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by Rita Lopa 00

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TIME SUBMITTED	21-MAY-2019 09:48PM (UTC+0700)	WORD COUNT	1740
SUBMISSION ID	1133894195	CHARACTER COUNT	9522

International Journal of Civil Engineering and Technology (IJCIET)
Volume 9, Issue 13, December 2018, pp. 566-573, Article ID: IJCIET_09_13_055
Available online at http://www.iaeme.com/ijciet/issues.asp?JType=IJCIET&VType=9&IType=13
ISSN Print: 0976-6308 and ISSN Online: 0976-6316

EVALUATION OF PONRE-PONRE DAM INSTRUMENTATION

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ABSTRACT

Ponre-Ponre Dam is a dam using rockfill with CFRD, Concrete Face Rockfill Dam. Recently, The dam is not yet have an Operating Permit and Approval which is a prerequisite and one of the benchmarks of the operation of the dam. Based on Article 83 of Government Regulation No. 37 of 2010 on Dams, prior to the operation of a dam must have a Dam Operating License Certificate approved by Department of Public Works . Implementation of dam operations shall be carried out under a dam operation permit issued by Department of Public Works. In order to conclude the dam safety status in accordance with the Dam Safety Inspection and Evaluation Guidelines, it is necessary to analyze and evaluate the condition of the dam prior to the Instrumentation aspects. The Great Inspection Methodology was developed with reference to the Dam Security Inspection and Evaluation Manual duly authorized by the Dam Security Commission Number: 05 / KPTS / 2003, March 2003. The results of the instrumentation evaluation show that piezometer, seepage, and settlement survey equipment are in un-maintained condition, therefore routine maintenance and maintenance and periodic cleaning arerequired.

Keywords: Dam security, instrument, Ponre-Ponre Dam.

Cite this Article: Rita Tahir Lopa, farouk Maricar and indra Mutiara, Evaluation of Ponre-Ponre Dam Instrumentation, International Journal of Civil Engineering and Technology, 9(13), 2018, pp. 566-573

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1. INTRODUCTION

Ponre-Ponre Dam is a dam using rockfill dam with Concrete Face Rockfill Dam (CFRD) located in the working area of Pompengan-Jeneberang Large River Basin. Ponre-Ponre Dam is located in the Tinco River, a subsidiary of the Walanae River, which is administratively located in Kahu and Libureng Sub-districts, Bone District.

Recently, the dam is not has an Operating Permit and Approval yet which is a prerequisite and one of the reference of the operation of the dam. Based on Article 83 of Government Regulation on Dams Number 37 of 2010, prior to the operation of a dam must have a Dam Operating License Certificate approved by Department of Public Work. Implementation of dam operations shall be carried out under a dam operation permit issued by the Department of Public Works.

2. RESEARCH METHOD

The research is located in Subdistrict Libureng and Kahu, Bone District, about 130 Km from Makassar City, South Sulawesi Province. Map of Ponre-Ponre Dam location, can be seen in Figure 1 and Figure 2.

Figure 1. Ponre-Ponre Dam

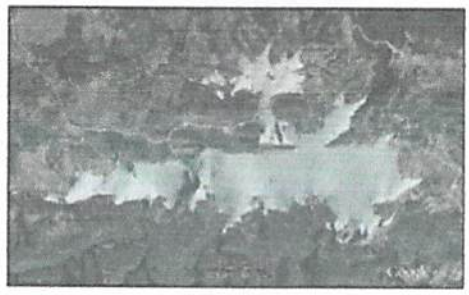

Figure 2. Ponre-Ponre Reservoir

Dam instrumentation is any kind of equipment or instrument installed in the body and or foundation of a dam or in other places primarily intended to monitor the behavior of dams on a continuous basis.

Intrumentation is examined for its condition and function by performing a direct reading and / or conducting a review / evaluation of the existing monitoring data series. It also conducts inspections and ensures hydrological equipment, remote monitoring systems and communication equipment are all functioning well, documentation and evaluation of monitoring data. Measurements / readings of each type of instrument are carried out continuously since the commencement of installation (construction). However, from the master data files obtained from the field, there is only data from the start of the filling of the reservoir that is from november 2008. Instrument readings are conducted regularly and administration is condected properly. Based on these historical data, each instrument is analyzed primary graphically as the graph of the relationship between data and time. While it be analyzed include: 1) standpipe piezometer and 2) measuring device (v-notch). The measurement results will be analyzed mainly based on the large

Inspection Methodology prepared with reference to Dam Security Inspection and Evaluation Manual duly authorized by the Dam Security Commission Number: O5 / KPTS / 2003, March 2003.

3. RESULT AND DISCUSSION

Ponre-Ponre Dam has a water catchment area of 78 km2 in which there are several instrumentations such as Standpipe piezometer, Seepage measurement weir (V-notch), Perimetric joint meter, Surface slope settlement point on the downstream slope, Surface slope settlement point on the downstream slope, Surface movement point on the upstream face slab slope, dan Crest settlement point on parapet wall, can be seen on Table 1.

Table 1. Instrumentation on Ponre-Ponre Dam

No	Instrumentation	Instrumentation Code	Function	Quantity
1.	Standpipe Piezometer	SP	Measure water pressure in clay core	6
2.	Seepage Measuring Weirs (V-notch)	W	Measure seepage in	3
3.	Surface slope settlement point in the downstream slope	Fs	Measure settlement in the down-stream	19
4.	Surface movement point in the upstream face slab slope	Rs	Measure movement in the up-stream face slab slope (construction)	22
5.	Crest settlement point on parapet wall	Cs	Measure settlement in the top of dam	12
6.	Extensometer/ Perimetric Joint Meter (EM)	EM	Measure settlement of plinth	3
7.	Waterlevel Recorder		Record the dam waterleve	1

Condition of Measurement Instrumentation Standpipe Piezometer mounted at 6 points in good condition except SP4 as shown in Table 2 and Figure 3 below.

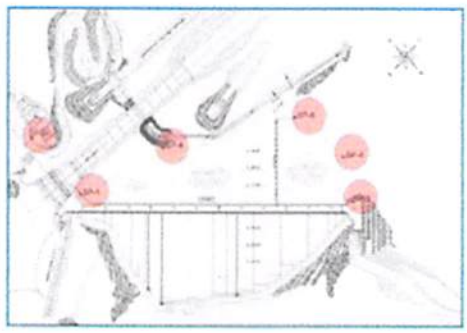

Figure 3. Location of Standpipe Piezometer Ponre- Ponre Dam Instrumentation

Table 2.Standpipe Piezometer Instrumentation

No.	X (m)	Y (m)	Z (m)
SP-1	165682.385	9461519.007	229.732
SP-2	165687.559	9461582.335	220.799
SP-3	165844.396	9461339.37	220.571
SP-4	165761.764	9461492.989	190.697
SP-5	165666.14	9461571.454	197.145
SP-6	165800.195	9461424.745	172.306

The condition of the water level on SP.4 (on the left side of the weir) is recorded that the ground water in the pipe has overflowed and can not be measured soil water level, can be seen in Figure 4.

Figure 3. Water overflows in SP.4

From the graph of MAW-CH-SP (2008-2015) relationship shown in Figure 5, the data shown in SP.4 (blue color) can only be observed to 24th Dec 2009.

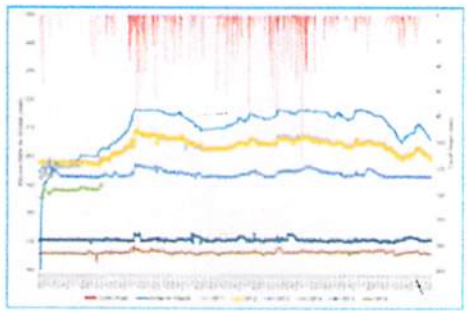

Figure 4. Graph relation MAW-CH-SP (2008-2015)

Conditions of Settlement Instrumentation to observe the point of observation of the shear and the reduction of the dam surface mounted at the top of the dam, many of which have no cover and a broken lock, as shown in Figure 6.

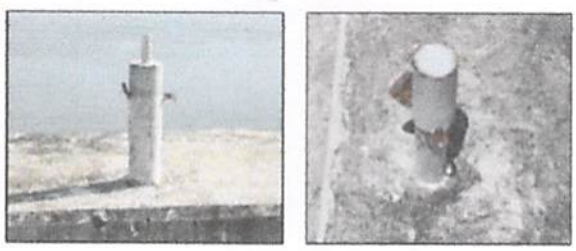

Figure 6. The crest Settlement staple cover is not installed and the padlock is broken

Condition of V-Notch Instrumentation mounted 3 V-Notch pieces, can be seen in Figure 7. Condition of Instrumentations are in good condition on the downstream and diversion works, while in the spillage, there are many moss, and it need maintenance (Figure 8).

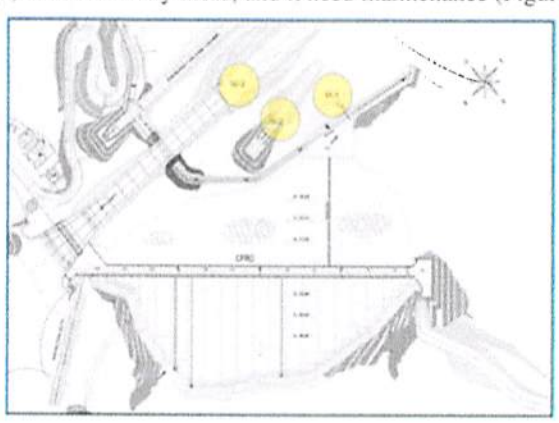

Figure 7. Location of V-Notch Ponre-Ponre Dam Instrumentation

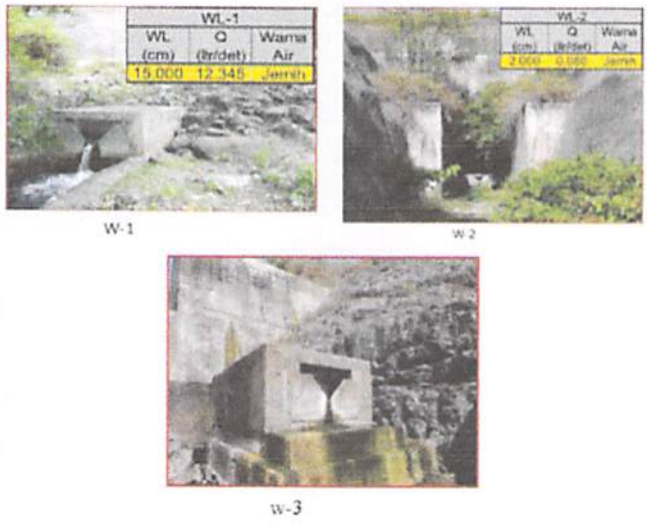

Figure 8. Condition of seepage measurement *V-Notch* Ponre-Ponre Dam

The graph shows the V-notch discharge affected by the rainfall shown in Figure 9 and, the Graph shows the V-notch discharge influenced by the Water Reservoir shown in Figure 10.

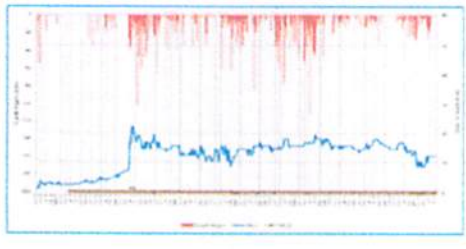

Figure 9. Rainfall and V-Notch discharge

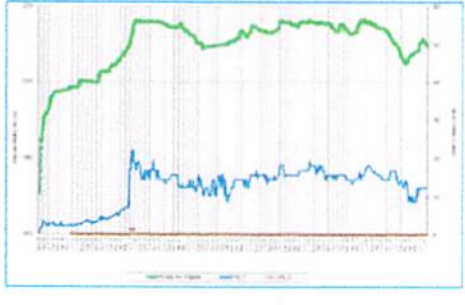

Figure 10. Reservoir water level and V-Notch dischrage

Condition of Crest Settlement Point Instrumentation, cover of many observation points at the top of many nonexistents, only CS-1 and CS-12 attached. Based on Design Riview Report Vol 6 annex Design, calculation section 4.2 crest camber is mentioned <0.25% of Dam height = 14 cm. The graph of settlement measurement as showns in Figure 11.

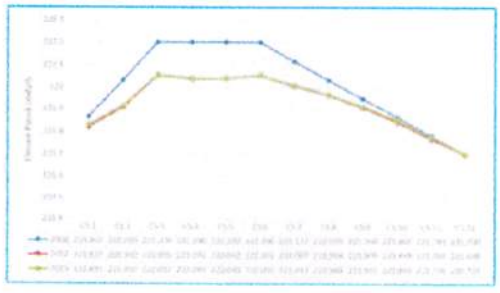

Figure 11. Settlement at the top of the dam during the Big check

Condition of Rockfill Settlement Point intrumentation occurs weathering on the riprap arrangement on the first, second, and third rows. Benchmarks that are located downstream (RS) should be made permanent road eg trap for survey team / officer to safely perform for measuring. The graph of settlement measurement at the time of the inspection as shown in Figure 12.

Figure 12. Settlement at elevation of downstream dam +210 mdpl, + 200 mdpl, and +190 mdpl during inspection.

Condition of Face Settlement Point Instrumentation, benchmark is good condition , while Water Level Recording has 2 years not working that elevation number is not appear on display. The MAW digital monitoring tool is damaged, MAW monitoring is conducted manually by measuring the peil gauge.

4. CONCLUSION AND RECOMENDED

The results of the Ponre-Ponre Dam instrumentation study found the problems to be addressed and the follow-up to be done are as follows:

1. Many of the settlement settlements are damaged or missing. Where many padlocks is damage. Evaluation results indicate that the open stitch cover may cause the end of the monument to experience a change of position, as it is not protected from the irresponsible dam visitor behavior.
2. It is recommended that it need to improve the cover of the stakes and to need periodic measurements in accordance with the schedule for monitoring settlements.
3. There is no safety access for surveyors at the observation point in the upstream slope. Evaluation results indicate that the absence of access roads may endanger OP officials in carrying out monitoring. It is recommended to make stairs / traps connecting observation points of settlement at downstream slopes.
4. The results of evaluation of instrumentation demonstrate that piezometer equipment, seepage, and settlement survey are in un-maintained condition, requiring routine maintenance and maintenance as well as periodic cleaning.

ACKNOWLEDGEMENT

We thank to International Journal of Civil Engineering and Technology (IJCIET) for giving us the opportunity to write this opinion paper. This work was supported by a grant from the Ministry of Public Works, Indonesia.

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