

ABSTRAK

RANCANGAN SISTEM PENYALIRAN TAMBANG DI *PIT* SPE 2 DENGAN ANALISIS *OVERFLOW* PADA PINANG *VOID* PT KALTIM PRIMA COAL

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Pit SPE2 yang masih dalam tahap awal penambangan berpotensi mengalami genangan akibat limpasan air hujan. Pada tahun 2025, lokasi ini belum memiliki Surat Layak Operasi pada *settling pond*, sehingga air hujan yang masuk ke dalam *pit* tidak dapat langsung dialirkan ke badan sungai. Kondisi tersebut dapat mengganggu kelancaran operasional penambangan, sehingga diperlukan sistem penyaliran yang efektif. Penelitian ini bertujuan untuk mengestimasi debit limpasan air hujan yang masuk ke *pit*, merancang dimensi saluran terbuka dan gorong-gorong, menentukan kapasitas *sump* untuk menampung air limpasan, menghitung kebutuhan pompa beserta kapasitasnya untuk mengalirkan air yang terakumulasi pada *Pai pond* dan *Bromsi pond*, serta menganalisis kemampuan Pinang *void* dalam menampung debit air dari *pit* SPE2 dengan sistem *overflow*.

Penentuan debit limpasan dilakukan menggunakan metode distribusi (Gumbel, Normal, Log Normal, dan Log Pearson III) dengan uji *Goodness of Fit* untuk memilih distribusi terbaik, kemudian dihitung menggunakan metode Rasional berdasarkan luas tangkapan dan koefisien limpasan. perancangan teknis saluran dan *sump* menggunakan rumus Manning dan pendekatan grafik volume, serta penentuan kebutuhan pompa berdasarkan *water balance* dan analisis kapasitas Pinang *void* terhadap debit masuk dari berbagai sumber dan dibandingkan dengan debit keluar melalui sistem *overflow*.

Hasil penelitian menunjukkan debit limpasan tertinggi di *pit* SPE2 sebesar 4,32 m³/s dan di Pinang *void* sebesar 10,80 m³/s. Rancangan saluran berbentuk trapesium dengan variasi dimensi menunjukkan muka air masih berada di bawah elevasi saluran, serta dilengkapi gorong-gorong berdiameter 1 m. Kapasitas *sump* sebesar 17.432 m³ mampu menampung debit masuk hingga 1,25 kali lipat. Kebutuhan pompa di *Pit* SPE2 mencakup 1 pompa multiflo 180 (432 m³/jam) pada *sump*, 1 pompa multiflo 420 EX (828 m³/jam) pada *Bromsi pond*, dan 2 pompa multiflo 420 EX (masing-masing 828 m³/jam) pada *Pai pond*. Pinang *void* dengan kapasitas 2.791.627 m³ mampu menampung debit masuk 27,56 m³/s dengan debit keluar *overflow* 35,88 m³/s, sehingga sistem dinilai aman tanpa risiko luapan.

Kata kunci: Debit Limpasan, Sistem Penyaliran Tambang, Kebutuhan Pompa, HEC-RAS, Sistem *Overflow*,

ABSTRACT

DESIGN OF MINE DRAINAGE SISTEM IN PIT SPE 2 WITH OVERFLOWANALYSIS OF PINANG VOID PT KALTIM PRIMA COAL

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Pit SPE2, which is still in the early stages of mining, has the potential to experience inundation due to runoff from rainfall. In 2025, this location will not yet have an Operational Feasibility Permit for the settling pond, so rainwater entering the pit cannot be directly discharged into the river. This condition may disrupt mining operations, therefore an effective drainage system is required. This study aims to estimate the runoff discharge entering the pit, design the dimensions of open channels and culverts, determine the capacity of the sump to accommodate runoff water, calculate the number and capacity of pumps required to discharge accumulated water into Pai Pond and Bromsi Pond, as well as analyze the capacity of Pinang void to store runoff from Pit SPE2 through the overflow system.

The determination of runoff discharge was carried out using probability distribution methods (Gumbel, Normal, Log Normal, and Log Pearson III) with a Goodness of Fit test to select the most suitable distribution, followed by calculations using the Rational Method based on catchment area and runoff coefficients. The design of channels and sump was carried out using Manning's equation and volume graph approaches, while the pump requirements were determined based on water balance analysis and the capacity of Pinang void to accommodate incoming discharge from various sources compared with the discharge released through the overflow system.

The results show that the highest runoff discharge in Pit SPE2 reached 4.32 m³/s, while in Pinang void it reached 10.80 m³/s. The designed trapezoidal channels with varied dimensions showed that water levels remained below the channel elevation and were equipped with culverts of 1 m diameter. The sump capacity of 17,432 m³ was able to accommodate up to 1.25 times the incoming discharge. Pump requirements in Pit SPE2 included 1 multiflo 180 pump (432 m³/h) in the sump, 1 multiflo 420 EX pump (828 m³/h) in Bromsi Pond, and 2 multiflo 420 EX pumps (828 m³/h each) in Pai Pond. Pinang void, with a capacity of 2,791,627 m³, was capable of accommodating an inflow of 27.56 m³/s with an overflow outflow of 35.88 m³/s, indicating that the drainage system is safe without risk of flooding.

Keywords: *Runoff Discharg, Mine Drainage System, Pump Requiremen, HEC-RAS, Overflow System*