

**STUDI INTERKONEKSI KANAL BANJIR BARAT, KECAMATAN
GROGOL PETAMBURAN, JAKARTA BARAT DENGAN AIRTANAH
SEKITARNYA MENGGUNAKAN HIDROISOTOP ALAM DEUTERIUM
DAN OKSIGEN-18**

Oleh

Marisa Aprilliyana
14/369225/TK/42614

Diajukan kepada Departemen Teknik Nuklir dan Teknik Fisika Fakultas Teknik
Universitas Gadjah Mada pada tanggal 18 Desember 2018
untuk memenuhi sebagian persyaratan untuk memperoleh derajat
Sarjana S-1 Program Studi Teknik Nuklir

INTISARI

Kanal Banjir Barat adalah salah satu sungai di wilayah DKI Jakarta dengan kondisi pencemaran yang mengkhawatirkan. Kandungan limbah pada air sungai dapat mencemari airtanah di sekitarnya. Penelitian ini bertujuan untuk menentukan interkoneksi hidraulik antara air sungai dengan airtanah di sekitarnya berdasarkan metode aplikasi hidroisotop (D dan ^{18}O).

Interkoneksi hidraulik ditentukan melalui analisis kedekatan nilai δD (‰) dan $\delta^{18}\text{O}$ (‰) dan pengujian statistika Analisis Variansi satu arah dengan metode *Least Significance Different* dan *Duncan*. Indikasi adanya pencemaran air dianalisis berdasarkan parameter fisika (temperatur, daya hantar listrik, dan *total dissolved solid*) dan kimia (derajat keasaman, amonia, timbal, dan *total suspended solid*).

Hasil analisis komposisi hidroisotop menggunakan kedekatan nilai dan uji ANOVA satu arah menunjukkan adanya interkoneksi hidraulik beberapa sampel airtanah dengan air sungai. Sampel airtanah yang memiliki kesamaan genesis dengan KG dan KBB adalah SG-1 (698974,805E dan 9318499,663N) nilai rasio isotop δD ($-39,6 \pm 2,9$)‰ dan $\delta^{18}\text{O}$ ($-7,5 \pm 0,22$)‰ dengan SG-6 698376,454E dan 9318563,360N) nilai rasio isotop δD ($-39,2 \pm 2,4$)‰ dan $\delta^{18}\text{O}$ ($-7,02 \pm 0,22$)‰. Kesamaan genesis juga ditemukan antara sampel airtanah SG-3 (698631,905E dan 9318505,083N) nilai rasio isotop δD ($-32,7 \pm 2,4$)‰ dan $\delta^{18}\text{O}$ ($-6,45 \pm 0,25$)‰ dengan SG-4 (698988,095E dan 9318490,657N) nilai rasio isotop δD ($-32,1 \pm 1,7$)‰ dan $\delta^{18}\text{O}$ ($-6,45 \pm 0,25$)‰, kemudian SG-7 (698316,194E dan 9318561,921N) nilai rasio isotop δD ($-36,9 \pm 1,1$)‰ dan $\delta^{18}\text{O}$ ($-6,24 \pm 0,24$)‰ dengan SG-8 (698252,521E dan 9318503,348N) nilai rasio isotop δD ($-36,8 \pm 0,8$)‰ dan $\delta^{18}\text{O}$ ($-6,5 \pm 0,16$)‰. Hasil analisis parameter fisika dan kimia sampel menunjukkan kandungan NH_3 pada sampel SG-4 sebesar 6,6006 mg/L, KBB sebesar 6,7647 mg/L, dan KG sebesar 7,1588 mg/L melebihi baku mutu yang telah ditetapkan (0,5 mg/L).

Kata kunci : airtanah, air sungai, deuterium, oksigen-18, interkoneksi hidraulik
Pembimbing Utama : Dr. Ir. Agus Budhie Wijatna, M.Si.
Pembimbing Pendamping : Bungkus Pratikno, S.T., M.T.

**STUDY OF HYDRAULICS INTERCONNECTION BETWEEN BANJIR
BARAT CANAL, SUB-DISTRICT GROGOL PETAMBURAN, WEST
JAKARTA AND SURROUNDING GROUNDWATER USING
ENVIRONMENTAL HYDROISOTOPE OF DEUTERIUM
AND OXYGEN-18**

By

Marisa Aprilliyana

14/369225/TK/42614

Submitted to the Department of Nuclear Engineering and Engineering Physics
Faculty of Engineering Universitas Gadjah Mada on Desember 18th, 2018
in partial fulfillment of Degree of
Bachelor of Engineering in Nuclear Engineering

ABSTRACT

Banjir Barat Canal is one of rivers at the province of DKI Jakarta with polluted water condition. The waste content in the river water could contaminate the surrounding groundwater. The objective of this research was to determine the hydraulics interconnection between Banjir Barat Canal and the surrounding groundwater based on hydroisotope application methods (D dan ^{18}O).

The hydraulics interconnection was determined using the analysis of the proximity value of δD (‰) and $\delta^{18}\text{O}$ (‰) as well as one-way statistics method of the Analysis of Variance with the method of Least Significance Difference and Duncan. The indication of water pollution was analyzed based on physical parameters (temperature, electric conductivity, and total dissolved solid) and chemical parameters (acidity, ammonia, lead, and total suspended solid).

The results of hydroisotope composition analysis showed that there were interconnections among several groundwater samples and river water samples. The groundwater samples which had the genesis similarities with KG and KBB were SG-1 (698974.805E and 9318499.663N) with the amount of δD (-39.6 ± 2.9)‰ and $\delta^{18}\text{O}$ (-7.5 ± 0.22)‰ and SG-6 (698376.454E and 9318563.360N) with the amount of δD (-39.2 ± 2.4)‰ and $\delta^{18}\text{O}$ (-7.02 ± 0.22)‰. Genesis similarities were obtained between groundwater samples SG-3 (698631.905E and 9318505.083N) with the amount of δD (-32.7 ± 2.4)‰ and $\delta^{18}\text{O}$ (-6.45 ± 0.25)‰ and SG-4 (698988.095E and 9318490.657N) with the amount of δD (-32.1 ± 1.7)‰ and $\delta^{18}\text{O}$ (-6.45 ± 0.25)‰, SG-7 (698316.194E and 9318561.921N) with the amount of δD (-36.9 ± 1.1)‰ and $\delta^{18}\text{O}$ (-6.24 ± 0.24)‰ and SG-8 (698252.521E dan 9318503.348N) with the amount of δD (-36.8 ± 0.8)‰ and $\delta^{18}\text{O}$ (-6.5 ± 0.16)‰. The analysis results of physics and chemical parameter analysis showed that NH_3 contents in samples of SG-4 of 6.6006 mg/L, KBB of 6.7647 mg/L, and KG of 7.1588 mg/L were all above the national water quality requirement (0.5 mg/L).

Keywords : groundwater, river water, deuterium, oxygen-18, hydraulics
interconnection

Supervisor : Dr. Ir. Agus Budhie Wijatna, M.Si.

Co-supervisor : Bungkus Pratikno, S.T., M.T.