DAFTAR ISI

HALAMAN JUDUL ........................................................................................................ i
HALAMAN PENGESAHAN ....................................................................................... ii
HALAMAN PERSEMBAHAN .................................................................................. iii
UCAPAN TERIMA KASIH ...................................................................................... iv
KATA PENGANTAR ................................................................................................. v
SARI ....................................................................................................................... vi
DAFTAR ISI .............................................................................................................. vii
DAFTAR TABEL ......................................................................................................... xi
DAFTAR GAMBAR ................................................................................................... xii

BAB I PENDAHULUAN ......................................................................................... 1
  1.1 Latar Belakang ................................................................................................. 1
  1.2 Rumusan Masalah .......................................................................................... 2
  1.3 Maksud dan Tujuan ....................................................................................... 3
  1.4 Lokasi dan Waktu Penelitian ......................................................................... 3
    1.4.1 Lokasi Penelitian ................................................................................... 3
    1.4.2 Waktu Penelitian .................................................................................. 4
  1.5 Hasil yang Diharapkan ................................................................................... 5
  1.6 Alat dan Fasilitas ........................................................................................... 5
  1.7 Manfaat Penelitian ....................................................................................... 5

BAB II METODOLOGI PENELITIAN ................................................................. 7
  2.1 Tahap Pendahuluan ....................................................................................... 7
    2.1.1 Studi Pustaka ......................................................................................... 7
    2.1.2 Penyusunan Proposal .......................................................................... 8
  2.2 Tahap Penelitian ............................................................................................ 8
    2.2.1 Studi Pendahuluan .............................................................................. 8
    2.2.2 Studi Regional ...................................................................................... 8
2.2.3 Tahap Pengumpulan Data .............................................................. 8
2.3 Interpretasi Data .................................................................................. 9
2.4 Tahapan Penyusunan Proposal ......................................................... 10
2.5 Bagan Alir Penelitian .......................................................................... 11

BAB III TINJAUAN PUSTAKA ................................................................. 12

3.1 Geologi Regional Cekungan Jawa Barat Utara .................................. 12
3.2 Kerangka Tektonik dan Struktur Geologi Cekungan Jawa Barat Utara .. 13
3.3 Sedimentasi Cekungan Jawa Barat Utara .......................................... 23
3.4 Stratigrafi Regional ............................................................................ 25
3.5 Petroleum System Cekungan Jawa Barat Utara .................................. 29

BAB IV DASAR TEORI ............................................................................ 34

4.1 Interpretasi Data Sumur ...................................................................... 34
4.1.1 Konsep Interpretasi Wireline Log .................................................. 34
4.1.2 Wireline Log Untuk Identifikasi Fasies Pengendapan ...................... 37
4.1.3 Penentuan Key Surface .................................................................. 40
4.1.4 Mud Log ........................................................................................ 44
4.2 Interpretasi Data Seismik ..................................................................... 44
4.2.1 Interpretasi Struktur Geologi ........................................................... 44
4.3 Peta Bawah Permukaan ..................................................................... 46
4.3.1 Peta Depth Structure ...................................................................... 47
4.3.2 Peta Ketebalan (Isopach) ............................................................... 47
4.3.3 Peta Porositas ................................................................................ 47
4.3.4 Peta Permeabilitas ........................................................................ 47
4.3.5 Peta Saturasi Air .......................................................................... 48
4.4 Tinjauan Umum Fasies Pengendapan ............................................... 48
4.4.1 Fasies Pengendapan Delta .............................................................. 48
4.4.2 Klasifikasi Delta .......................................................................... 49
4.5 Interpretasi Jenis Fluida ...................................................................... 55
4.5.1 Interpretasi Kuantitatif Berdasarkan Data Log Sumur .................................55
  4.5.1.1 Perhitungan Volume Shale (Vsh) .................................................................55
  4.5.1.2 Perhitungan Porositas (Ø) ...........................................................................56
  4.5.1.3 Perhitungan Nilai Faktor Formasi (F) .........................................................57
  4.5.1.4 Perhitungan Tahanan Jenis Air Formasi (Rw) .............................................57
  4.5.1.5 Perhitungan Saturasi Fluida ........................................................................58

BAB V PENYAJIAN DATA .........................................................................................59
  5.1 Data ......................................................................................................................59
    5.1.1 Peta Dasar (Basemap) ....................................................................................59
    5.1.2 Data Log Sumur (Wireline Log) .................................................................60
    5.1.3 Data Mudlog ....................................................................................................61
    5.1.4 Data Core ........................................................................................................63
    5.1.5 Data Kemiringan (Dip Meter) ........................................................................63
    5.1.6 Data Penampang Seismik ..............................................................................64

BAB VI ANALISA DATA DAN PEMBAHASAN .....................................................65
  6.1 Analisis Data .........................................................................................................65
    6.1.1 Objek Penelitian .............................................................................................65
    6.1.2 Perangkat Lunak yang Digunakan ................................................................66
    6.1.3 Analisis Data Sumur (Wireline Log) .............................................................66
      6.1.3.1 Analisis Litologi ........................................................................................67
      6.1.3.2 Interpretasi Lingkungan Pengendapan ....................................................68
    6.2 Korelasi ..............................................................................................................71
      6.2.1 Korelasi Stratigrafi .....................................................................................72
      6.2.2 Korelasi Struktur .......................................................................................72
    6.3 Peta Paleogeografi .............................................................................................83
    6.4 Data Petrofisika ...................................................................................................84
      6.4.1 Analisis Kuantitatif Log Sumur ...................................................................85
6.5 Interpretasi Data Seismik ................................................................. 86

6.5.1 Well Seismic Tie ................................................................. 86

6.5.2 Interpretasi Sesar ................................................................. 87

6.5.3 Interpretasi Horizon ............................................................... 88

6.6 Pemetaan Bawah Permukaan ...................................................... 93

6.6.1 Peta Struktur Waktu ............................................................... 93

6.6.2 Peta Struktur Kedalaman ......................................................... 95

6.6.3 Peta Gross Sand ................................................................. 97

6.6.4 Peta Net Sand ................................................................. 98

6.6.5 Fluid Outline ................................................................. 99

6.6.6 Peta Netpay ................................................................. 100

6.7 Perhitungan Cadangan Hidrokarbon ........................................... 101

6.7.1 Perhitungan volume gas ...................................................... 103

BAB VII KESIMPULAN ...................................................................... 104

DAFTAR PUSTAKA ............................................................................... 105

LAMPIRAN ......................................................................................... 107
DAFTAR TABEL

Tabel 1.1 Jenis Kegiatan dan Waktu Penelitian.........................................................4
Tabel 5.1 Kelengkapan Data Log Sumur .................................................................60
Tabel 6.1 Batas Kedalaman Formasi Talang Akar, Interval top hingga bottom ...... 65
Tabel 6.2 Ketebalan Lapisan “X” ..............................................................................66
Tabel 6.3 Tabulasi Hasil Petrofisika Kompartemen “A” ........................................ 85
Tabel 6.4 Tabulasi Hasil Petrofisika Kompartemen “B” ........................................ 85
DAFTAR GAMBAR

Gambar 1.1 Peta Struktur Cekungan Jawa Barat Utara (Noble, 1977) .................... 1
Gambar 1.2 Lokasi daerah telitian (Peta Geologi Lembar Indramayu, 1995) ........ 4
Gambar 3.1 Fisiografi Jawa Barat (Van Bemmelen, 1949) ................................. 13
Gambar 3.2 Jalur Subduksi Meratus (Kapur Akhir-Tersier Awal) dan
   Jalur Subduksi Tersier Akhir (Hutchison, 1982) ..................................... 14
Gambar 3.3 Peta Struktur dan Tektonik Oligosen Awal pada Cekungan
   Jawa Barat Utara (Gresko et al., 1995) .................................................. 15
Gambar 3.4 Pergerakan dari selatan dari Kapur sampai Eosen Awal,
   yang kemudian membentuk batas selatan Paparan Sunda
   (Sribudiyanti et al., 2003) ........................................................................ 16
Gambar 3.5 Cekungan-cekungan pull apart yang terbentuk pada Eosen
   Tengah sampai Oligosen Awal (Daly et al., 1987) .................................... 17
Gambar 3.6 Geologi Regional Cekungan Jawa Barat Utara (Martodjojo, 1984) .... 17
Gambar 3.7 Penampang Tektonik Kapur-Miosen (Martodjojo, 1984) ................... 18
Gambar 3.8 Paleogeografi Kala Kapur-Awal Eosen (Martodjojo, 1984) .......... 19
Gambar 3.9 Penampang Tektonik Geologi Miosen Awal-Aakhir Miosen
   Tengah (Martodjojo, 1984) ...................................................................... 20
Gambar 3.10 Paleogeografi Kala Miosen Awal (Martodjojo, 1984) ................... 21
Gambar 3.11 Penampang tektonik geologi Miosen Akhir-Resen
   (Martodjojo, 1984) .................................................................................. 22
Gambar 3.12 Paleogeografi Kala Miosen Akhir (Martodjojo, 1984) ................. 22
Gambar 3.13 Perubahan muka air laur global Cekungan Jawa Barat Utara
   (Martodjojo, 1984) .................................................................................. 24
Gambar 3.14 Lingkungan pengendapan pada Cekungan Jawa Barat Utara
   (Nopyansyah, 2007) ................................................................................. 25
Gambar 3.15 Stratigrafi Cekungan Jawa Barat Utara (Martodjojo, 1984) ......... 29
Gambar 3.16 Sistem Petroleum Cekungan Jawa Barat Utara
(Sribudiyanti et al., 2003) ..................................................................................30

Gambar 4.1 Ilustrasi logging, dan grafik hasil logging (Ellias&Singer,2007) ........35

Gambar 4.2 Indikasi lingkungan pengendapan dari kurva log GR/SP
(Walker, 1992) ........................................................................................................39

Gambar 4.3 Indikasi fasies pengendapan dari kurva log GR/SP, merupakan
model log dan fasies sedimen yang ideal (modifikasi dari
Serra, 1972; Parker, 1977; Galloway dan Hobday, 1983
dalam Rider, 1996) ..................................................................................................39

Gambar 4.4 Contoh pola kurva log Gamma Ray (GR) untuk erosi dasar
channel. Erosi terjadi pada bagian dasar dari sikuen penghalusan
ke atas yang diinterpretasikan sebagai alluvial channel.
(Rider, 1996) ........................................................................................................40

Gambar 4.5 Contoh kurva log yang menunjukkan sequence boundary,
merupakan batas yang jelas dan dikenal sebagai suatu bidang
erosional (tidak selalu). Gilbert type delta dengan pasir kasar
menumpuk distal shelf shale menunjukkan perubahan facies
ke arah cekungan. (Rider, 1996). ........................................................................41

Gambar 4.6 Kurva log yang menunjukkan flooding surface dengan bidang
tegas, terjadi perubahan nilai yang mendadak pada log
densitas dan resistivitas. (Rider, 1996) .................................................................41

Gambar 4.7 Kurva log yang menunjukkan transgressive surface
dengan bidang erosional. (Rider, 1996). .................................................................42

Gambar 4.8 Ekspresi log yang menunjukkan maximum flooding surface
sebagai condensed section (Rider, 1996) .................................................................43

Gambar 4.9 Pola ekspresi kurva log yang menggambarkan system tract,
termasuk endapan laut dalam (oleh Vail dan Wordnard,1990
dalam Rider, 1996). .................................................................................................43
Gambar 4.10 Contoh *line* yang menunjukkan pola sesar yang memotong beberapa horizon ................................................................. `45

Gambar 4.11 Kedudukan horizon yang menggambarkan jenis sesar

(Marfurt et al., 2000) ........................................................................................................46

Gambar 4.12 Model lingkungan pengendapan delta (JC Horne, 1978) .............. 50

Gambar 4.13 Bagian – bagian sand deposit pada system delta

(Coleman and Prior, 1982) .................................................................................................. 51

Gambar 4.14 Morfologi Delta (Allen, 1998) ................................................................. 54

Gambar 5.1 Peta Dasar (*Basemap*) ............................................................................. 59

Gambar 5.2 Contoh pola kurva log sumur KR-09 ..................................................... 61

Gambar 5.3 Data mudlog sumur KR-09 ............................................................. 62

Gambar 5.4 Data kemiringan (dip) sedimen pengendapan KR-08 pada interval top dan bottom yang berarah barat laut-tenggara................. 63

Gambar 5.5 Basemap sumur lapangan “DIK” ............................................................... 64

Gambar 6.1 Model lingkungan pengendapan (JC. Horne, 1978 `..............................) 69

Gambar 6.2 Interpretasi fasies dan lingkungan pengendapan sumur KR-09........... 70

Gambar 6.3 Penampang korelasi pada sumur penelitian lapangan DIK............... 71

Gambar 6.4 Korelasi stratigrafi sumur KR06-ML06-ML07................................. 73

Gambar 6.5 Korelasi stratigrafi sumur KT01-KR13-KR08-KR09 ......................... 74

Gambar 6.6 Korelasi stratigrafi sumur JK01-ML06-KR09 ................................. 75

Gambar 6.7 Korelasi stratigrafi sumur TM01-ML06-ML07 ............................. 76

Gambar 6.8 Korelasi stratigrafi sumur KR06-ML06-ML07 .............................. 77

Gambar 6.9 Korelasi stratigrafi sumur KB01-ML01-JK01 ................................. 78


Gambar 6.11 Korelasi struktur sumur TM01-ML06-ML07 .............................. 80

Gambar 6.12 Korelasi struktur sumur JK01-ML06-KR09 ................................. 81

Gambar 6.13 Korelasi struktur sumur KB01-TM01-JK01 ............................... 82

Gambar 6.14 Peta Paleogeografi yang menunjukkan arah sedimen sesuai dip
meter dan hasil korelasi stratigrafi yang diinterpretasikan sebagai lingkungan Lower Delta Plain .............................................83

Gambar 6.15 Penarikan shale line dan sand line pada sumur KR-08 .........................84
Gambar 6.16 Peta dasar (basemap) lapangan DIK .................................................................86
Gambar 6.17 Hasil ekstraksi wavelet pada proses well seismic tie
sumur ML-06 ..........................................................................................................................87
Gambar 6.18 Basemap kenampakan picking seismik .........................................................89
Gambar 6.19 Section seismik dari interpretasi sesar dan horizon (A) .........................90
Gambar 6.20 Section seismik dari interpretasi sesar dan horizon (B) .........................91
Gambar 6.21 Section seismik dari interpretasi sesar dan horizon (C) .........................92
Gambar 6.22 Peta struktur waktu lapisan “X” interval TOP ........................................94
Gambar 6.23 Peta struktur waktu lapisan “X” interval BOTTOM .....................................94
Gambar 6.24 Peta struktur kedalaman lapisan “X” interval TOP ....................................96
Gambar 6.25 Peta struktur kedalaman lapisan “X” interval BOTTOM ............................96
Gambar 6.26 Peta gross sand lapisan “X” ...........................................................................97
Gambar 6.27 Peta netsand lapisan “X” .............................................................................98
Gambar 6.28 Batas LKG kompartemen “A” .................................................................99
Gambar 6.29 Batas LKG kompartemen “B” .................................................................99
Gambar 6.30 Peta Netpay lapisan “X” unit kompartemen “A” .................................100
Gambar 6.31 Peta Netpay lapisan “X” unit kompartemen “B” .................................101