

CONSIDERATIONS ON OVERALL STABILITY OF GAP CREATED, IN 22 DECEMBER 2010, IN TOWN OCNA MUREȘ, COUNTY ALBA

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ABSTRACT: *Stability study of gullies created in massive salt after exploitation salt solution, constituted and is a constant concern of researchers in the field, because of the need to protect the environment and population. After the crumbling produced in Ocna Mureș, in 20 December 2010, both newly formed lake and adjacent area crumbling, were continuously monitored by visual observation, topographic measurements and caliper measurements. The purpose of this study is to highlight the current state of stability of the newly formed lake and the adjacent area, through analysis and interpretation of topographic measurements.*

KEYWORDS: stability, topographic measurements, crumbling, scoring stability, etc.

1. INTRODUCTION

In the morning of 22.12.2010 near the well 123 S from field wells Ocna Mureș, County Alba, occurred an event by forming a cone subsidence and the appearance of a lake filled with brine.

The evolution was accelerated in the first hours, so the initial subsidence cone diameter was approximately 10 m with the water level at 2-2,5 from the ground, at around 20, the cone had a diameter of 70-90 m.

There was an increase of water level from the newly formed lake, until the discharge of it, through the point with the lowest ground elevation subsidence of the cone formed, to Lake Ștefania.

On the morning of 23.12.2010 subsidence process has subsided and the first measurement of the contour terrain subsidence cone, its surface was approx. 5,400 m².

The water quota in the newly formed lake was 255,693 m, decreasing.

In August - September 2011, at the surface of the cone crumbling of the newly formed lake, over a distance of 2-3 m into the interior of the cone, highlighted an increase in areas with existing cracks and crevices. These fissures and cracks were visible towards the field wells (well S 123).

On 14.09. 2011 at around 15, a large portion of the bank from the near of well S123 crashed into the lake.

As a result of the tendency natural embankment, large blocks of slopes with gradient of 70-80° friable rocks around the lake new format were drawn, which has increased surface contour of the newly formed lake. This process of embankment and crumbling / crashed occurred from bank to well S 123, so towards Field wells and not to living areas.

2. METHODOLOGY OF WORK

Topographic monitoring consists of sampling and analysis of measurements, respectively the interpretation of their results. Monitoring points are coded and materialized on the field by landmarks, benchmarks, feet and flanges wells and topographic marks.

For topographic monitoring newly formed lake on 22.12.2010 in field wells Ocna County and surrounding area following measurements were performed:

2.1. Planimetric topographic measurement for the evolution at surface of cone crumbling contour

As a result of the event that took place on 22.12.2010 in Ocna Mureș, by forming a cone of crumbling and the appearance of a lake of brine, conducted a series of topographic measurements for continuous monitoring and detailed of the cone crumbling.

These measures follows the surface cone crumbling evolution and the directions of development or breakage over time.

At the same time it was agreed the levelling measurements for determining the quota water from the newly formed lake.

In the period 23.12.2010-18.10.2013 were realized a number of 28 surveying to highlight the evolution of the cone surface crumbling, which are presented in the table no.1:

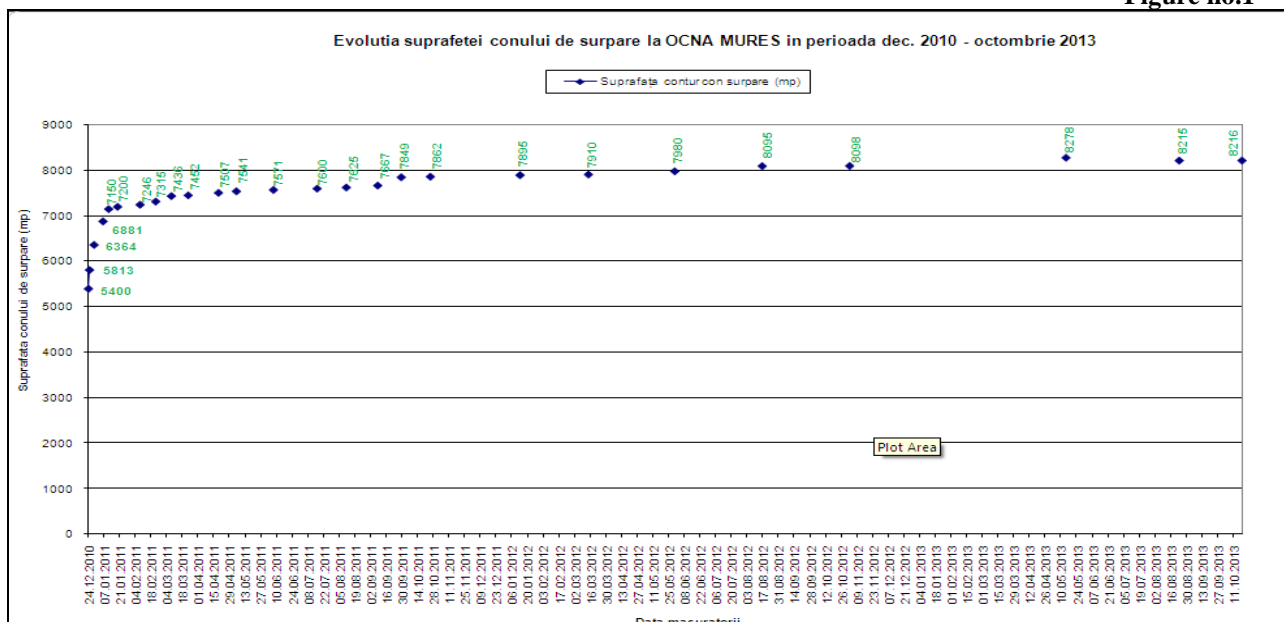
Evolution surface contour of the cone crumbling, monitoring in the period December 2010 - October 2013 is presented in figure no.1

Tabel no. 1

No. Crt.	Data	Surface con crumbling (m ²)	Quota Lake Plus
1.	23.12.2010	5.400	255,693
2.	24.12.2010	5.813	255,123
3.	28.12.2010	6.364	255,793
4.	05.01.2011	6.881	256,069
5.	10.01.2011	7.150	256,104
6.	18.01.2011	7.200	256,106
7.	07.02.2011	7.246	256,570
8.	21.02.2011	7.315	256,800
9.	07.03.2011	7.436	256,959
10.	22.03.2011	7.452	257,054
11.	18.04.2011	7.507	257,016
12.	04.05.2011	7.541	256,893

13.	06.06.2011	7.571	256,564
14.	15.07.2011	7.600	256,594
15.	10.08.2011	7.625	256,372
16.	07.09.2011	7.667	256,167
17.	19.09.2011	7.802	256,102
18.	28.09.2011	7.849	256,133
19.	24.10.2011	7.862	256,063
20.	12.01.2012	7.895	255,765
21.	30.05.2012	7.980	255,323
22.	16.08.2012	8.095	255,4195
23.	02.11.2012	8.098	255,2215
24.	14.05.2013	8.278	255,4585
25.	03.06.2013	8.278	255.5045
26.	11.06.2013	8278	255.5145
27.	22.08.2013	8215	255,4945
28.	18.10.2013	8216	255.7945

Figure no.1



The increase surface contour of cone crumbling in 18.10.2013 compare to 23.12.2010 is 52.14%.

2.2. Precision leveling topographic measurement of on benchmarks located near the cone of crumbling, at the foot wells, at the flanges wells and topographic marks placed on the foundations of the building:

After the event occurred in December 2010, in the area adjacent of the cone of crumbling were marked and signaled leveling points by planting and taking out new benchmarks and existing (metal benchmarks planted in the ground, benchmarks placed on feet and flanges wells and topographic marks placed on the foundations of the building) in order to realize a tracking network stability or land affected.

The system topographic tracking was performed to determine the vertical displacements of each landmark in the area adjacent to Lake Plus, by executing, recording and processing of measurements in several stages.

Precision topographic measurements performed on benchmarks in time, have an important role in the concept of tracking (surveillance) of surface deformations and stability of the adjacent land of cone crumbling.

Leveling topographic measurement performed in the area of cone crumbling serve tracking, monitoring and analysis of developments of the cone crumbling.

To perform the measurement precision leveling were initially planted in a number of benchmarks in metal pipe 67, which forms the basis of tracking stability of the land adjacent to the newly formed of the cone crumbling.

At the same time at the measurements were used existing old benchmarks placed at the feet and flanges of the wells and the topographic marks placed in the foundations of buildings near the Lake Plus.

As a basic reference was used RN45 national landmark located in the foundation of the Orthodox Church Ocna County share is transmitted through a closed loop traverse nivelitică, following the route which passes through parts RN45 - R61 - R1 - R24 - R31 - R35 - R38 - R50 - RN45.

In 2011, the biggest displacements vertical interval 24.10.2011 10.01.2011 ÷ were registered highlights R46 (-76.4 mm) and R47 (-72.3 mm), which are the directions of water flow the slope, which is discharged into the lake, but around him, like a fan other landmarks are found diving values between 40-60 mm and S123 probe were values of -40.68 mm (average the 4 feet) and S124 probe were values of -24.33 mm (average 3 feet).

And in 2012 the maximum values of vertical displacements (there were all at same landmarks (as in 2011), at landmark R 46 (-122.2 mm), located behind the House Finance the immediate vicinity of the newly formed lake at the foot S123 well which recorded a value -74.32 mm (average 4 feet) and feet S124 well which values of -45.96 (average 3 feet) on 10.01.2011 between 02.11 ÷ .2012.

In the year 2013, the maximum vertical displacement (between January 2011 ÷ October 2013) is recorded on reperii R46 (-134.2 mm), R47 (-110.3 mm), R15 (-119.5 mm) and feet S123 well (-92.33 mm, average 4 feet).

Based on topographic measurements made on parts and flanges wells was represented a map of vertical movements recorded on a monitoring period of about three years.

To get a clearer picture of areas where there is the maximum vertical displacements recorded for the period January 2011-October 2013 was represented Fig. 2 "Izoscufundări -January 2011 ÷ October 2013, Ocna Mures".

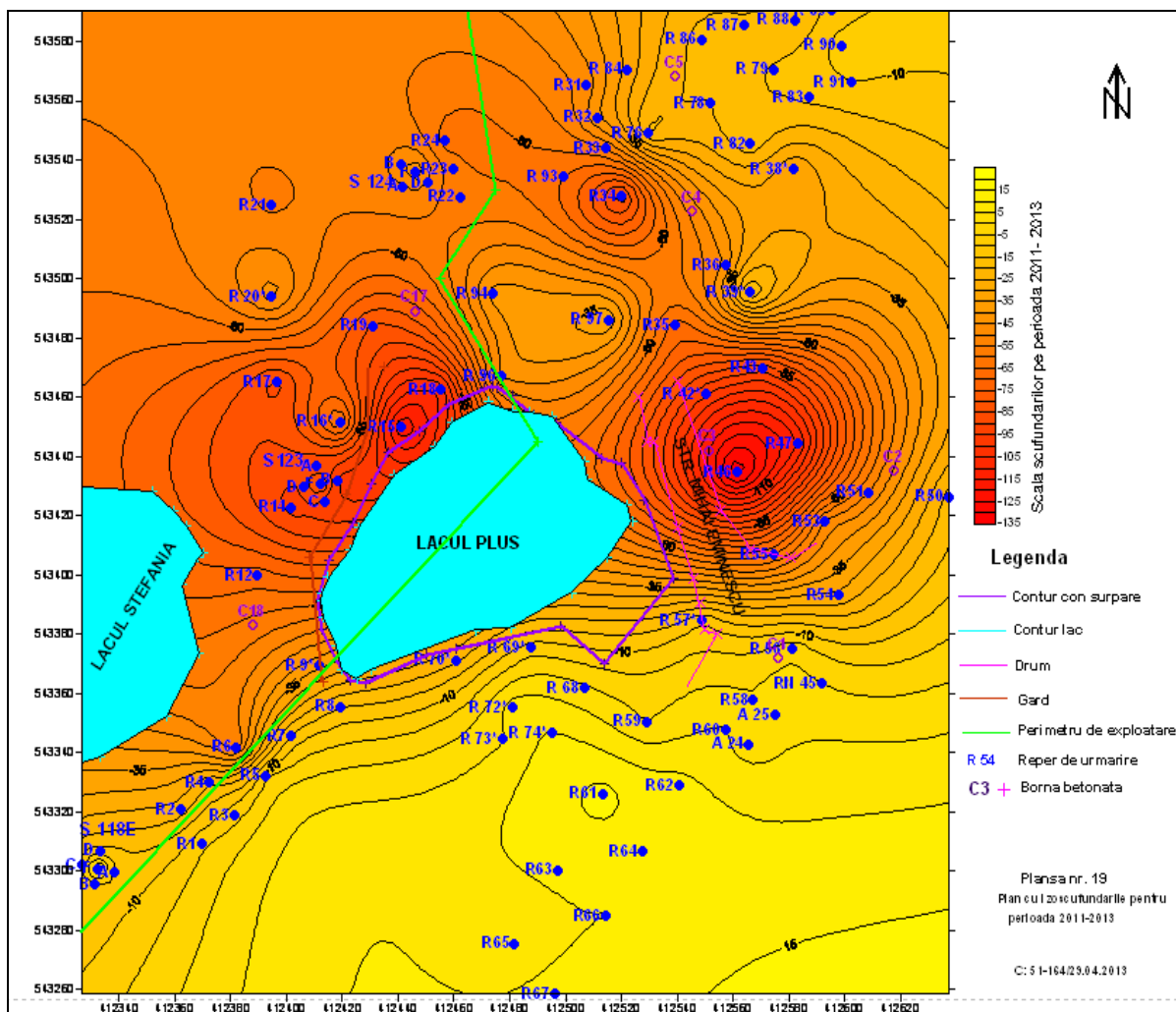


Figure no.2 –“Izoscufundări: Ianuarie 2011 ÷ Octombrie 2013, Ocna Mures” (C: 51-164/2013)

It notes that the ground highlights R46 -R47 were recorded the highest values of vertical displacements ranging from [-110.3 ÷ 134.2 mm].

Diving iso curves reflect well the reality only near the landmarks for which are known coordinates and total diving for the 2011-2013.

Diving iso curves drawn measurements based on the processing results for the period 2012 - 2013 (for the spotted wells placed at feet and flanges) configures areas where landmarks have been positive or negative vertical displacements.

3. CONCLUSIONS

From the results of measurements of leveling (for 2012-2013) that most benchmarks showed values close to the previous ones, which shows that it retains the same displacement continues to dive on certain areas.

Maximum vertical displacement was recorded on part no 46 (D 2011-2013 = -134.2 mm), located behind the House Finance the immediate vicinity of the newly formed lake, the direction of flow of water on the slope that runs down lake, but around him, like a fan other landmarks are found diving values > 60 mm.

Vertical displacements recorded topographic landmarks place on the field (construction, foundations, wells feet, flange anchor well landmarks on the back flush salt surface landmarks, etc.) are influenced by the following factors:

- the existence of a continuous phreatic layer, especially on the old bed of the river Mures, composed of coarse alluvial formations, very permeable, which generates continuous and uncontrolled dissolution of salt in some ways preferred cord;

- local changes (uneven terrain, potholes) continue the pattern of surface salt massif due to infiltration and groundwater movement (east-west) directly related to fluctuations in hydrostatic level of the river Mures, to which is added the volume of water collected Bantam hill, from hydro study.

- reduced disruption currently unquantifiable, the underground mining, surface influences that still follow through landmarks embedded in the back of the mountain of salt and landmarks placed on the column the flanges anchor wells

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