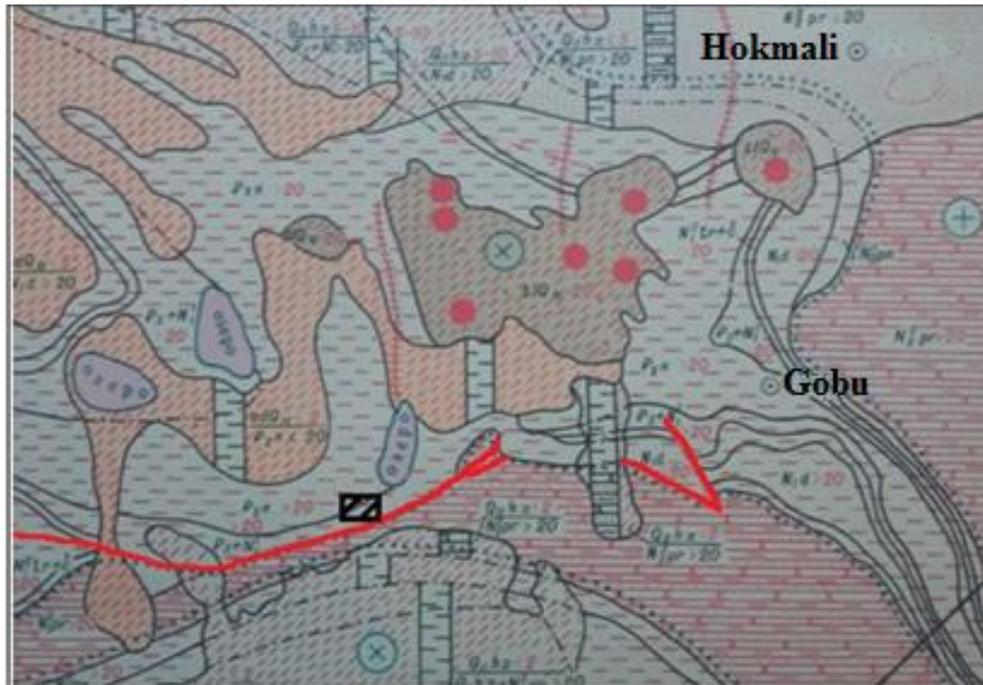


Figure 4. Engineering geology map of the area (authors: İ.A.İsrafilbeyov and V.A.Listengarten).



Figure 5. Geological transect and slope of the layers in the north-eastern, edge part of the field (shell, sandy clay rocks).



Figure 6. Damage caused by volcanic eruptions on a farm near the foot of the Gobu-Bozdagh volcano.



Figure 7. During the field work.

As a result of initial visual observation, it is determined that the one part of the research was inconvenient (sedimentary) from the point of view of construction (26000 m² area).

Layers with the low wave speed (235-586 m/s) have been identified at a depth of about 6.5-12.0 m from the surface and respectively 28-78.5 m. at depths in the transect of the 1; 4-7; 9-11; 13; 17 and 18 numbered profiles (these values are lower than others in the 1-8, 13, 16 and 18 numbered profiles).

Layers with lower wave velocities are known to be unfavorable ground from a seismic point of view. In this regard, it is important to implement additional engineer researches in the area.

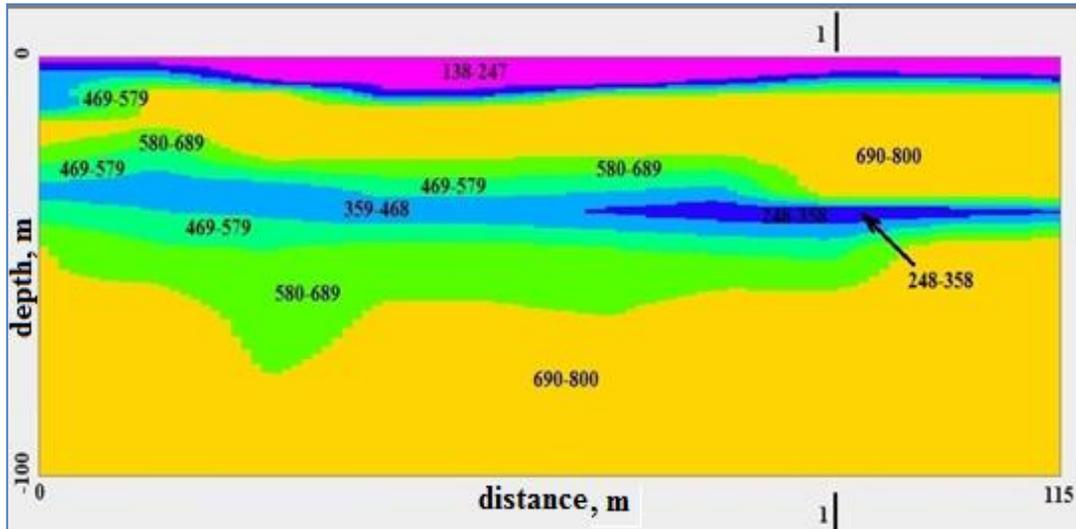


Figure 8. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 1.

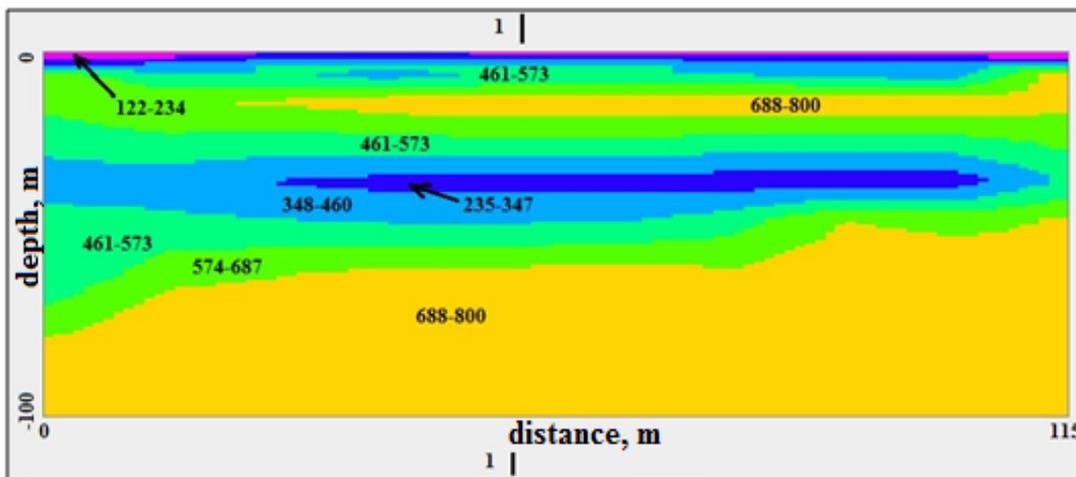


Figure 9. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 2.

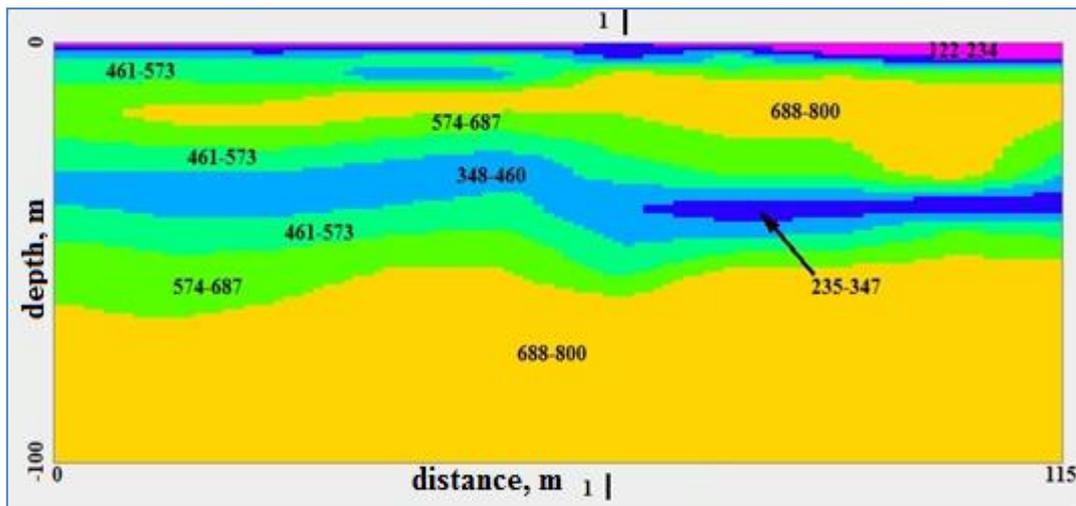


Figure 10. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 3.

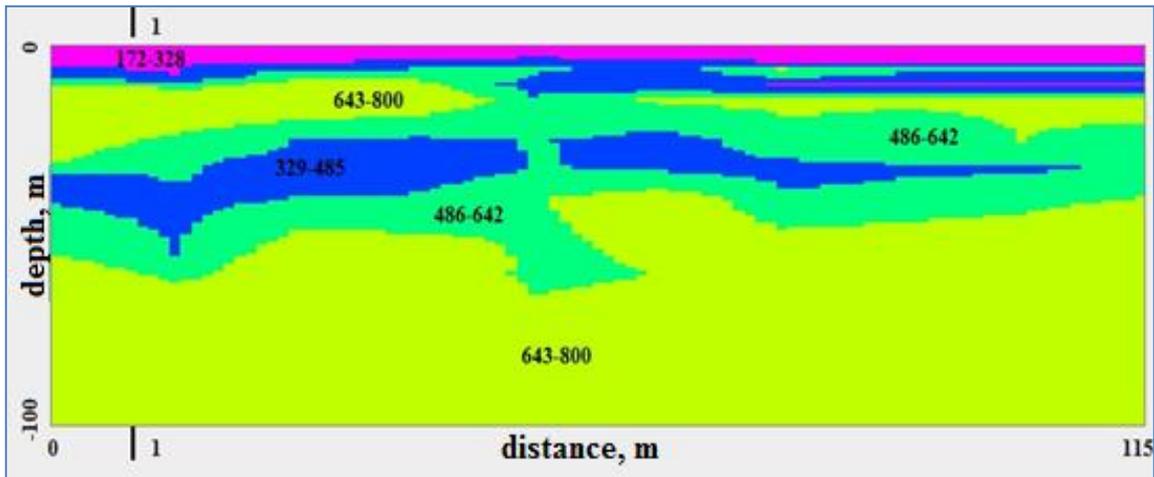


Figure 11. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 4.

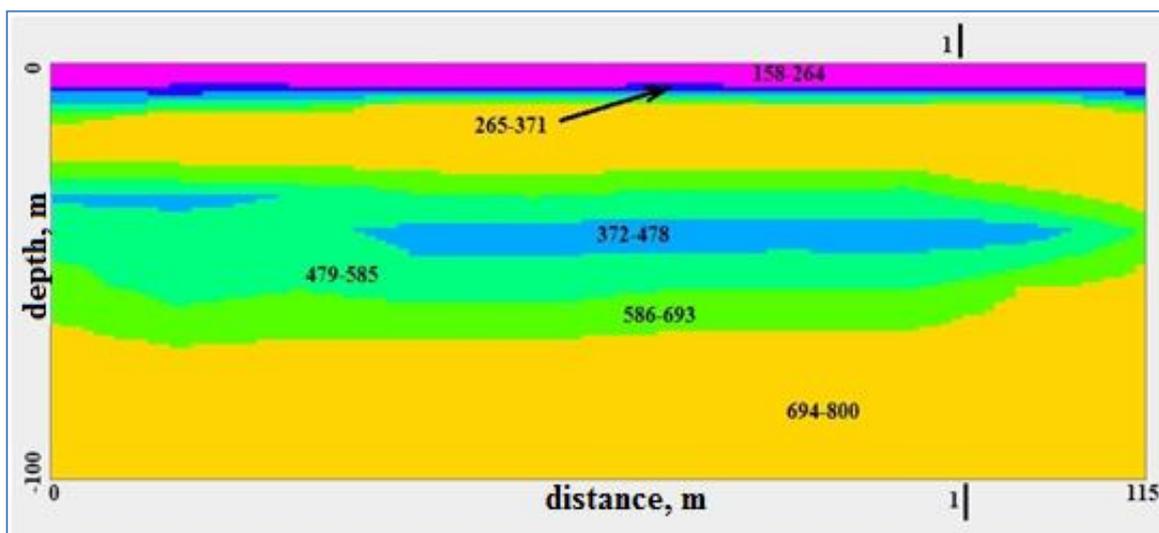


Figure 12. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 5.

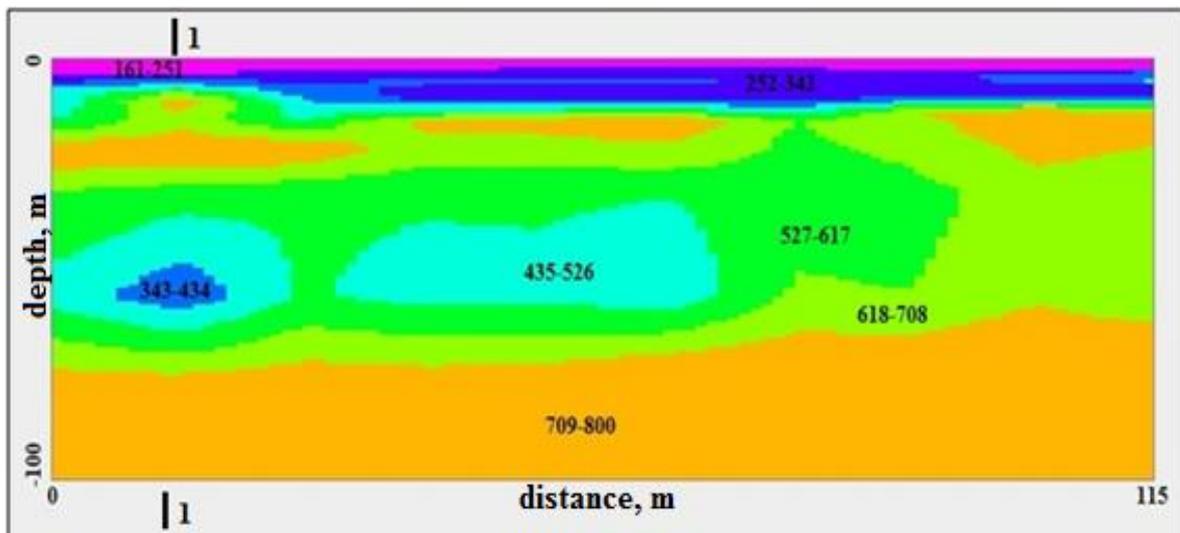


Figure 13. Two-dimensional velocity section (m / s) of transverse waves on the seismic profile No. 6.

Conclusions

- Fuzzy slope of the layers in the small velocities zones investigated to a depth of 100 m in the area, having the pinching out, the variation of the values of transverse seismic wave velocities between 120-800 m/sec in the layers.
- It is identified that the grounds in the approximately 6.5-12.0 m depths are very weak (empty, soft or aqueous) and the unfavorable in terms of seismicity, starting from the surface on the seismic profiles No. 1; 4-7; 9-11; 13; 17 and 18 and laying of the unfavorable grounds are to the depth of 3.0 m below the surface in the other 6 seismic profiles (with the exception of No. 15)
- Low seismic velocities in all seismic profiles have been determined (at depths of 28-78.5 m, with the wave velocities of 235-586 m / s). These values are lower than others on profile of 1-8, 13, 16 and 18 (235 -485 m/s).
- An unfavorable and sedimentary area for construction works has been identified in the relief, south of the research area (100 m x 260 m= 26000 m² in the area). There are unevennesses with the amplitude up to 1.0 m. within this unfavorable area and the same time, the color of the flora is completely different from the surrounding area.

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