

Graphical Analysis of Publicly Available Monitoring Well Databases to Evaluate and Categorize
Groundwater Recovery Across Alberta, Canada

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

A graphical analysis method is applied over the province of Alberta, Canada using publicly available water level data from standard monitoring wells to evaluate and categorize aquifer recovery. Agriculture in the province relies heavily upon surface water for irrigation, which is increasingly unreliable due to climate change and increasing climate variability. Due to an expected future reliance on groundwater, it is necessary to better understand groundwater flow and aquifer characteristics across Alberta to prevent over-allocation of groundwater resources. Water level data from provincial monitoring well hydrographs are examined and graphically analyzed to broadly characterize recovery in agriculturally significant regions of the province of Alberta, Canada. Through this analysis, the presence of a recharge boundary within a recovery curve can be ascertained. Of the 292 monitoring wells originally screened, recovery curve analysis is conducted on 49 monitoring wells. Using graphical analysis of recovery curves within monitoring well hydrographs, the presence or absence of recovery or aquifer replenishment in an area immediately surrounding monitoring well screens is determined. 785 recovery curves from the 49 monitoring wells are subsequently categorized as either “enhanced recovery”, “normal recovery”, or “inconclusive”, with continuing discussion and analysis focusing on results from 36 wells located in three significant aquifers within the province. These aquifers include the Paskapoo aquifer, aquifers within the irrigation districts of southern Alberta, and surficial aquifers within agriculturally rich regions of the province. Results demonstrate the presence of a potential recharge signal deviating from standard Theis recovery curve in 97.22% of the 36 monitoring wells studied. In individual wells, recovery curve classifications vary over time, with some recovery curves being classified as “normal recovery”, and some being classified as “enhanced recovery”, showing signs of a possible recharge boundary. This classification depends on the characterization of late-time recovery curve behavior, as pumping signals transition to regional aquifer signals over time. Analyzed hydrographs show the influence and effects of changes in groundwater pumping on surrounding water levels, including through change in water policy. This method provides information about the presence or absence of recharge over a large area, in contrast to traditional methods of determining recharge which cover smaller areas in comparison. However, a comprehensive database of monitoring well data are required to facilitate analysis, as 48.76% of recovery curves analyzed were classified as “inconclusive”. It is recommended that results from this method are paired with data such as climate indices or agricultural usage, to help determine possible correlations between results and climatic, geographic, or agricultural factors.

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Research for this thesis is conducted on traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples and situated on the Haldimand Tract, land which was promised to the Six Nations peoples. The study site analyzed in this thesis is located on land from Treaties 4, 6, 7, 8, and 10, as well as Métis settlements.

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Eventually, all things merge into one, and a river runs through it. The river was cut by the world's great flood and runs over rocks from the basement of time. On some of the rocks are timeless raindrops. Under the rocks are the words, and some of the words are theirs.

I am haunted by waters.

—Norman Maclean, *A River Runs Through It and Other Stories*

Chapter 1: Introduction

Typically, groundwater recharge on a larger scale is determined through water balance calculations, groundwater modelling, or observing changes in groundwater storage using remote sensing data such as from the GRACE satellites (Brookfield et al., 2018; Wu et al., 2019; Senthilkumar et al., 2019; Döll and Fiedler, 2008). These methods are not always ideal. It is expensive and time consuming to construct models, and data of sufficient quality are needed to output good quality results. Data obtained from GRACE satellites are better suited for studies where generalized conclusions can be drawn, due to low spatial resolution and limited precision (Jiang et al., 2014; Castellazzi et al., 2016). Identifying groundwater recharge on a large scale is thus not an easily solvable problem.

To consider smaller landscape features or to provide results on precise locations, another approach that considers recharge on a local scale is required. Pumping tests commonly provide information on aquifer boundary conditions, hydrogeologic parameters, and maximum well yield. They can obtain information over a local to regional area, especially when repeated tests are conducted in multiple wells. Several analytical solutions have been developed to analyze water level response to pumping based on differing physical conditions and assumptions (Kruseman and de Ridder, 1990). The solutions are commonly solved by plotting aquifer drawdown versus time in response to a pumping event or other stressors in log-log or semi-log space, providing estimates for various hydrogeologic parameters (e.g., hydraulic conductivity). However, solving for these parameters requires precise information, including pumping rate, distance to the pumping well, and the time pumping started and stopped. As a result, pumping tests are expensive and time consuming to properly conduct. Yet, even without that precise information, key insights about boundary conditions and other aquifer dynamics can be determined from long-term hydrograph data that are qualitatively evaluated in a manner similar to a pump test (Butler et al., 2013). By analysing the behavior of residual drawdown (or recovery curves) over time after the cessation of a pumping signal, the presence of boundary conditions in the area surrounding the monitoring well, such as recharge boundaries, can be ascertained. This approach was used previously on a small scale to analyze conditions near three wells (Butler et al., 2013), and it should be possible to apply this method across a larger region using routinely collected groundwater data from standard monitoring well databases. This qualitative assessment of long-term recovery would then provide information on aquifer dynamics, including processes such as recharge, inflow, and aquifer mining in the area surrounding these wells.

The goal of this research is to determine to what extent existing publicly available groundwater level monitoring data can be used to evaluate patterns of recovery in the absence of information on surrounding pumping wells. Agricultural areas of Alberta, Canada are the focus of this study due to its agricultural importance and prevalence of publicly available and readily accessible groundwater monitoring well data. Using routinely collected groundwater level monitoring data collected and stored in an online database, the potential to identify areas of recharge is evaluated by graphically analyzing water level response to regular agricultural

pumping. The method is a cost-effective way of broadly assessing aquifer dynamics, as analyzing previously collected hydrograph data is much less expensive than installing new wells and sensors to collect additional data or conducting multiple pumping tests across a large region.

Chapter 2: Background

2.1: Study Area

The province of Alberta, Canada, is the focus of this study due to its agricultural importance in Canada and the extensive available groundwater level data. The study area is limited to areas within the province where land use is predominantly agricultural and there is currently intensive irrigation and/or groundwater pumping for agriculture. While groundwater pumping and irrigation both occur throughout the province, their zones of intensity vary. Irrigation from surface water is the most common source of irrigation water within Alberta, with most surface water irrigation licenses issued in the southeast due to the semi-arid climate and fertile soil (*Figure 1*) (Alberta Government, Agriculture and Irrigation, 2023).

This study focuses on the Paskapoo aquifer, southern Alberta aquifers, and surficial aquifers across the province (*Figure 2*), but considers groundwater level data from monitoring wells from aquifers across the province of Alberta. The Paskapoo aquifer is selected for study due to the large number of monitoring wells with available data, as well as its location below a rapidly growing urban area of the province (Alberta Government, Treasury Board and Finance, 2023). Situated underneath the urban corridor connecting the cities of Calgary and Red Deer (*Figure 1*), more wells pump from this aquifer than any other aquifer in the Canadian prairies (Groundwater Information Network, 2021). Several smaller aquifers and buried valley aquifers are present in Southern Alberta. In this agriculturally important region, agriculture relies on surface water for irrigation. Surface water supplies in this semi-arid region are likely to become unreliable with climate change, as diminishing snowpack in the winter months has reduced the amount of surface water this region receives (Government of Alberta, 2024). Thus, these smaller aquifers and surficial aquifers are more likely to be relied upon to fulfil irrigation requirements as surface water sources becomes unreliable over time. Finally, the extensive surficial aquifers are studied as they provide an important source of groundwater to the province and will be exploited first as groundwater use increases.

Studies have been previously conducted on groundwater recharge in several Alberta aquifers (Huang et al., 2016; Bhanja et al., 2018; Bhanja and Wang, 2021; Berthold et al., 2004); however, research on mapping recharge zones in the province are lacking. Previous studies focused on identifying recharge locations in individual watersheds or single aquifers rather than on a larger, provincial scale (Niazi et al., 2017; Ophori and Tóth, 1989; Hayashi and Farrow, 2014; Poschmann, 2007; Hendry, 1983; Hendry, 1988; Grasby et al., 2008). These studies employed methods typically used when identifying recharge, such as modelling, geophysical mapping, baseflow analysis, chloride mass balance, and in-situ measurements. Research quantifying recharge zones on a national scale used statistical analysis of Canadian baseflow and groundwater data (Rivard et al., 2009).

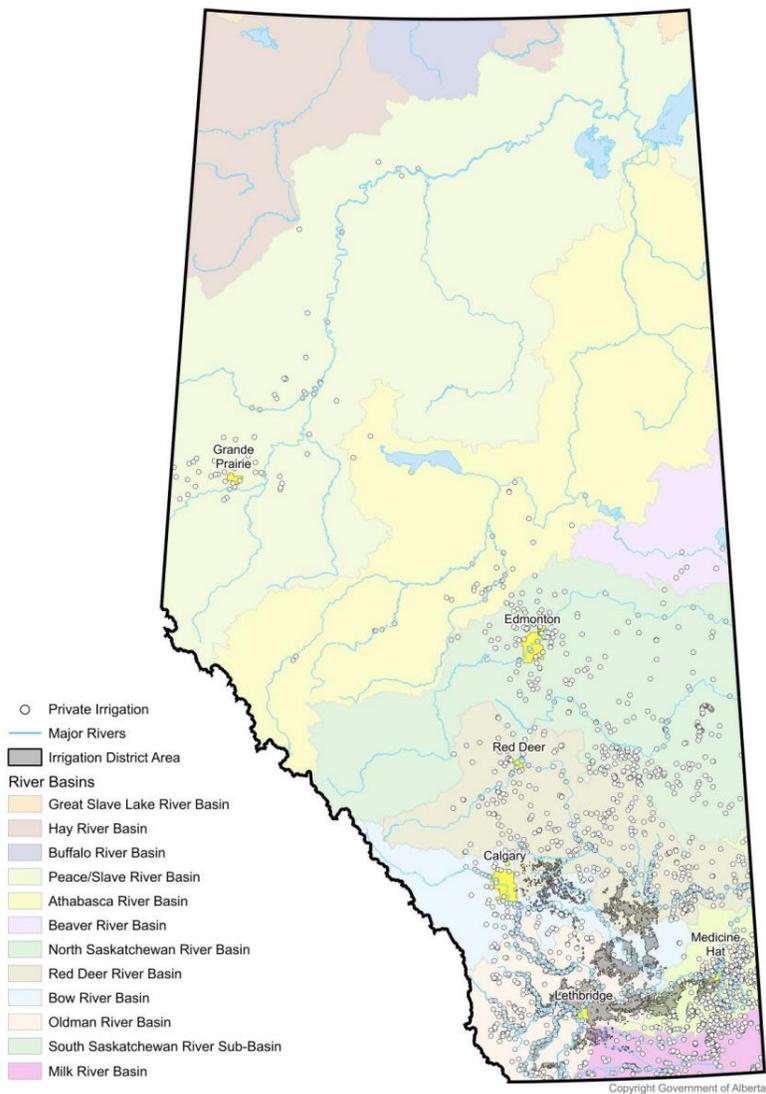


Figure 1: Map of location of private irrigation licenses for surface water diversions in Alberta (from Government of Alberta 2022).

2.1.1: Agriculture and Irrigation in Alberta

The province of Alberta is important to agricultural production in Canada, hosting ~32% of Canada’s total agricultural land, 27.6% of its total cropland acreage, and 21.9% of the country’s total number of farms (Statistics Canada, 2022). Agricultural activity is concentrated in the south-eastern corner of the province, south of Edmonton (Figure 1) and east of the Rocky Mountains (Figure 2), as well as in the northwest, in the Grande Prairie region (Figure 1). Cropland acreage is growing in the province; between 2016 and 2022, overall cropland increased by 1.6%, with land devoted to growing canola and barley increasing by 8.4% and 15.7%, respectively (Statistics Canada, 2022). Overall harvests have risen as well; the 31 million tonnes

of crops harvested in 2022 is a 10.3% increase compared to the average over the previous ten years (Government of Alberta, 2023).

Irrigation systems have been used in Alberta since the beginning of the 20th century, with the industry growing and adapting to new technologies and the changing climate over time (Government of Alberta, 2023; Klassen and Gilpin, 1999). Agriculture in southern Alberta relies on irrigation due to the region's semi-arid climate, with yearly precipitation averaging < 450mm. Irrigation in Alberta consists mainly of surface water irrigation systems that divert water from rivers and reservoirs, infrastructure for which is concentrated in Alberta's 11 irrigation districts (*Figure 3*). Although concentrated in the southern portion of Alberta, surface water irrigation licenses are registered throughout much of the agriculturally viable lands of the province (*Figure 1*) (Alberta Government, Agriculture and Irrigation, 2023). In 2021, a total of 9.78 billion m³ of freshwater was allocated for use across all industries in the province, with over 96% sourced from surface waters, compared with 1.6 billion m³ of freshwater allocated for irrigation in 2022 (Alberta Energy Regulator, 2022; Statistics Canada, 2023). Data is sparse on how much groundwater is allocated for irrigation in Alberta; in 2009 this parameter was graphically represented in a comparative manner from most to least (*Figure 4*).

Water requirements for various popular Alberta crops vary depending on the plant species and stage of growth (*Figure 5*). Optimal irrigation requirements for popular crops in southern Alberta differs greatly depending on the location grown and is linked to growing season precipitation and the potential evapotranspiration for each species (Bennet and Harms, 2011; Bennet et al., 2014). For instance, the potential water required to grow alfalfa, a water intensive crop, differs by ~60 mm across the region. For most crops, total and peak water usage amounts vary, with peak usage occurring in July. Water use for barley requires an average of 384-447 mm of water per year, which peaks in July at ~6.5 mm/day (Bennet and Harms, 2011; Bennet et al., 2014). In contrast, alfalfa requires an average of 687-747 mm of water per year for proper growth and has variable amounts of peak water use across multiple harvests in a single year, declining from ~8.5 mm/day during the first cut to ~7 mm/day before the last cut (Bennet and Harms, 2011; Bennet et al., 2014). Thus, crop selection and location affect water requirements, influencing the irrigation demands across the province.

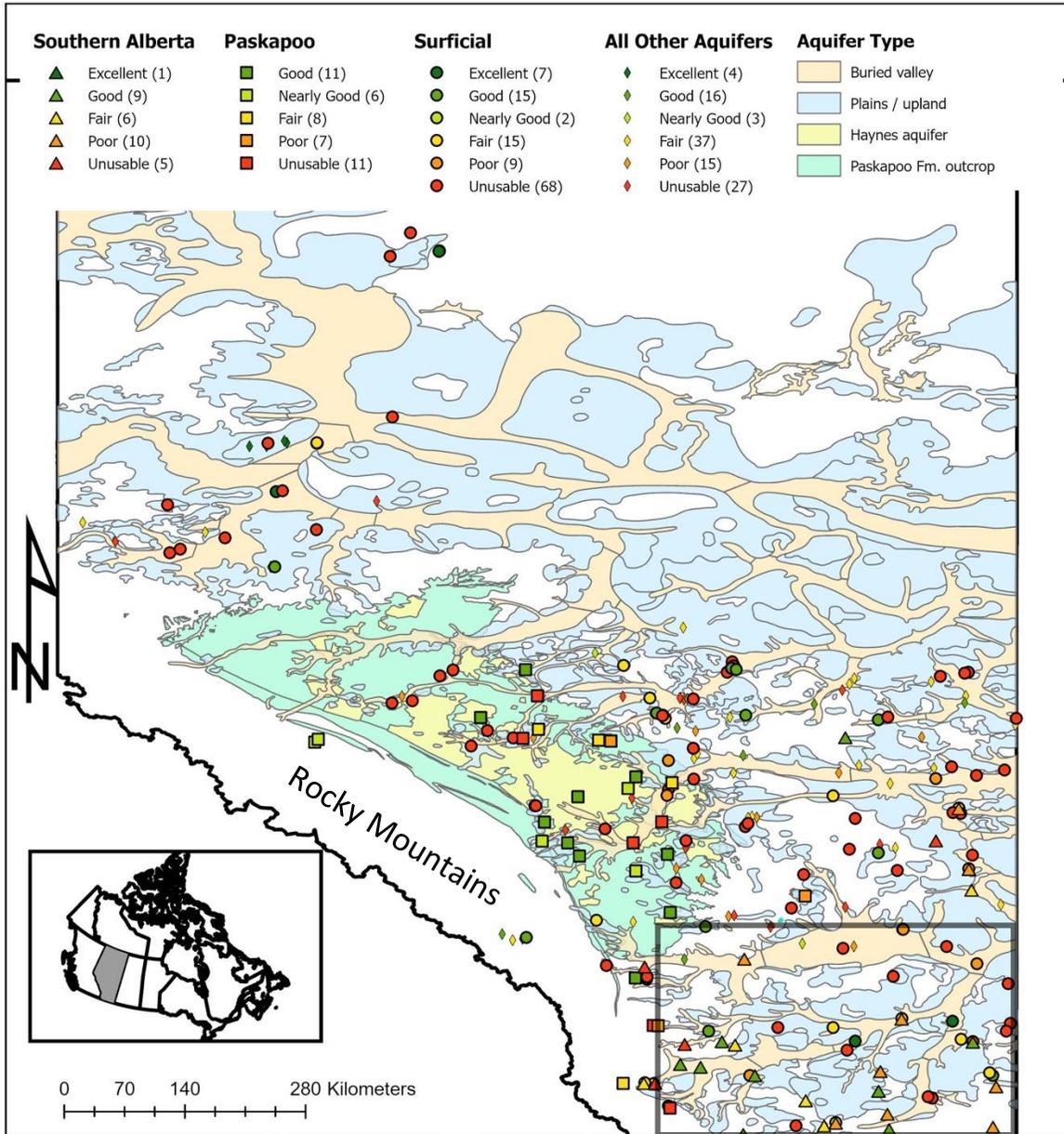


Figure 2: Map showing the distribution of studied Groundwater Observation Well Network (GOWN) monitoring wells in the study site. Each point represents an analyzed monitoring well, organized by colour and shape. Triangles indicate wells in the southern Alberta aquifers, squares represent wells in Paskapoo aquifer, circles represent wells in surficial aquifers, and all other wells are indicated by diamonds. Data quality, as described in the methods, is organized by colour from Excellent to Unusable. The area of Southern Alberta is delineated by a grey rectangle in the bottom right corner of the map. Surficial aquifer map data from Hartman et al. (2023). Paskapoo aquifer map data from Alberta Government (2024).

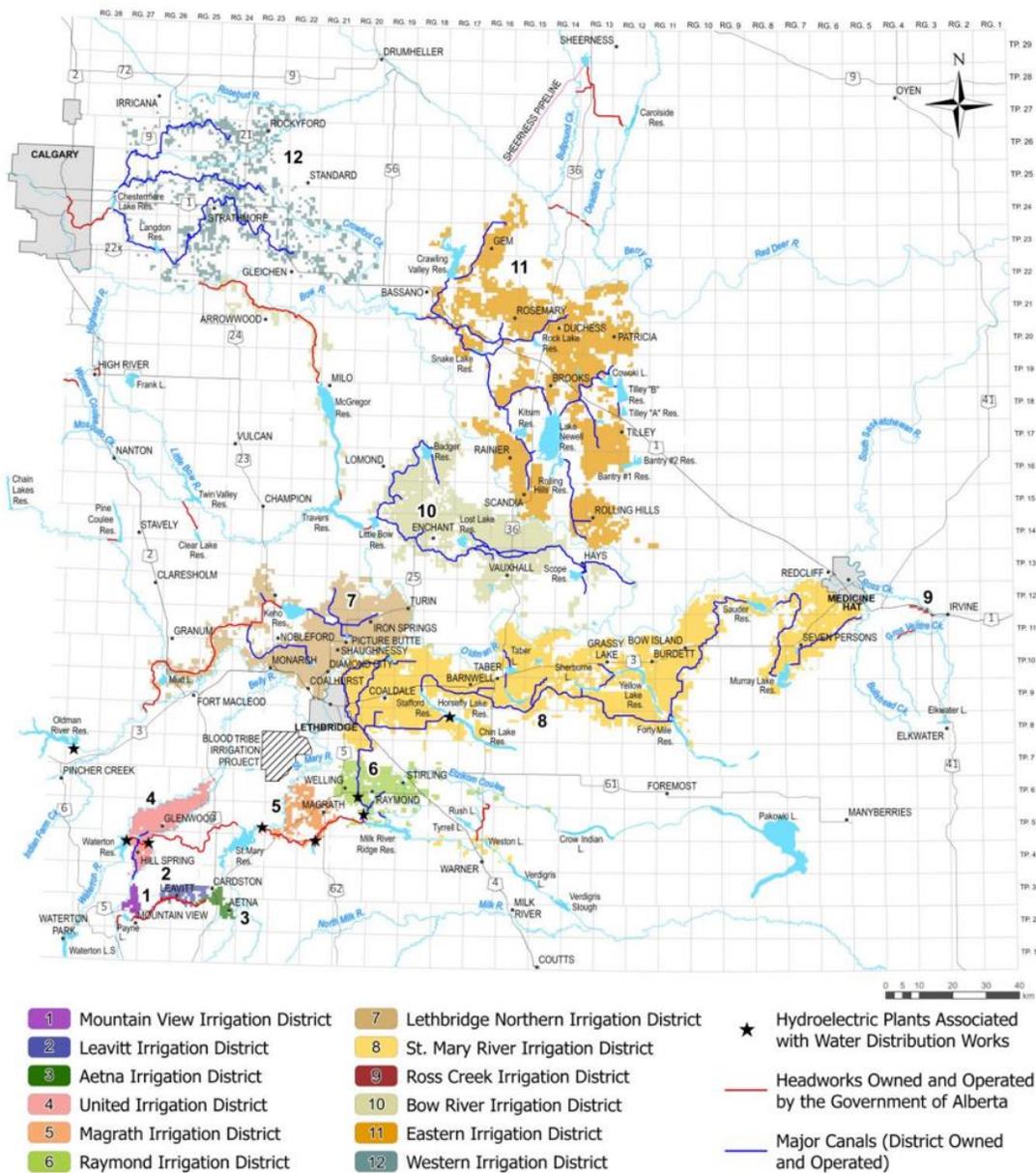


Figure 3: Map of irrigation districts in southern Alberta, (from Government of Alberta, 2022). These irrigation districts are designed to manage surface water for their irrigation needs.

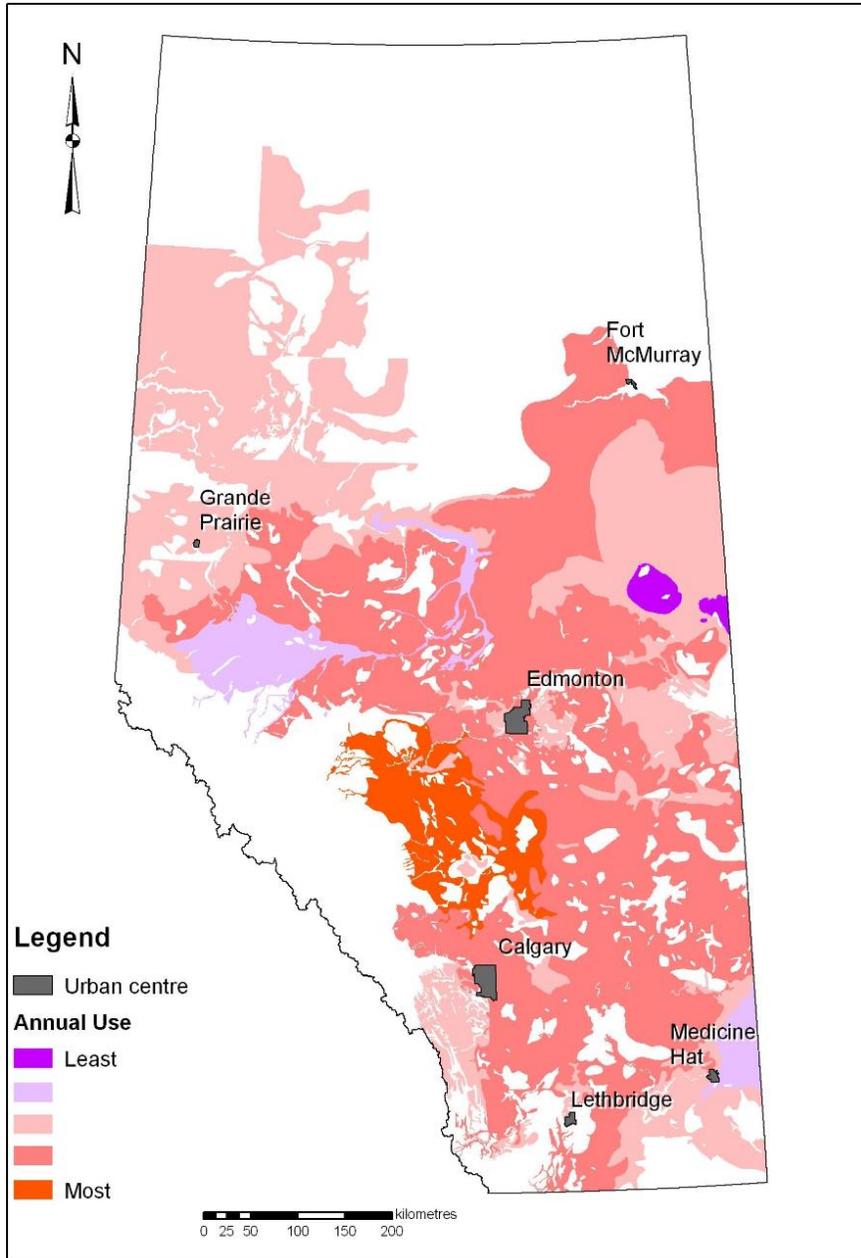


Figure 4: Groundwater use for irrigation c. 2007 (from Lemay and Guha 2009).

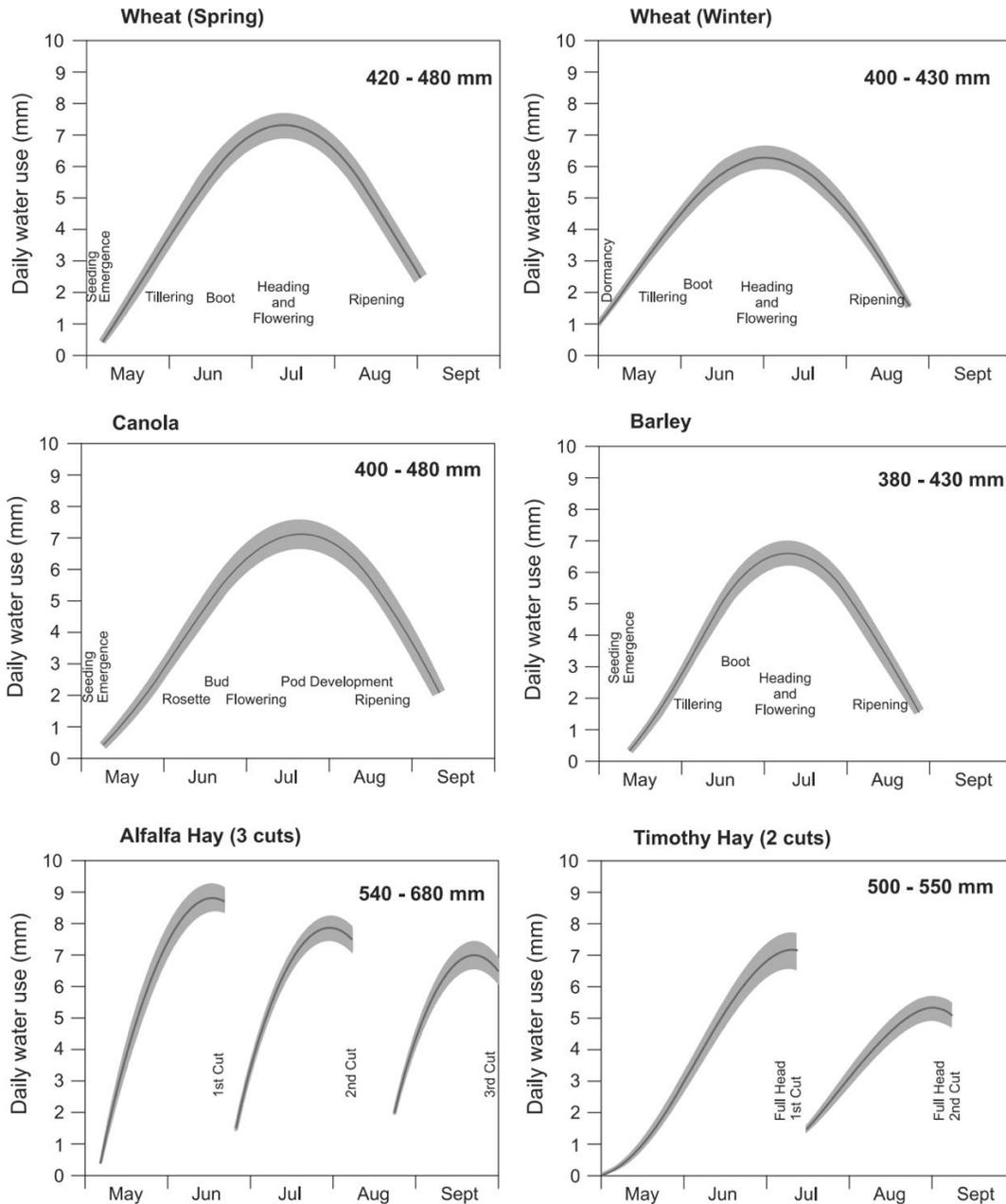


Figure 5: Daily water requirements for common Alberta crops, (from McKenzie and Woods 2011). Gray areas represent variability in water requirements due to crop cultivar, growing conditions and environmental conditions. Values in the top right corners represent the approximate amount of water required for a given species during an entire growing season.

2.1.2: Water Scarcity in Southern Alberta

Since irrigation in southern Alberta is reliant on surface water flows, which are heavily reliant upon winter precipitation, irrigation is influenced by climate variability. Melting snowpacks from the prairies contribute to river flows in April, whilst melting snowpack in the Rocky Mountains provides flow from mid-April to June (Government of Alberta, 2018). Meteorological drought, characterized by below average precipitation, can severely limit these surface water flows. Such conditions have existed in Alberta since 2022, with below average snowfall in the ongoing drought resulting in reduced river water levels and reservoir water storage throughout the province. For example, by April 15th, 2024, the average amount of water stored in Alberta's reservoirs was 43.4% of total capacity, compared to the between 59% and 76.8% of capacity that is typical in mid-April (Government of Alberta, 2024). Palaeoecological evidence indicates drought is common in southern Alberta, and historically more frequent compared to instances of drought since colonisation and cultivation of the area (Sauchyn and Skinner, 2001; Schindler and Donahue, 2006). Today, much of Alberta receives 14-24% less precipitation than it did during the late 19th and early 20th century, and mountain snowpack, which contributes to surface water flows, has also decreased in thickness and longevity due to warmer temperatures (Schindler and Donahue, 2006). As glaciers retreat and mountain snowpacks decline, there is a risk that surface water irrigation in southern Alberta is not sustainable, a situation that will be compounded as irrigation requirements increase to sustain crops as climate change increases the summer temperatures and reduces precipitation (Eum et al., 2023; Jiang et al., 2017). With increasing drought and warmer winter temperatures, the reliability of surface water sources will become strained, and groundwater will become more important for farmers looking to maximize harvests (Famiglietti, 2014). Over pumping of the province's aquifers during drought may lead to groundwater depletion, which has previously occurred in aquifers located in the Colorado River Basin and California's Central Valley, USA (Famiglietti et al., 2011; Castle et al., 2014). To continue the current intensity of agricultural operations in the area as well as supply water for planned irrigation expansions (Government of Alberta, 2020), groundwater supplies will necessarily be increasingly relied upon to fulfill irrigation requirements, supplementing surface water deficiencies (Famiglietti, 2014).

2.1.3: Hydrogeology of Alberta

Aquifers in Alberta can be separated into three broad categories based on their lithology: surficial aquifers, buried valley aquifers, and bedrock aquifers (*Figure 6*). Surficial aquifers, composed primarily of permeable till, are found throughout the province (*Figure 2*). Buried valley aquifers in the Canadian prairies formed as valleys that eroded into the underlying bedrock and were then buried by poorly sorted terrigenous till (Cummings et al., 2012). These aquifers cover most of the study area, featuring prominently over major agricultural zones, and are important to the Canadian prairies as a whole, supplying water for urban, agricultural, and industrial uses (*Figure 2; Figure 7*) (Cummings et al., 2012). Bedrock aquifers are typically the deepest of the three aquifer types, and are composed of sandstone, siltstone, mudstone, and shale.

Bedrock aquifers represent many of the major aquifers pumped in Alberta, including the Paskapoo aquifer and Bearpaw Formation (Barker et al., 2013). Although data are available from many bedrock aquifers, this study focuses on the Paskapoo aquifer and seven smaller aquifers in southern Alberta, in addition to the many surficial and buried valley aquifers across the province, all of which are described further below.

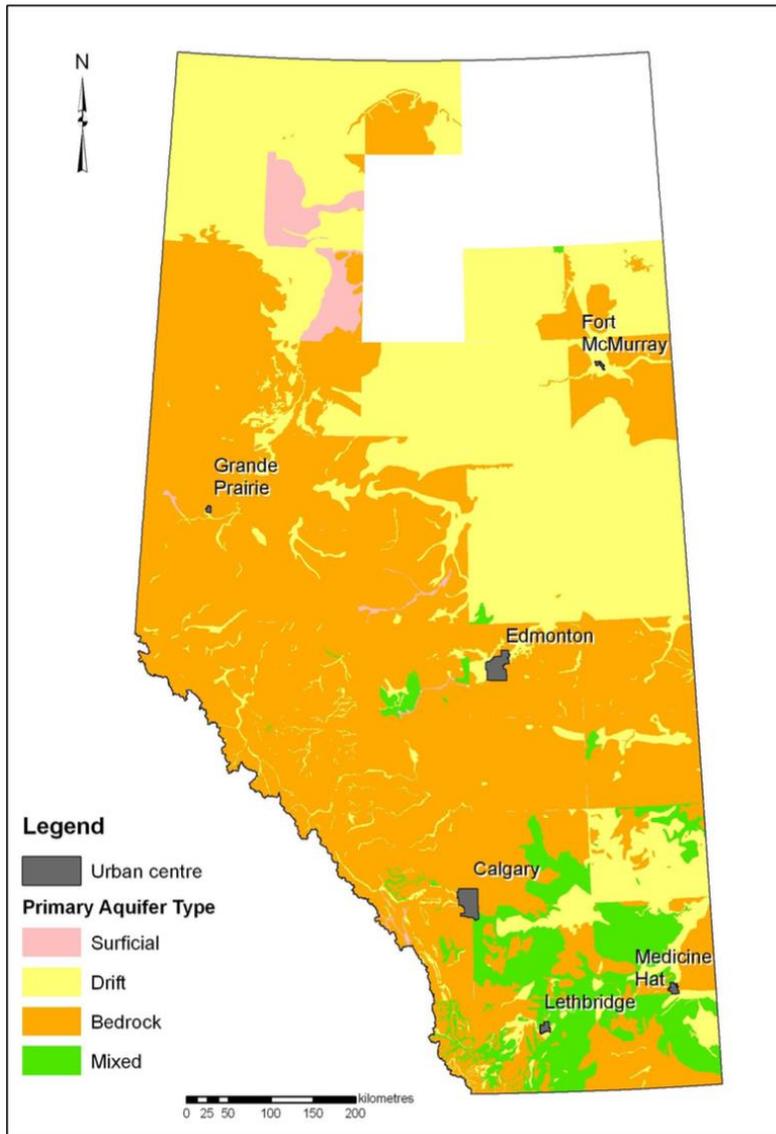


Figure 6: Map of aquifer types in Alberta based on geological sediment data (from Lemay and Guha 2009). Map was constructed by combining information from raster images of relevant geographical maps and GIS information to produce designated vector polygons. Lithology related to surface deposits are labelled as “Surficial”, glacial drift is classified as “Drift”, and bedrock sediments are labelled as “Bedrock”. Aquifers where the lithology is a combination of surficial, drift, and/or bedrock sediment data are labelled as “Mixed”.

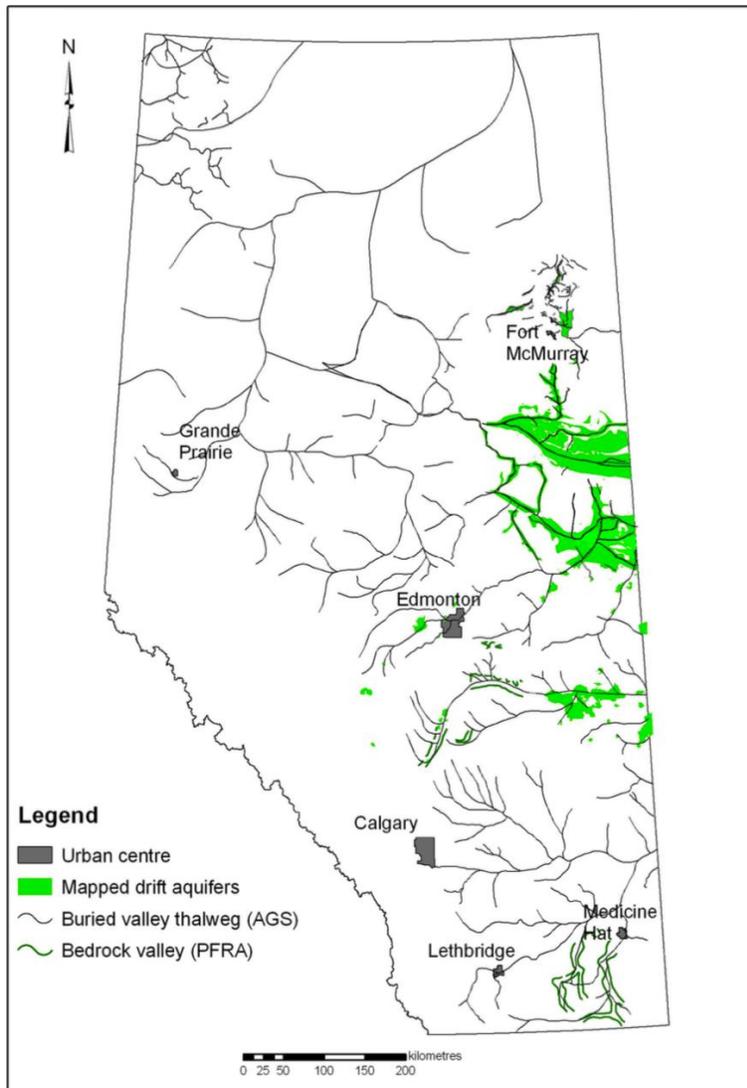


Figure 7: Map of hydrogeologically significant buried valley aquifers, bedrock valley aquifers, and drift aquifers, from Lemay and Guha (2009).

2.1.3.1: The Paskapoo Aquifer

The Paskapoo aquifer is in an extensive Paleocene formation spanning a large portion of Alberta (Figure 2). The Paskapoo Formation is composed primarily of siltstone and mudstone units with fine to coarse grained fractured sandstone units between them. The thickness of these sandstone units varies, with an average thickness of 6.5m and a maximum thickness of 50m (Grasby et al., 2008). This large, heterogenous aquifer is divided into three sections: the Haynes Member, the Lacombe Member, and the Dalehurst Member. The ratio of sandstone to siltstone and mudstone varies between these three units, with the productive Haynes member being comprised of 70-90% sandstone and 10-30% mudstone (Grasby et al., 2008). Borehole data was used to determine the thickness of coarse-grained sediment layers in the Paskapoo Fm., mapping out potentially productive areas for well construction (Lemay and Guha, 2009). The borehole

compositional data illustrate the productive nature of the aquifer; layers of transmissible coarse-grained material are found throughout the Paskapoo Formation (*Figure 8*).

Pumping in the Paskapoo aquifer is common; it contains the largest number of wells compared to other Alberta aquifers, supporting a growing population in a region where no new surface water allocations will be licensed (Grasby et al., 2008). As the major cities overlying the aquifer grow, the Paskapoo aquifer will be under increasing pressure to supply water. Projections suggest that the population of Alberta will grow to 7.1 million people by 2051, with 81% of expected to live within the Calgary-Edmonton corridor, much of which overlies the Paskapoo aquifer (Government of Alberta, 2023). Thus, demand for groundwater from this aquifer is likely to increase over time.

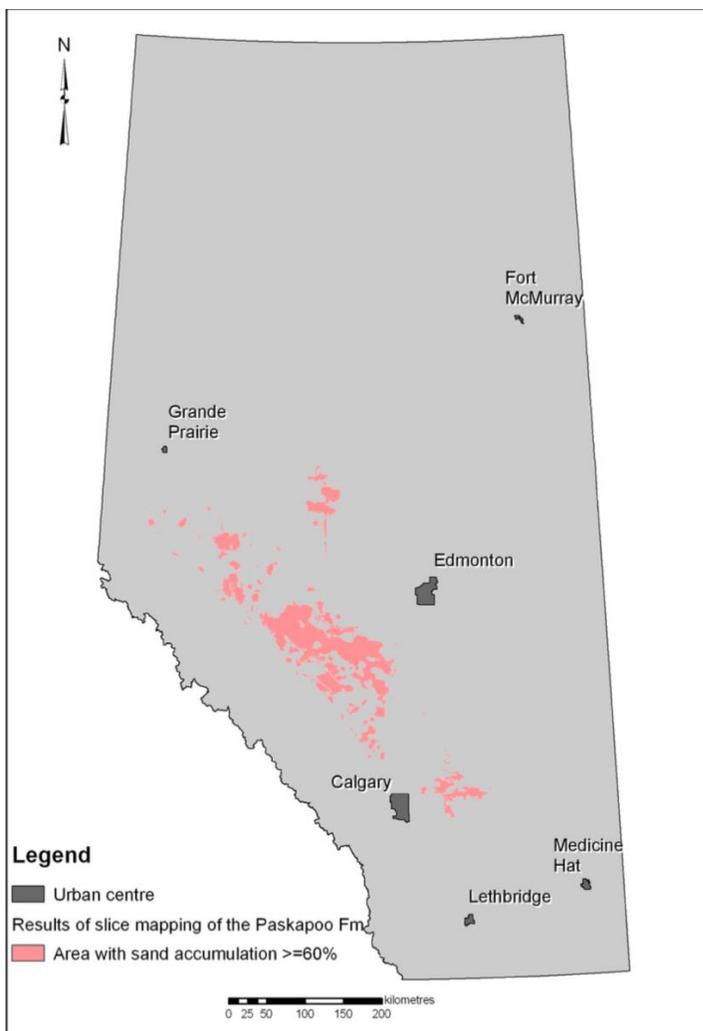


Figure 8: Map of hydrogeologically significant bedrock sediments in the Paskapoo and Scollard Formations (from Lemay and Guha 2009). The Scollard Formation underlies the Paskapoo Formation.

2.1.3.2: Southern Alberta Aquifers

Various aquifers and permeable formations are situated in the southern area of Alberta, underlying the semi-arid agricultural region. Here, the Milk River aquifer, the Bearpaw Formation, the Lethbridge Valley aquifer, the Oldman aquifer formation, the Mud Valley aquifer, the Lea Park aquifer, and the Porcupine Valley aquifer are considered. In descending stratigraphic order, the Bearpaw, Oldman, Lea Park, and Milk River Formations overlie one another, although they are not connected hydraulically, with other formations being present between them. These confined and semi-confined formations are composed of both permeable units such as sandstone and siltstone, and impermeable units such as shale (*Figure 9*). Of these, the Milk River aquifer is the most well-known and is composed mostly of sandstone aquifer and shale aquitard deposits (Meyboom, 1959). Previous studies indicated groundwater pumping in confined sections of the Milk River aquifer is unsustainable (Pétre et al., 2019; Pétre et al., 2016). If pumping increases due to changes in precipitation and/or temperature (Famiglietti, 2014), depletion could accelerate. The Porcupine Valley and Lethbridge Valley aquifers are not included on *Figure 9*, with information on these aquifers sparse. Wells currently drilled into seemingly impermeable formations, such as the Bearpaw or Lea Park Formations, may be pumping from small sandstone aquifers found between shale beds. They are thus worth studying as it is possible that they are susceptible to being depleted more quickly compared to mainly permeable sandstone formations such as the Milk River aquifer. Their depletion could also accelerate the depletion of nearby permeable strata if inflow from leaky aquitards enters into the system as a response to pumping.

Age	Lithology	Group and Formation	Member Designation	Aquifers	
Quaternary	Sand, Gravel, Clay, Silt	Surficial Deposits	Upper and Lower	Permeable Aquifer	
Tertiary	Miocene	Cypress Hills Formation		Permeable Aquifer	
	Paleocene	Sand, Silt, Shale, Coal, Sandstone, Mudstone	Dalehurst Member	Permeable Aquifer	
			Lacombe Member	Impermeable Aquitard	
Haynes Member	Permeable Aquifer				
Upper Cretaceous	Sandstone, Shale	Scollard Formation		Permeable Aquifer	
	Shale, Coal	Horseshoe Canyon Formation		Permeable Aquifer	
	Sandstone, Shale, Siltstone	Bearpaw Formation		Impermeable Aquitard	
	Campanian	Sandstone, Shale, Coal, Siltstone	Oldman Formation	Dinosaur Member	Permeable Aquifer
				Upper Siltstone Member	Permeable Aquifer
				Comrey Member	Permeable Aquifer
	Santonian-Campanian	Sandstone, Siltstone, Shale	Foremost Formation	Birch Lake Member	Impermeable Aquitard
				Ribstone Creek Member	Impermeable Aquitard
				Victoria Member	Permeable Aquifer
				Brosseau Member	Permeable Aquifer
Santonian-Campanian	Shale, Siltstone, Mudstone	Lea Park Formation		Impermeable Aquitard	
Santonian-Campanian	Sandstone, Siltstone, Shale, Coal	Milk River Formation		Permeable Aquifer	

Figure 9: Stratigraphic lithology of regions in southern Alberta (adapted from Mumpy & Catuneanu 2019; Hamdi and Goïta, 2023), showing how many of the southern Alberta formations overlie each other. Stratigraphic formations of note are the Cypress Hills, Paskapoo, Bearpaw, Oldman, Foremost, Milk River, and Lea Park Formations.

2.1.3.3: Surficial and Buried Valley Aquifers

Surficial and buried valley aquifers are relatively shallow silt, sand, or gravel aquifers that are closer to the surface compared to bedrock aquifers. Buried valley aquifer formations are alluvial river valleys which had previously carved through the bedrock surface during the Tertiary Period, now overlaid with coarse-grained material, such as sand and gravel in deeper strata, and mud-rich till in layers closer to the surface (Lemay & Guha, 2009; Cummings et al., 2012). These river valleys were filled in with till during the Quaternary Period following glaciation periods in the province, the exact composition of which varies depending on location. For example, buried valley formations closer to the western side of the province are rich in gravel till from the Rocky Mountains, while those on the eastern side contain a higher percentage of mud and sand (Cummings et al., 2012). Although the size and shape of buried valley formations vary, these formations were much larger than modern day alluvial rivers, with widths spanning tens of kilometers and depths reaching up to 160m deep (Cummings et al., 2012). These formations, like surficial aquifer formations, are found across the province of Alberta. (*Figure 2; Figure 7*).

Surficial aquifers and buried valley aquifers are important to study as they are distributed across Alberta and common across much of the agricultural land. Wells drilled into surficial aquifers are less costly to drill and operate than those in deeper bedrock aquifers, due to being relatively shallower and thus easier to construct. Thus, surficial aquifers are likely to be more intensely explored as solutions to future water shortages. Shallower surficial wells are more likely to run dry compared to deeper wells during times of drought, due to declining water tables, over-pumping, or both (Jasechko & Perrone, 2021; MacAllister et al., 2020; Calow et al., 2010). Therefore, it is important to study recovery in surficial aquifers to prevent the risk of future depletion. Additionally, many wells tapping surficial aquifers are located directly on top of other aquifers (*Figure 2*). As such, the surficial aquifers may be hydraulically connected to the deeper aquifers, and depletion to one may affect water levels and recharge in another.

Chapter 3: Methods

3.1: Monitoring Well Data

Several provincial and federal databases contain publicly available monitoring well water level data for analysis, but one of the best and most complete databases in Canada is maintained by the government of Alberta. This database, known as the Groundwater Observation Network, or GOWN, currently contains the water level data for 1,159 wells, 306 of which are actively monitoring water levels (Government of Alberta, 2024). The database also provides important information, such as the aquifer in which the well is screened, well elevation, well depth, basic lithology, geographical coordinates, and aquifer type (confined or unconfined). Additional information on the aquifers, such as aquifer lithology, depth, and type, were gathered as necessary from the Groundwater Information Network (GIN) database (Groundwater Information Network, 2024). This database contains information such as published studies, aquifer fact sheets, maps, and datasets from the Canadian federal government, various Canadian provincial governments, as well as the USGS.

The large number of monitoring wells in the GOWN database are screened for further study considering the following criteria. Monitoring wells in agricultural areas are identified based on geography; thus, wells outside of major agricultural areas are not considered. Wells not considered thus includes those located north of Edmonton, and the Rocky Mountains on the western border of the province. Areas with a large number of monitoring wells in a small area are not considered to provide as broad an overview as possible at this stage of study. The resulting dataset consists of 292 wells which were considered for further analysis. The selected wells are then organized based on several factors, including location, aquifer, presence and quality of water level data, and agricultural significance.

Data quality is determined by examining the hydrograph of each well over time and classifying it into one of six categories (**Table 1**). The factors contributing to this determination include the “noisiness” of the hydrograph data, the presence and length of data gaps, the number of pumping signals and the length and quality of water level recovery data following those inferred pumping events. For instance, hydrographs with continuous data and recording numerous pumping episodes resulting in smooth recovery and drawdown curves are labelled as “Excellent”. In contrast, wells with discontinuous water level data, filled with noise and/or with no discernable recovery or drawdown curves are labelled as “Poor” or “Unusable”. Only the 61 wells with data considered “Excellent” or “Good” are considered here for more detailed interpretation of water level response to pumping. The tabulated classification for each well is provided in Appendix B.

The “agricultural significance” of a well is defined here as the proximity of a given well to agricultural lands, such as cropland or grazing fields, based on several criteria as assessed using satellite imagery provided by Google Earth (Google, 2022). Wells located on or within approximately 50 meters of an agricultural field were deemed agriculturally significant, as are those located in rural agricultural towns (e.g. a small town of approximately 3-4 km², surrounded

by agricultural fields). In contrast, wells where agricultural fields are not present within approximately 200 meters (such as in wooded areas, hills, or large towns and cities) are classified as not agriculturally significant. An advantage of using water level data from wells in agricultural areas is that if the major use of groundwater in the area is for irrigation, there will be a strong seasonal pumping signal, such as increased pumping in the summer months and little/no pumping during winter months. This increases the chance for wells to have longer, uninterrupted recovery curves with which to study. Based on these criteria listed, 12 wells labelled as “Excellent”, and 37 wells labelled as “Good” are analyzed.

Table 1: Data quality rubric for screening GOWN monitoring wells.

Category	Criteria
Excellent	Multiple smooth recovery curves present. Data is mostly continuous throughout, with little to no noise.
Good	One or two smooth recovery curves present. Some are smooth whilst others are noisy or choppy. Most other curves are of good enough quality for analysis.
Nearly Good	One or two smooth recovery curves present. Most other curves are of good enough quality for analysis. Contains either excessive noise, patches with no data, or both.
Fair	One or two good or fair quality recovery curves amid excessively noisy or choppy data. Little to lots of noise present. Good years usually span a couple of decades, with other decades having poor or unusable data.
Poor	Little to no recovery curves present, if at all. Shows some potential in certain areas but no hope for easy data analysis.
Unusable	Data cannot be used for analysis. Either too noisy, too fragmented, or water level data is not present at all.

3.2: Identifying and Plotting Recovery Curves

Hydrographs for the remaining “Good” and “Excellent” wells are then considered by identifying, normalizing, and analyzing water level response to pumping and other stressors for individual pumping events. Many of the GOWN wells were drilled between the 1960s and 1980s and had monitoring equipment installed between the 1980s and 1990s; thus, several decades of water level data are commonly available. While the monitoring wells have varying years of water level data across their operating lifetimes to examine, pumping data (e.g., distance to the pumping well or exact timing of pumping) that could be used to determine hydraulic parameters (e.g., hydraulic conductivity) are not available. However, other aquifer characteristics, such as the presence or absence of recharge boundaries, can be identified using the methods described by Butler et al., (2013), including interpreting log-log and semi-log graphs of normalized recovery

data. This is accomplished by considering the entire well hydrograph to identify likely pumping events and the associated drawdown and recovery curves with continuous data. Likely pumping events in water level data are identified as a pronounced period of water level decline, typically in spring or summer months, immediately following a period of relatively stable or rising water level measurements. In a semi-arid province such as Alberta, recovery curves due to irrigation pumping off-seasons are easy to identify, prominently rising within the hydrograph year by year. This is more easily identifiable in curves labelled as “Excellent”, although even hydrographs classified as “Fair” will also contain easily identifiable recovery curves. If applying this method in a wetter region, or during a wetter period, precipitation events may increase the difficulty of identifying recovery curves, adding additional noise to the hydrograph. Despite this, irrigation pumping seasons are identifiable in a hydrograph, as within a given monitoring well these events generally occur at consistent times year by year, whether in a wet or dry year. In regions where pumping signals are more frequent, or only last for short amounts of time, recovery curves will still be identifiable, as these pumping signals will still occur with regular frequency relative to the overall hydrograph and could be discernable from noise caused from irregular events such as changes in barometric pressure. Pumping signals may be difficult to detect if the monitoring well is farther away from the pumped well; in this case, the pumping signal would get lost in the surrounding noise, and no recovery curves worth analysing would be present within the hydrograph.

Recovery curves are identified by a dramatic rise in water level following either a period of pronounced decline, or stagnation in water level following a pronounced decline that had been identified as a pumping event. For each recovery curve, the precise date, time, and depth of the lowest water level before the water level rises is identified and recorded. The end of the recovery curve is likewise identified as the highest water level before water levels either begin to decline again or stagnate. The former often occurs if not enough time elapses for the water level to fully recover before pumping resumes. Each recovery curve is then isolated and normalized, with the time and water level for the start of the recovery set to 0 days and 0 m, respectively. Each normalized recovery curve is plotted three times, using linear, semi-logarithmic, and log-log axes, as is typical when analysing pumping test results and residual drawdown curves (Kruseman and de Ridder, 1990). Log-log plots are often used for evaluating recovery, but often semi-log plots are more useful; as such, both semi-log and log-log graphs are plotted for each linear recovery curve to aid in analysis (Kruseman and de Ridder, 1990). Care is taken to make sure that for a given well, each of its recovery curve plots display the same axis scale, so that recovery curves can be superimposed onto each other if desired.

3.3: Graphical Analysis of Recovery Curves

The late-time behavior of recovery curves for each well are subsequently analysed for changes in signals as recovery signals become weaker, which is used to identify indications of recharge, inflow, or groundwater mining. The plotted recovery curves are similar to plotted pumping tests, but we assume imaginary recharge is occurring once the pumping ceases.

Recharge subsequently occurs quite rapidly and over time slows down, the behavior resembling a response similar to a Theis curve. The superposition of water injection into the system is assumed, with the subsequent response of the recovery curve and change in late-time behavior analysed to determine evidence of boundary conditions such as a recharge boundary. Recharge refers to water infiltrating from the subsurface to replenish groundwater stores, such as through precipitation. Identifying areas where this can easily or frequently occur (zones of recharge) is of main focus. Here, inflow refers to groundwater replenishment from other sources in the subsurface, such as lateral inflow from adjacent and connected aquifers or formations, or inflow from adjacent and connected leaky aquitards.

The method used in this research to evaluate and classify recovery curve plots is based on the methods outlined by Butler et al. (2013) and Butler et al. (2021), where recovery curves are analysed in a qualitative fashion by analysing the response of drawdown versus time in linear, semi-log, and log-log space. Plotting recovery (or residual drawdown) following a pumping test is commonly done, often in semi-log or log-log space, to glean information about aquifer conditions such as transmissivity, storativity, etc. (Kruseman and de Ridder, 1990; Freeze and Cherry, 1979; Hall, 1996; Weight and Sonderegger, 2001). The qualitative graphical analysis method used in Butler et al. (2013) and Butler et al. (2021) are based on this practice, using recovery curve data from monitoring well hydrographs to gain insight on boundary conditions affecting well response to pumping signals, notably recharge boundaries. By analysing the patterns displayed by monitoring well recovery curves immediately following the cessation of a pumping signal, it is possible to determine whether the behavior of a recovery curve is displaying signs of a nearby recharge boundary. Thus, even in the absence of information on nearby pumping wells, the presence of recharge in an area surrounding a monitoring well can be determined by graphically analysing recovery curve hydrographs for the signs of water level recovery being more than expected (as described below). This method is employed unchanged in this research, differing only by the choice of application, doing so here with hundreds of monitoring well hydrographs over a large, provincial area.

The type of response displayed by a recovery curve's late-time behavior determines its classification, as the Theis recovery signal fades compared with other signals. A recovery curve indicating recharge or other inflows ("enhanced recovery") would rise linearly throughout this time after the Theis recovery signal ends until the next pumping-induced drawdown. This change in slope is distinct compared to the Theis curve, rendering it easy to identify (*Figure 10a*). If it is not continuous at the same slope throughout, fluctuations in water level could be due to other natural or anthropogenic processes occurring in the region.

Recovery curves that flatten as the regional signal takes over indicate full recovery and a system in equilibrium, and are classified as "normal recovery" (*Figure 10b*). This type of recovery curve's late time behavior response more closely resembles a standard Theis curve response compared to curves classified as "enhanced recovery". Some wells may not have the recovery signal completely flatten, but rather appear to have progressed far enough that other, stronger signals should have taken over in late time. A monitoring well with a majority of

recovery curves classified as “normal recovery” indicates that the area immediately around the well is not likely a recharge zone, although it does not necessarily indicate that the aquifer is in danger of depletion in the long term. Although beyond the scope of this paper, further research can be conducted on wells where a majority of the recovery curves are classified as “normal recovery” to assess the risk of aquifer mining. By comparing water levels at the beginning of pumping with water levels at the end of recovery, the risk of groundwater mining and long-term depletion can be ascertained.

Results are inconclusive if recovery curves do not follow either of the above patterns, rather appearing to change its behavior, even if only for a short period of time (*Figure 10c*). For example, if a recovery curve flattens out for only a relatively short amount of time before continuing to recover, it would be labelled “inconclusive”. A scenario like this, where the recovery curve flattens out before rising again, may not represent the actual full recovery of a system due to external events such as pumping from a distant well. As such, it cannot be accurately discerned what is occurring in this curve without further information. Recovery curves are also considered inconclusive if they only span a short amount of time of 20 days or less, as this is typically not enough time to identify either the full normal recovery or recharge signals. When examining the hydrographs, it was clear that at least 20 days were required to successfully characterize recovery curves. Finally, if a recovery curve in a given monitoring well spans a shorter amount of time compared to that well’s average recovery time, then it is likely to be classified as “inconclusive”, depending on how large the difference is.

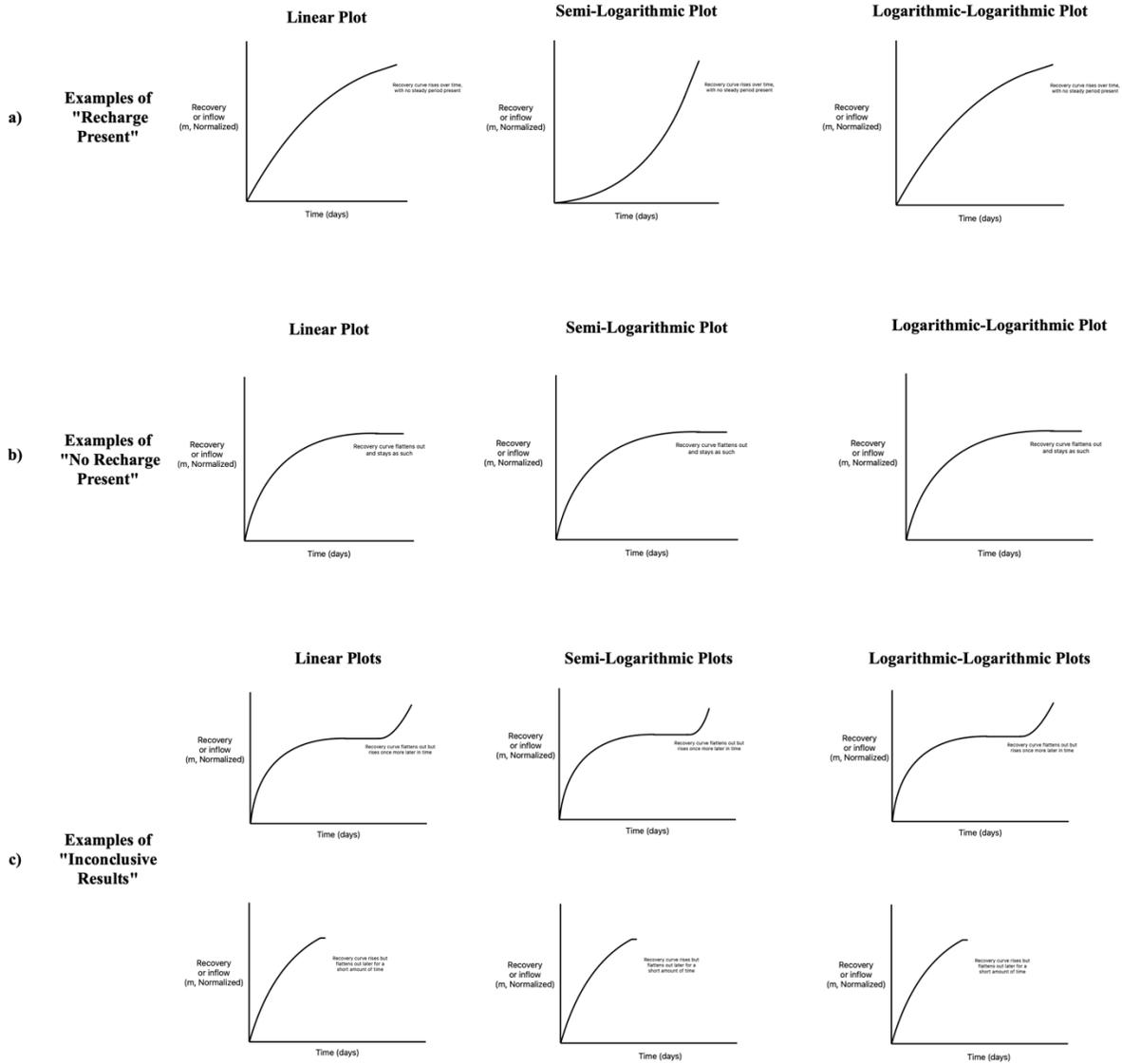


Figure 10: Examples of recovery curves and their classifications. a) Examples of recovery curves where recovery, inflow, or replenishment is present (“enhanced recovery”). b) Examples of recovery curves where no recovery, inflow, or replenishment is present (“normal recovery”). c) Examples of recovery curves where the presence or absence of recovery, inflow, or replenishment is inconclusive.

Chapter 4: Results

Water level data from 292 wells are classified, with data from 74 (25.34%) meeting study criteria and suitable for graphical analysis (Excellent, Good, or Nearly Good, **Table 2**). Recovery curves, 785 in total, are then analyzed for the 49 wells with the most suitable data within the “Excellent” and “Good” categories (Appendices D-J). Of these 49 wells, 36 wells within the Paskapoo aquifer, southern Alberta aquifers and surficial aquifer categories are considered for further analysis, with ten (27.78%), seven (19.44%) and 19 (61.11%) monitoring wells analyzed in each section, respectively. The surficial aquifer category contains the most monitoring wells compared to the other two aquifer categories, a total of 116 wells, compared to 43 and 31 wells in the Paskapoo aquifer and southern Alberta aquifers, respectively. However, only 18.97% of the surficial aquifer well hydrographs are classified as “Excellent” or “Good”, the lowest among the three selected study site sections. In contrast, 25.58% of the total Paskapoo aquifer section wells are labelled as “Excellent” or “Good”, with 32.26% of the southern Alberta aquifers section in those categories (**Table 2**).

Table 2: Distribution of GOWN monitoring wells that meet study criteria and their data quality classifications.

Well Category	GOWN Wells Amount (%)	Paskapoo Amount (%)	Southern Alberta Amount (%)	Surficial Amount (%)
Excellent	12 (4.12)	0 (0.00)	1 (3.23)	7 (6.03)
Good	51 (17.47)	11 (25.58)	9 (29.03)	15 (12.93)
Nearly Good	11 (3.77)	6 (13.95)	0 (0.00)	2 (1.72)
Fair	66 (22.60)	8 (18.60)	6 (19.35)	15 (12.93)
Poor	41 (14.04)	7 (16.28)	10 (32.26)	9 (7.76)
Unusable	111 (38.01)	11 (25.58)	5 (16.13)	68 (58.62)
TOTAL	292 (100)	43 (14.73)	31 (10.62)	116 (39.73)

Normalized recovery curves are compared with the idealized classification recovery curves (e.g., *Figure 11*). Generally, recovery periods in each well occurred outside of irrigation pumping seasons, although recovery periods within pumping seasons did occur. Irrigation pumping seasons in the province tend to start during spring or early summer, and end in the fall or early winter (Appendix C). These are difficult to identify in the analyzed monitoring wells because pumping was not consistent from well to well or year to year. For one, relatively lower amount of groundwater is used for irrigation compared to surface water irrigation. Secondly, indications of seasonal irrigation pumping in surficial well hydrographs are muffled by the influence of surface water irrigation on surficial aquifer water levels. Finally, singular, regular pumping seasons are infrequent in Alberta due to the varying agricultural uses for water, such as the many different crop types grown in the province. Below, highlights from the results for the

three study areas are described, broadly noting patterns of recovery, and monitoring wells with prominent hydrographs and/or recovery curves. The length of time and magnitude of recovery of prominent recovery curves are compared with other recovery curves from the same well, to determine inconsistencies or patterns.

Recovery curves showing evidence of enhanced recovery are found in wells across the three chosen study sites and are discussed below. Evidence for increasing water levels beyond normal recovery is present in at least one recovery curve for each well analyzed, except for the Medicine Hat North_3050 monitoring well, which has each of its three recovery curves classified as “inconclusive” (**Table 45** in Appendix C6). Two of these are classified as such as they span less than 20 days in length. For most wells, evidence of enhanced recovery is present in only a small percentage of recovery curves analyzed, although for some wells, evidence for enhanced recovery is present in nearly every recovery curve analyzed (**Table 3**).

Table 3: Percentage of recovery curve category results for each monitoring well analyzed. Category with highest value per well is in bold lettering.

Section/Well	Recharge or Inflow Present (%)	No evidence for recharge or inflow (%)	Inconclusive results (%)
PASKAPOO	50.72	10.87	38.41
Cynthia Shallow_0992	57.14	14.29	28.57
Crestomere Lake Obs1_0291	54.55	0.00	45.45
Rocky Mountain House Shallow_0980	28.57	14.29	57.14
Sundre South Shallow_0983	57.14	28.57	14.29
Elnora #7_0127	36.36	13.64	50.00
Irricana 2376E_0223	46.15	11.54	42.31
Okotoks Land Fill 2378E_0217	54.55	45.45	0.00
Paddle River 81-1-A_0345	57.14	0.00	42.86
Raven 87-1_0384	68.18	0.00	31.82
Warburg 2185E_0315	45.45	0.00	54.55
SOUTHERN ALBERTA	48.33	10.83	40.83
Foremost Town_0221	40.00	0.00	60.00
Del Bonita 70-3_0101	57.89	0.00	42.11
Orton 1514E_0111	23.33	23.33	53.33
McNally_0110	25.00	0.00	75.00
Viking 2600E_0298	78.95	5.26	15.79
Mud Lake 1537E_0112	51.35	13.51	35.14
Okotoks 05-1 South_0786	50.00	0.00	50.00
SURFICIAL	37.54	8.09	54.37

Milk River 56-1_0103	38.46	23.08	38.46
Hays East_3053	50.00	0.00	50.00
Hays 2523E_0279	100.00	0.00	0.00
High River 2580E_0279	18.18	18.18	63.64
Kirkpatrick Lake 86-3 East_0230	47.83	0.00	52.17
Many Springs_0364	50.00	0.00	50.00
Medicine Hat North_3050	0.00	0.00	100.00
Rockyford_3026	25.00	0.00	75.00
Waterton Dam #5_0105	15.38	23.08	61.54
Watino 2353E_0369	35.71	10.71	53.57
La Crete 2447E_0380	5.56	11.11	83.33
Innisfree 2403E_0235	52.27	6.82	40.91
Leedale Shallow_3022	57.14	0.00	42.86
Bruderheim 2343E #1 North_0178	57.89	5.26	36.84
Bruderheim North_3069	16.67	0.00	83.33
Cooking Lake 1348E North_0157	45.83	12.50	41.67
Devon #2 North_3010	35.42	4.17	60.42
Carmangay West_3010	20.00	40.00	40.00
Cypress Hills 2293E_0107	10.00	10.00	80.00
AVERAGE	42.03	9.30	48.67

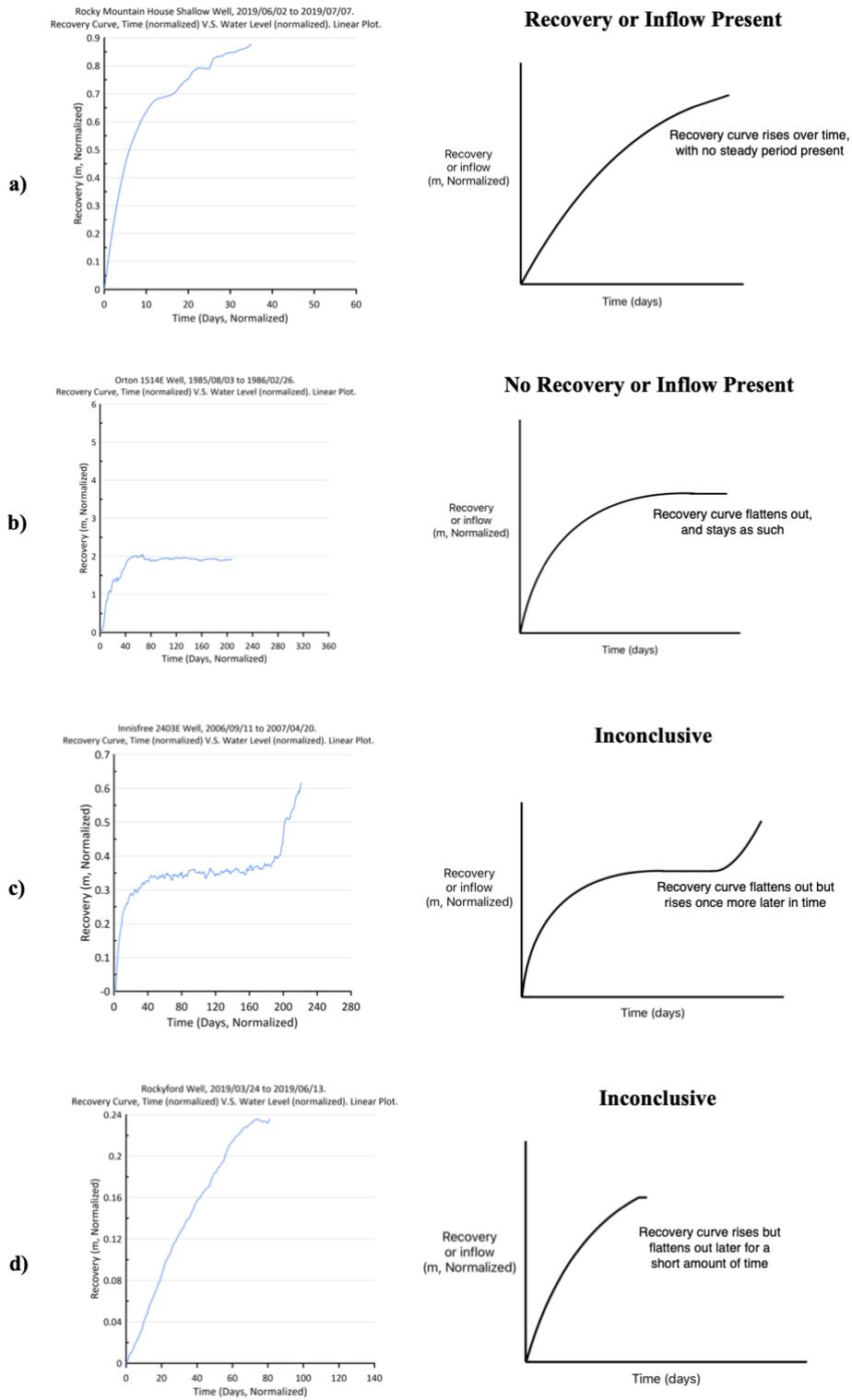


Figure 11: Linear recovery curve comparison between examples from the dataset (on left) and the idealized graphs (on right). a) Paskapoo aquifer Rocky Mountain House Shallow_0980 well and an idealized “enhanced recovery” curve. b) Southern Alberta aquifers Orton 1514E_0114 well and an idealized “normal recovery” curve. c) Surficial

aquifers Innisfree 2403_0235 well and an idealized “inconclusive” curve. d) Surficial aquifers Rockyford_3026 well and an idealized “inconclusive” curve. Although similar to the figure in a), the key difference is the curve’s behavior late time, where rather than continuing to rise, the recovery curve stagnates for a short amount of time before ending. This period of stagnation is too short to definitively classify the curve as “normal recovery” but spoils the classification of “enhanced recovery”. Thus, it is classified as “inconclusive”.

4.1.: Paskapoo Aquifer

Indications of aquifer replenishment worth further investigation are observed in each of the ten Paskapoo aquifer wells analyzed (**Table 3**), but recovery curves showing evidence of “normal recovery” are found in 60.00% of the aquifer’s monitoring wells. Overall, evidence for enhanced recovery is observed in 50.72%, and “normal recovery” in 10.87% of all recovery curves analyzed from the Paskapoo aquifer. Four Paskapoo aquifer wells consistently recorded only periods of “enhanced recovery” or have data that are inconclusive, never recording recoveries classified as “normal recovery” (**Table 3**). These wells are: Crestomere Lake Obs1_0291 (**Table 11** in Appendix C1), Paddle River 81-1-A_0345 (**Table 18** in Appendix C1), Raven 87-1_0384 (**Table 19** in Appendix C1), and Warburg 2185E_0315 (**Table 20** in Appendix C1). Monitoring wells with consistent results such as these are the exception, however.

For example, data from the Irricana 2376E_0223 well (**Table 16** in Appendix C1) indicates “normal recovery” during 1995-1996, 1996-1997, and 1998-1999 (*Figure 76, Figure 78, and Figure 80* in Appendix D6). Prior to 2004, instances of enhanced recovery levels were seldom, interpreted in only 23% of the recovery curves analyzed, with instances of normal recovery interpreted in the same amount. Within this period, two recovery curves from the monitoring well are classified as “enhanced recovery”, three are classified as “normal recovery”, and six are classified as “inconclusive”. For example, two recovery curves from this period, one from 1992 and one from 1996-1997, demonstrate the differences seen between “normal recovery” and “enhanced recovery” curves during this time (*Figure 12; Figure 13*). These two recovery curves differ in late time response, resulting in different classifications. Although the recovery period differs in length of time (spanning 121 days and 204 days, respectively), it is evident by 100 days that their behaviors are different, with the former recovery curve showing signs of enhanced recovery (*Figure 12*), and the latter curve demonstrating normal recovery (*Figure 13*). After 100 days, the recovery curve in 1992 (*Figure 12*) continues to rise to a maximum recovery of 0.30 m, deviating from the standard Theis curve response, whilst in 1996-1997 (*Figure 13*), it starts to plateau, indicating a normal recovery response after a maximum recovery of 0.53 m. After 2004, there are ten recovery curves classified as “enhanced recovery”, zero classified as “normal recovery”, and four classified as “inconclusive”. Before 2004, the average recovery curve length is 140 days, and an average recovery of 0.40 m. Additionally, water levels during this time decline from recovery curve peak to peak at an average of 0.50 m per year, indicative of groundwater mining in the region. In 1992 (*Figure 12*), water level at peak recovery in this monitoring well was 9.94 m below ground surface, while in 1996 (*Figure 13*), the water level at the top of the respective recovery curve was only 11.90 m below ground surface. After 2004, the average recovery curve length was 219 days, and the average recovery

seen in recovery curves increased to 0.83 meters. Compared to the 140-day average seen prior to 2004, the recovery observed in recovery curves at 140 days after 2004 is 0.71 m, on average. Water levels after 2004 also rose an average of 0.59 m per year (in respect to surface level) at the end of each recovery curve peak, showing yearly replenishment of the overall system over time.

Another example is Okotoks Land Fill 2378E_0217 (**Table 17** in Appendix C1), where five recovery curves are classified as “normal recovery”. These five recovery curves have an average length of time of 146 days, and an average recovery of 1.28 meters. This is intermixed with six recovery curves classified as showing evidence of enhanced recovery, which span an average of 177 days and have an average recovery of 1.83 meters. While the well itself is located adjacent to a landfill, the remaining surrounding area is mainly agricultural.

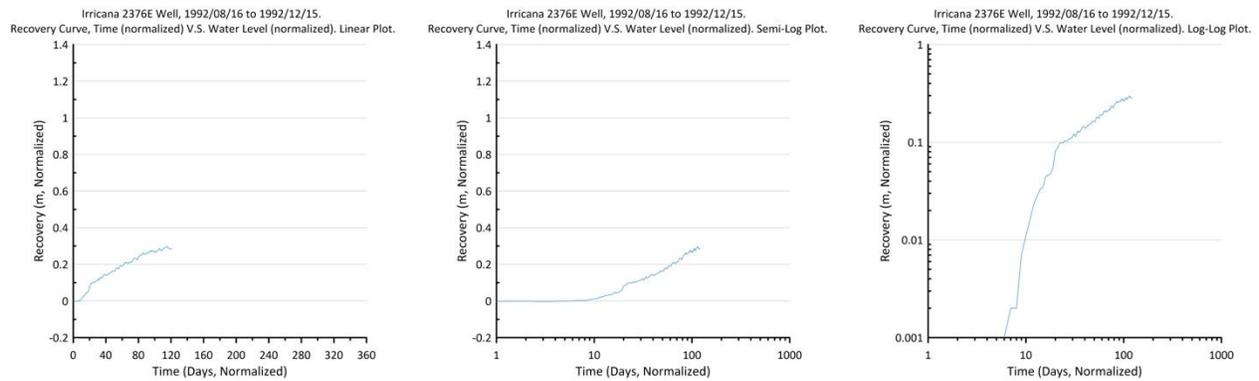


Figure 12: Recovery curve plots for Irricana 2376E_0217 well, 1992/08/16 to 1992/12/15. Recovery curve classified as "enhanced recovery".

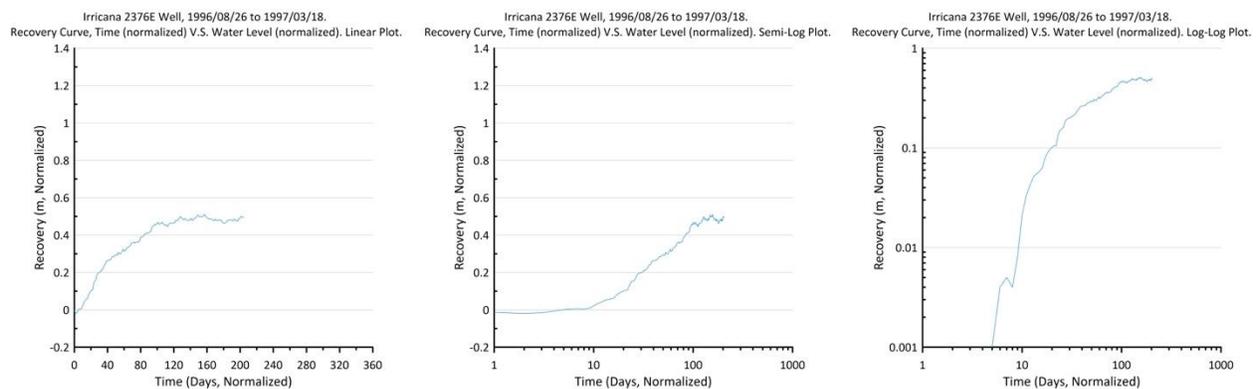


Figure 13: Recovery curve plots for Irricana 2376E_0217 well, 1996/08/26 to 1997/03/18. Classified as "normal recovery".

4.2: Southern Alberta Aquifers

All monitoring wells in Southern Alberta aquifers indicate inflow, recharge, or an otherwise upward trending water level beyond normal recovery, although the frequency varies,

with 48.33% of recovery curves classified as “enhanced recovery”. “Normal recovery” conditions are observed in recovery hydrographs from three of the seven wells. (**Table 3**). The other four wells are Foremost Town_0221 (**Table 24** in Appendix C3), Del Bonita 70-3_0101 (**Table 25** in Appendix C3), McNally_0110 (**Table 27** in Appendix C3), and Okotoks 05-1 South_0786 (**Table 30** in Appendix C3). Most recovery curves for Foremost Town_0221 and McNally_0110 are classified as “inconclusive” as they contain many recovery curves that span 20 days or less. It was not possible to determine the presence or absence of recovery or recharge in these short recovery curves.

One monitoring well screened in the Oldman aquifer in this region, Viking 2600E_0298 (**Table 28** in Appendix C3), is somewhat unusual due to a single recovery curve within its results. This well has 78.95% of its recovery curves classified as “enhanced recovery” (**Table 3**), but records only one instance where normal recovery is present, during the winter of 2013-2014 (*Figure 14*). This recovery curve’s length of time, 242 days, is not an outlier within the well’s dataset; the average recovery length for the Viking 2600E_0298 well recovery curves is 208 days. It also falls within the minimum and maximum spans of time seen in the monitoring well’s recovery curve dataset, 141 and 310 days, respectively. The recovery magnitude is 0.11 meters, below the average recovery of 0.14 meters for this monitoring well’s dataset.

Another well of note is the Orton 1514E_0111 monitoring well, located in the Lethbridge Valley aquifer (**Table 26** in Appendix C3). This well has an equal amount of recovery curves classified as “enhanced recovery” and “normal recovery”, at 23.33% each (**Table 3**). Normal recovery curves appear both early, at the start of data recording in 1985, and later in the well hydrograph; however, the frequency of curves classified as “enhanced recovery” decreases after 2011. This contrasts with the Irricana 2376E_0223 monitoring well in the Paskapoo aquifer, where recovery curves classified as “enhanced recovery” are more common after 2004.

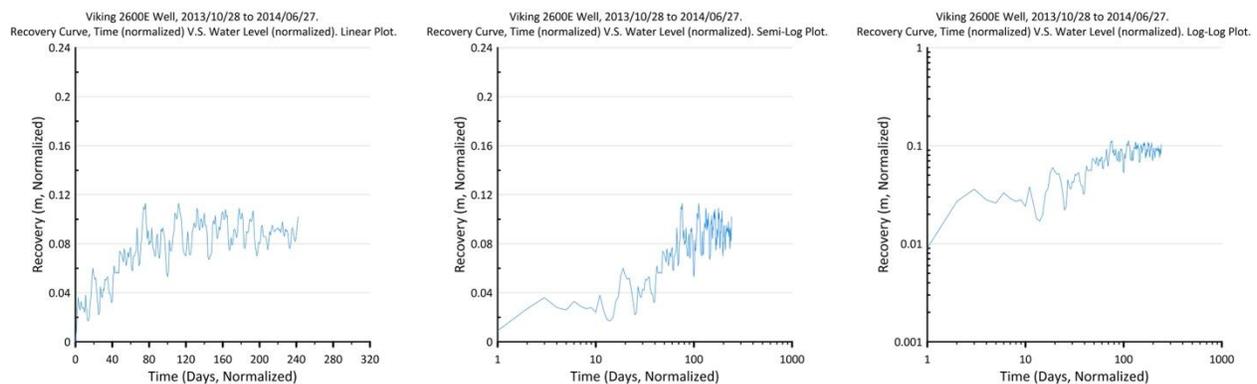


Figure 14: Recovery curve plots for Oldman aquifer Viking 2600E_0298 well, 2013/10/28 to 2014/06/27. Results show evidence that normal recovery is present during this time.

4.3: Surficial Aquifers

In general, most recovery curves analyzed for surficial aquifer hydrographs are either classified as “enhanced recovery” or “inconclusive” (**Table 3**), at 37.54% and 54.37%,

respectively. Hydrographs for several of the surficial wells analyzed are worth highlighting, due to outliers within their recovery curve results or patterns therein. For instance, the Cooking Lake 1348E North_0157 monitoring well (**Table 54** in Appendix C6) hydrograph has a period of seven years, between 2001 and 2008, where no signs of enhanced recovery are identified, although three are classified as inconclusive (between 2004-2007). Recovery curves occurring during 2001-2004 (*Figure 694*; *Figure 695* in; Appendix I16) and 2007-2008 (*Figure 699* in; Appendix I16), are classified as “normal recovery”. The recovery curves between 2001 and 2008 have an average length of time of 236 days and an average recovery of 0.17 meters. In contrast, the average length of time for all recovery curves in the monitoring well’s dataset is 196 days, and the average recovery is 0.20 meters. Prior to 2001 and after 2008, recovery periods are classified as either “enhanced recovery” or “inconclusive”, without any classified as “normal recovery”. A similar trend is observed in the data from the High River 2580E_0287 monitoring well (**Table 42** in Appendix C6). The first analyzed recovery curve in 1994 is classified as “enhanced recovery” (*Figure 481* in; Appendix I4). Following twelve-year gap in recovery data, there is a long stretch of recovery curves classified as either “inconclusive” beginning in 2006 or “normal recovery” beginning in 2006. Recovery curves classified as “normal recovery” are observed in 2017 and 2018 (*Figure 486*; *Figure 487* in; Appendix I4). The final recovery curve observed in the data, in 2022, is classified as “enhanced recovery” (*Figure 491* in; Appendix I4). The two recovery curves classified as “normal recovery”, one in 2017 and one in 2018, span 31 days and 82 days, and have recoveries of 0.79 and 0.73 meters, respectively. In contrast, recovery curves for High River 2580E_0287 span an average length of time of 50 days, with an average recovery of 1.16 meters.

Chapter 5: Discussion

5.1: Method Validity

The method introduced here is useful for identifying areas to investigate more closely for groundwater recharge, replenishment, or inflow across a large region. For example, standard monitoring well water level data from Raven 87-1_0384 (**Table 19** in Appendix C1) in the Paskapoo aquifer, Viking 2600E_0298 (**Table 28** in Appendix C3) in a Southern Alberta aquifer, and Innisfree 2403E_0235 (**Table 50** in Appendix C6) in a surficial aquifer each provide good examples of the insights possible on the presence or absence of recharge, replenishment, or inflow in the area near a monitoring well with long-term, good quality hydrograph data. Water level data from these wells are available for around thirty years, with an average of twenty-eight recovery curves suitable for analysis. Recovery curves are analyzed for the presence of deviations from normal recovery, with water level increases above those expected potentially indicating recharge or inflow to the aquifers. Results show that a signal that could indicate enhanced recovery is present and noticeable for most of the recovery periods observed for each well. This signal is evident in 68.18%, 78.95%, and 52.27% of the recovery curves for Raven 87-1_0384, Viking 2600E_0298, and Innisfree 2403E_0235, respectively (**Table 3**). This suggests that information on the presence of recharge in a given area around a monitoring well can be obtained using this approach. Older monitoring wells with water level data spanning decades have a higher probability of recording recovery curves that are suitable for analysis. Ideal characteristics include continuous recovery curves that span several months. While this study focuses on individual wells spread across the landscape, multiple wells in a well-established monitoring site could improve insights into the occurrence of recharge.

With longer term data, temporal patterns in recovery curve classification can be identified, such as the patterns seen in monitoring well results discussed in Chapter 4. From there, additional research can be conducted depending on the hypothesized reasons for these patterns. In the Paskapoo aquifer, for example, the Okotoks Land Fill 2378E_0217 (**Table 17** in Appendix C1) monitoring well recovery curves fluctuate between showing evidence of enhanced recovery, and normal recovery. These changes in recovery could be due to shifts in demand for water over time in the nearby landfill, or local or regional changes in the water level driven by precipitation from year to year, or changes in crop type or agricultural practices in the surrounding lands. In the southern Alberta aquifers section, 78.95% of the Viking 2600E_0298 (**Table 28** in Appendix C3) monitoring well's analyzed recovery curves are classified as "enhanced recovery". The well's recovery curves display signs of enhanced recovery throughout the hydrograph, with strong indications of a recharge boundary in the area around the Viking 2600E_0298 well. This pattern is not observed during 2013-2014's winter recovery curve, possibly due to excessive pumping or weather factors preventing replenishment. The recovery curves for the Orton 1514E_0111 monitoring well (**Table 26** in Appendix C3) are classified as "enhanced recovery", but the frequency decreases over time, such that only normal recovery is observed from 2011 to the present day. This could be due to excessive pumping during this time,

modifying the recovery trends of that section of Lethbridge aquifer. The reverse situation is observed in the Irricana 2376E_0223 monitoring well in Paskapoo aquifer (**Table 16** in Appendix C1), where recharge or replenishment is sparse before 2004, and more frequent afterwards. The Irricana 2376E_0223 monitoring well results are discussed further within this section. Similar observations are made for the Cooking Lake 1348E North_0157 (**Table 54** in Appendix C6) and High River 2580E_0287 (**Table 42** in Appendix C6) surficial aquifer monitoring wells. Within the recovery curve results for these wells, periods where the recovery curves are classified as “normal recovery” are amidst periods of time where recovery curves are classified as “enhanced recovery”. Further research would be required to determine whether this is the result of normal annual fluctuations, or actual recharge present within the system.

Hydrographs, and the recovery curves within them, can have certain characteristics which make them useful for detecting the presence, or absence, of recharge. These characteristics are based on observations from the Alberta GOWN monitoring well database; as such, they may vary slightly depending on the region or database for which this method is used. It is preferable if the monitoring well hydrographs span at least a decade to identify yearly pumping patterns and changes to the system over time, such as changes in yearly pumping signals or normal annual fluctuations in water level. Pumping and recovery events are preferably regular, annual cycles, fully continuous, and pronounced compared to the overall water level over time. This helps to distinguish recovery events from noise, as well as for identification of their start and end points within the hydrograph. Recovery curves should span at least 20 days, and preferably be at least 60 days long. This aids in classifying recovery curves; shorter intervals tend to be inconclusive, as changes to water level within a small amount of time could be due to noise, rather than due to recovery in the system. As discussed in the methods, a minimum of 20 days were required in order to successfully classify recovery curves. There is no maximum length of time for a recovery curve where, past that, classification becomes difficult. The longer a recovery curve spans, the easier it is to determine to presence of a recharge boundary within it. The relative magnitude of a recovery curve compared to the normal water level of the examined monitoring well, from its beginning to its peak before the next drawdown occurs, should be prominent compared to normal noise fluctuations in water level seen in its corresponding hydrograph. The recovery curve should have a sustained rise or latency period, and preferably not end sharply or suddenly, which allows one to properly determine the recovery curve’s deviation or conformity to the Theis solution curve. Hydrographs and recovery curves with these characteristics have a higher chance of providing excellent monitoring well data that are fit for analysis, and a lower chance of recovery curves being classified as “inconclusive”.

Certain characteristics can increase the chance of obtaining “unusable” hydrographs (**Table 2**) or “inconclusive” (**Table 3**) recovery curves. For example, should drawdown begin too suddenly after a recovery begins, it becomes difficult to determine if recharge is present, as water level changes driven by recharge are weaker than those driven by either early pumping or early recovery. Discontinuous sections within a hydrograph or recovery curve render it unusable for analysis, as it removes crucial information necessary for classification. Depending on the

location of the discontinuous section, it could be impossible to identify a recovery curve's start or end points, the full magnitude of recovery, or distinguish recharge from normal water level fluctuations. A hydrograph that is filled with noise (for example, as a result of a well's barometric efficiency and response to barometric pressure changes), from which recovery and drawdown events are impossible to distinguish, becomes difficult to use for analysis. Similarly, if a recovery curve's magnitude of recovery is too small relative to other events within the hydrograph, the curve blends into the noise and become impossible to pinpoint. From these, a minimal amount of recovery curves can be identified for analysis.

Using multiple recovery curves from either a single well or multiple wells in combination with each other, it is possible to piece together a temporal picture of the presence or absence of recharge within a large area; however, the results are integrations over time and space and are not able to provide recovery classifications for a precise location or time. Recovery curve analysis is applied for the entire length of time that the recovery curve spans. As such, signs of recovery on a smaller scale, such as within two weeks or less, cannot be precisely determined. Likewise, as applied here, recovery curve results are for monitoring wells that are located an unknown distance away from an unknown number of pumping wells with unknown pumping schedules. When a recovery curve is classified as showing signs of recharge, it can be assumed that recharge is occurring relatively close to the monitoring well, but the precise location relative to the monitoring well cannot be ascertained. Results are only produced from monitoring wells with suitable recovery curve data for analysis. Gaps are present in locations where monitoring well data are not. Classification of a given recovery curve can also be subject to error or become subjective if the curve is difficult to analyze. This is due to the noise and ambiguity of certain hydrographs, the uncertainty surrounding the cessation or classification of pumping signals, as well as the unknown timing or presence of additional pumping events surrounding the analyzed monitoring wells. As such, a recovery curve classified as inconclusive by one individual, may show the indications of recharge to another. This is not typically a significant issue; however, when a recovery curve is difficult to classify, the uncertainty lies in whether it is classified as "inconclusive" or not. It is important to note that difficulty in classifying a recovery curve is proportional to how much noise is present in the data. The smoother a hydrograph and its subsequent recovery curves are, the higher the probability they will be classified as either "enhanced recovery" or "normal recovery".

The overall validity and accuracy of this method of identifying the possible presence of recharge boundaries in an aquifer can be evaluated through a comparison with the literature. This study indicates evidence for recovery or replenishment can be observed in at least a portion of all wells screened in the Paskapoo aquifer. This finding is supported by a previous study in which results found that recharge for the aquifer occurs over most of its projected surface area, rather than as focused recharge in select locations (Grasby et al., 2008). A significant downwards hydraulic gradient is present in the aquifer, suggesting much of the inflows to the Paskapoo aquifer originate from the surface (Grasby et al., 2008). This is further supported by results from a previous study indicating that recharge in the Paskapoo aquifer is driven largely by winter

snowpack melt, as well as infiltration in topographic depressions (Hayashi and Farrow, 2014). Recharge in topographic depressions would indicate focused recharge to the Paskapoo aquifer, rather than over a large area. Although results indicate that enhanced recovery in Paskapoo was present throughout the aquifer in each of the monitoring wells examined, this study does not compare results with topographic features, and so a conclusion on the correlation between them is not possible. Surficial aquifer monitoring wells overlaying the Paskapoo aquifer should have quicker responses to precipitation-driven recharge events compared to the Paskapoo aquifer wells, which are in deeper, confined sandstone layers. This would be quicker than recharge mechanisms typically seen recharging confined aquifers, such as inflows from leaky aquitards and other connected aquifer units. Irrigation-driven pumping and recharge events are obvious within a long-term hydrograph despite irregular events such as large-scale precipitation events, drops in barometric pressure, etc. This is due to their regular nature and pronounced curve relative to the ones produced by irregular events, which in comparison appears as noise (*Figure 15*).

However, in some locations, shorter than ideal recovery periods, resulting in inconclusive classifications, results in less definitive conclusions than found in the literature. Among the surficial wells analyzed, Cypress Hills 2293E_0107 (**Table 57** in Appendix C6) has recovery curves spanning from 1986 to 1997, with a period of “normal recovery” identified in 1986 (*Figure 762* in Appendix I19), and a period of “enhanced recovery” identified during 1995 (*Figure 769* in Appendix I19). The remaining recovery curves (80.00%) identified within the monitoring well’s hydrograph are classified as “inconclusive”. Recovery curves for this well have an average span of time of 35 days, and an average magnitude of recovery of 0.78 meters. The inconclusive recovery curves span an average of 37 days, with an average recovery of 0.83 meters. At 18 days, the recovery curve classified as “enhanced recovery” is shorter than the recommended length of 20 days and has a below average recovery of 0.65 meters. The recovery curve classified as “normal recovery” is also below average in terms of length of time and magnitude of recovery, and spans 31 days and has a recovery of 0.52 meters. This is in contrast with results from a previous study, which indicate that recharge occurred in the region surrounding the monitoring well during this time in the late 1980’s, providing over 40% of the groundwater recharge in the local watershed (Ophori and Tóth, 1989). It is likely that the short recovery periods are affecting the classification of the recovery curves. This highlights the need for hydrographs with recovery curves of suitable quality and length when performing this method of analysis. Should this method be applied to a database with unsuitable data, the risk of obtaining discrepancies in results increases.

5.2: Method Applications

This method is suited for providing an initial overview of the presence of enhanced recovery or recharge in an agricultural region, as pumping signals related to irrigation are more easily seen in a monitoring well’s hydrograph due to their regular frequency and size. From these agricultural monitoring well hydrographs, recovery curves can be easily isolated and analyzed

for the presence of recharge boundaries. These results can subsequently be used to pinpoint areas for further research. For example, monitoring wells in an aquifer or watershed are analyzed with this method to determine the presence of recharge boundaries, and results indicate that recovery or replenishment could be occurring in a portion of the region studied. Further research can then be conducted on that smaller region using methods that are commonly used for identifying the presence of recharge boundaries on a smaller scale. Additionally, this method can inexpensively determine the presence of recharge boundaries over a large area, as it can be performed as part of a desk study. Equipment, supplies, and travel expenses required for field methods, such as pumping tests, are not necessary with this method, which simply requires time/labor, a computer, and available existing monitoring well data. As such, this method can be fully completed indoors and without any extra field work. This method utilizing recovery curves is preferable for analysis compared to constant discharge results obtained during pumping tests as it assumes a constant recovery, which is difficult to maintain and record in drawdown curves compared to sustained recovery curves (Kruseman and de Ridder, 1990).

By detecting changes in a surrounding region's pumping habits, monitoring well hydrographs and the analysis of their recovery curves can potentially detect changes in surface recharge to groundwater. In agricultural regions, groundwater recharge is potentially affected by the presence of surface water irrigation by diverting surface water flows, potentially modifying existing recharge patterns. This is likely to be significant with surficial aquifers, which are closer to the surface compared to bedrock aquifers, and so are more likely to be sensitive to changes in recharge from surface infiltration. The extensive and well-established irrigation infrastructure found within the region could also affect both recharge and recovery curves (*Figure 3*). Recharge in southern Alberta surficial aquifers was found to be enhanced by the presence of fractures in the overlying till formations (Hendry, 1983). Changes to this till layer, such as with the construction of irrigation infrastructure or tilling the land for crop growth, may influence the rate of recharge of surficial or other relatively shallow aquifers in southern Alberta. Different surface water irrigation schedules and flow through canals and laterals should be reflected in the recovery curve analysis results. The presence of agriculture could also influence recharge to Southern Alberta aquifers; areas cleared out for cropland use may see an overall increase in recovery curves interpreted as "enhanced recovery" due to the influence of agricultural practices on surface water infiltration (Scanlon et al., 2008; Scanlon et al., 2010). By comparing monitoring well recovery curve analysis results within irrigated areas with the location and operation of nearby irrigation infrastructure, the effect of surface water irrigation on groundwater recharge could be identified.

The effects of changes in groundwater management on groundwater recharge and inflows can be identified using this method, as they are recorded in monitoring well hydrographs. For example, water policy changes in the nearby town of Irricana, near the Irricana 2376E_0223 monitoring well (referred to subsequently as "Irricana monitoring well"), caused a noticeable change within the hydrograph and the recovery curves. The Irricana monitoring well hydrograph is characterized by a clear pattern of annual pumping and recovery cycles, with two distinct long-

term trends: initially, from 1981 until 2005, groundwater levels decline, followed by an increase that slows and perhaps stabilizes after 2017 (*Figure 15*). Prior to 2004, the water level in the well declined an average of 0.5 m per year. Afterwards, the water level rises an average of 0.59 m per year. Recovery curves between these two periods differ in average length of time and magnitude of recovery, as seen in the results. The larger than expected long-term groundwater decline resulted from a misunderstanding of safe yield amounts estimated during pumping tests conducted in the late 1970's (Munroe et al., 2022). To allow groundwater levels to recover, Irricana made the choice to switch its water supply to surface water, ceasing pumping at all six pumping wells in the town in 2005 (Munroe, 2015). The Irricana monitoring well is located approximately 1 km northwest of Irricana and its pumping wells, which are located within an area approximately 1 km² inside the town (Munroe, 2015). Seasonal pumping is still observed in the Irricana monitoring well hydrograph, indicating continued use of groundwater for irrigation in the area.

A likely explanation for the observed recovery is lateral inflow from other parts of the Paskapoo aquifer, from leaky aquitards, or from other, smaller connected units. Recent meteorological recharge is most likely not a large contributing factor, due to the depth of the Haynes member and its position underneath the Lacombe member, a formation consisting mainly of impermeable units such as mudstone and shale (Hughes et al., 2017).

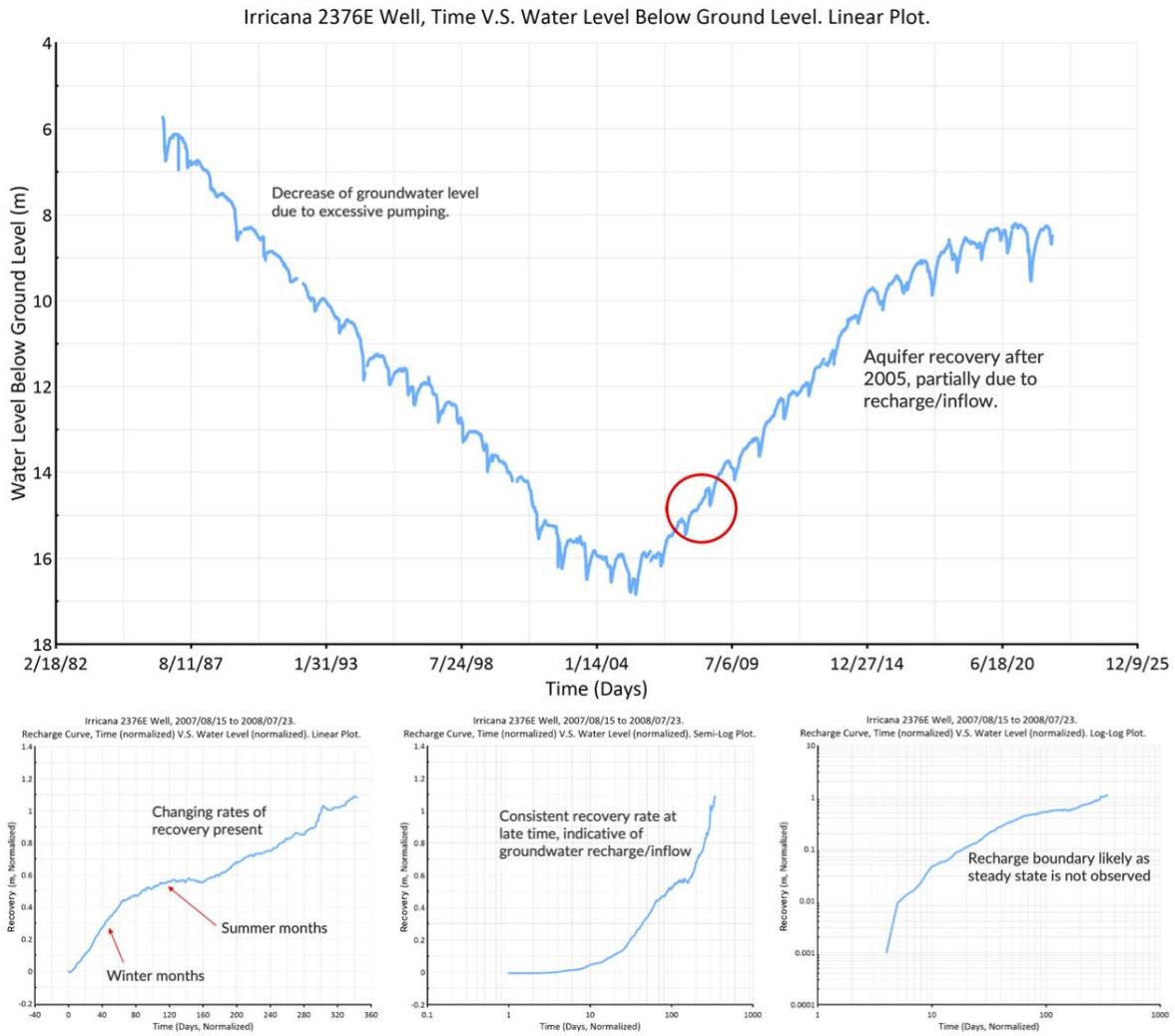


Figure 15: Annotated graphs showing the decline and subsequent rise in water level over time in the Irricana 2376E_0223 monitoring well. The well is screened at 60.67 m in the Haynes member of the Paskapoo aquifer, a confined portion of the aquifer comprised of shale and sandstone units that are relatively deep compared to surficial aquifers (Alberta Government, 2024). An analyzed recovery curve, shown in the red circle of the main plot, is graphed on linear, semi-log, and log-log scales. This hydrograph demonstrates how long-term hydrograph trends in conjunction with recovery curve analysis results can offer insight on a well's overall health, giving more information together than if examined separately.

5.3: Opportunities, Challenges and Potential Solutions

While recovery curves are the focus of this study, a similar approach could be used to evaluate drawdown curves from these hydrographs for boundary conditions. Drawdown curve analysis targets the period in monitoring well hydrographs when pumping starts, and water levels subsequently start to decline. It follows a similar process as recovery curve analysis and was previously utilised in a study to identify and analyze different boundary conditions in a section of the High Plains Aquifer (Butler et al., 2013; Butler et al., 2021). The latter study analyzed drawdown curves lasting up to three years, which is longer than the majority of drawdown

curves found in GOWN wells considered in this study. However, given the success of identifying the presence of recharge boundaries with the shorter recovery curves produced from the analyzed monitoring wells, it is reasonable to assume that insights would be possible from shorter drawdown curves as well. Drawdown analysis could also provide information on recharge boundaries, as well as information on other boundary conditions, such as the presence of confined, unconfined, or semi-confined aquifers (Butler et al., 2013; Butler et al., 2021). Utilising a combination of both drawdown and recovery curves in a study could increase the confidence in interpretations obtained, more than solely using drawdown curve data, due to possible changes in pumping rate, and difficulty in knowing when nearby pumping wells cease pumping.

There are challenges with the approach applied here. First, a large amount of well data needs to be considered to increase the probability of obtaining suitable recovery or drawdown curves for analysis. Of the initial pool of 292 monitoring wells, only 74 have suitable data for analysis, ranked as “Excellent”, “Good” or “Nearly Good”, with only 49 in the “Excellent” or “Good” categories, with only 36 from the three study sub-areas (**Table 2**). While a database such as the GOWN database provides a large quantity of monitoring well data, depending on project goals, this abundance of data takes a considerable amount of time to screen and process. While future projects could streamline the process by automating some steps, the process will likely remain time-consuming. Finally, it was challenging to find recovery curves suitable for analysis within the database, as they were limited by short recovery periods and incomplete water level records. Nearly half of the recovery curves analyzed, 48.67%, were classified as “inconclusive”, and were thus unfit for analysis (**Table 3**), which further indicates that this method could be challenging to apply when only a limited number of wells or recovery curves are available. Many recovery curves are classified as inconclusive as the data are noisy or imperfect, due to factors such as short recovery times. This method is thus limited to an area where there is sufficient suitable monitoring well data. Should monitoring well data be unavailable, or if the water level data are too noisy or discontinuous, then large areas of land or periods of time cannot be assessed for the presence of recharge or groundwater inflows. Combined with the previous drawbacks, it can be difficult to get sufficient suitable data for analysis. To mitigate these issues, it might be possible to identify additional monitoring well data not accessible in publicly available databases. For instance, governmental and academic institutions may have monitoring well data that are not readily available online. New monitoring well installations are also possible, but at considerable expense and would not initially provide significant temporal information.

This method functions best in regions with strong pumping and recovery signals which generate long, sustained, and uninterrupted recovery periods; as such, agricultural regions where most groundwater pumping occurs seasonally for irrigation purposes is ideal for analysis. However, recovery curves in agricultural regions may not always occur due to the cessation of pumping for growing season irrigation. Other water uses may cause shorter pumping and recovery events, which would generate shorter and incomplete recovery. Reasons for pumping that may interrupt larger recovery curves includes pumping water for oil and gas production,

supplying water for livestock, pumping groundwater from a nearby municipal well, etc. Certain crops are also harvested multiple times per growing season rather than in one harvest, such as alfalfa or hay; recovery in nearby monitoring wells would thus commence just before the crop is cut and once again cease as irrigation pumping resumes. This is evident in Alberta, where many different types of crops are grown (*Figure 5*). Surface water irrigation systems, such as canals, can also affect recovery curves, as water from the canals and laterals seeps into the earth through leaks, or through surface irrigation by farmers. As such, recovery curves present in agricultural regions may not always be long enough for suitable analysis. Additionally, trying to pinpoint specific agricultural events to signals seen in hydrographs is often difficult. This variance in recovery events can make pinpointing pumping seasons within a given monitoring well's hydrograph history difficult. Some monitoring wells, such as Paddle River 81-1-A_0345 (**Table 18** in Appendix C1), Milk River 56-1_0103 (**Table 39** in Appendix C6), Viking 2600E_0298 (**Table 28** in Appendix C3), and High River 2580E_0287 (**Table 42** in Appendix C3), have regular pumping seasons that commence in the spring or summer. Others, however, such as Crestomere Lake Obs1_0291 (**Table 11** in Appendix C1), Warburg 2185E_0315 (**Table 20** in Appendix C1), and Foremost Town_0221 (**Table 24** in Appendix C3), have pumping seasons that vary throughout the year, and finding a discernable pumping season pattern within their hydrographs is difficult. Additionally, certain locations have natural water level variations greater than the variation observed from regular pumping signals. Applying this method in these locations with wetter climates would thus be challenging, as pumping and recovery signals are too small to overcome these variations to be properly observed and classified.

Chapter 6: Summary and Conclusions

This study evaluates the use of routinely collected groundwater level data from a large, publicly available monitoring well database from the provincial Government of Alberta as a resource for identifying the presence of recharge boundaries in aquifers. Previously installed monitoring wells and publicly available archived data are utilised, demonstrating the valuable information that are available in such databases. This study includes wells drilled in shallower overburden aquifers as well as deeper, rocky, confined aquifers. By using previously recorded hydrographs from available monitoring well data, an overview of the presence of recharge boundaries in aquifers across the province of Alberta is identified by graphically analyzing recovery curves present within the hydrographs. Focusing on agriculturally significant portions of the province, the study broadly determines areas for further study for possible recharge over large areas in a cost-effective manner compared to common, smaller scale methods of determining recharge boundaries within a region. This method requires a comprehensive database of monitoring well hydrographs to increase the chance of obtaining recovery curves that are suitable for analysis, as not all monitoring wells will record data that is free of noise, contain continuous data, or both. Of the 292 monitoring wells originally sorted for this study, only 74 have hydrographs suitable for recovery curve analysis, classified as “Excellent”, “Good” or “Nearly Good”, with 49 labelled as “Excellent” or “Good” analyzed in this study. Of these, data from 36 wells are focused on for further analysis and discussion due to their locations in important aquifers within the province: the Paskapoo aquifer, southern Alberta aquifers, and surficial aquifers. The method is successful at identifying the presence of recovery, inflow or replenishment within the aquifers studied, with enhanced recovery identified in 97.22% of the 36 analyzed monitoring wells. Recovery curves classified as “inconclusive” are unfortunately common within the dataset, representing 48.67% of all recovery curves analyzed. This is due to factors such as excessive noise, or insufficient recovery time or magnitude, in the monitoring well hydrographs that are available for this study.

With this method, it is possible to gain a general understanding of the presence or absence of recharge over a large area using existing monitoring well water level data, whether from deeper or shallower wells in overburden aquifers. The influence of changes in groundwater pumping in a region, such as due to policy changes, can also be identified within the hydrograph and recovery curve analysis. These results can be used to determine where further efforts and research is necessary on a smaller scale. Results from this method can be compared with climate data, agricultural management practices, and irrigation data to determine if any correlations exist between these and recovery curve classification results. Although a comprehensive dataset of monitoring well hydrographs are required to get a worthwhile understanding of a given area’s hydrology, it does provide a use for continuously logging monitoring well data that may previously have had little analysis performed. If using this method elsewhere, such as different provinces, it is important to have a large, complete set of monitoring well data available to increase the chance of obtaining suitable recovery curves to analyze. This method would not

work well in areas where monitoring well data are sparse, or hydrographs include significant discontinuities. Users would also struggle to apply it in regions where the aquifers within are not well studied, as aquifer parameters such as spatial extent, hydraulic conductivity, lithology, etc., provide important context for further interpreting classified recovery curve results.

Chapter 7: Recommendations for Future Work and Research

A small percentage (16.78%) of the 292 GOWN database monitoring wells screened for study, those categorized as either “Excellent” or “Good”, are analyzed in this study due to time constraints. Future work related to this study could consider well data rated “Nearly Good” or “Fair”, which would increase the percentage of wells studied to 47.95%. Within the study, further analysis and discussion was conducted on the 36 wells from the Paskapoo aquifer, southern Alberta aquifers, and surficial aquifers sections. Additional analysis and discussion could be performed on the other aquifers whose recovery curves were analyzed for recharge, such as the Horseshoe Canyon aquifer, or the Peace River Valley section aquifers. The GOWN database also includes local areas with numerous monitoring wells which are omitted from analysis here; further analysis could be conducted to inspect all the data from these monitoring well fields. Additionally, only the recovery curves of monitoring well hydrographs were utilised for analysis; drawdown curves within the hydrographs were not analyzed. However, a similar method can be applied to drawdown curves to determine the presence of recharge boundaries within a monitoring well’s hydrograph and other boundary conditions such as the presence of confined, unconfined, or semi-confined aquifers. Future research could utilise this method on the drawdown curves of the studied wells to compare these findings with the results produced from the recovery curve data, thereby increasing the confidence of subsequent interpretations and conclusions.

Future research can be conducted to determine if correlations exist between recovery classifications identified within this study and potentially influencing factors, such as environmental or geographical factors. These include climate variability, agricultural practices such as surface water irrigation infrastructure, policy changes, or geographical features, such as topographic depressions, or surface water sources. Comparing recovery curve interpretations with the influence of common agricultural practices on recharge in Alberta is also recommended. Research has been previously conducted on the effects of irrigation practices on groundwater recharge (Arumí et al., 2009; Katz et al., 2016; Liu et al., 2011; Porhemmat et al., 2018); conducting these types of studies with data from this method is recommended.

Researching potential correlations between identified areas of recovery and external influences can help inform studies or guides for aquifer sustainability in Alberta. For example, determining the amount of groundwater which can be safely extracted per aquifer per growing cycle, warning signs to look for in hydrograph and recovery data, and how to respond should an aquifer become overdrawn. Once correlations or lack thereof are identified, this information could be used by the provincial government to improve vulnerability estimates and develop resource management plans to reduce the probability of groundwater depletion in Alberta. With climate change rendering surface water quantities uncertain and increasing the chances of drought, it is likely that regions such as southern Alberta will use more groundwater as surface water irrigation sources deplete. It would thus be worthwhile to compare well recovery curve analysis results with available climate data and/or drought indices to determine whether there is a correlation between them. Additional research on the links between analysis results and aquifer

vulnerability is also recommended; information obtained from deeper analysis of the recovery data can be used as part of an aquifer vulnerability assessment. Examining shorter-scale recovery curve classification results in conjunction with larger-scale hydrographs and their long-term trends could help farmers and agricultural practitioners determine whether they can extract more or less groundwater over time for their fields. The level of analysis required to examine this is, however, beyond the scope of this paper, and could be conducted in future research projects.

Similar research for the other two Canadian prairie provinces, Saskatchewan, and Manitoba, would be informative given their similar hydrogeology and agricultural challenges due to climate change. However, obtaining publicly available monitoring well data for these provinces is challenging. In addition to water level data availability, further basic research on the aquifers in the three Canadian prairie provinces is needed, with current insufficient information being available on their hydrogeologic parameters, such as transmissivity, hydraulic conductivity, spatial extent, groundwater production rates, etc. The method presented in this study benefits when hydrogeologic information, such as these aforementioned hydrogeologic parameters, are available for reference and analysis. This aids in the further analysis of results; for example, analyzing obtained recovery curve results for the Paskapoo aquifer is easier compared to lesser studied aquifers, due to the breadth of research having been previously performed on the aquifer. Suggestions include fully mapping aquifers in the Canadian prairies and making this data publicly available for further research, as well as increasing the amount of monitoring wells present within these regions.

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Appendices

Appendix A: Supplemental Maps and Information on Alberta, Canada

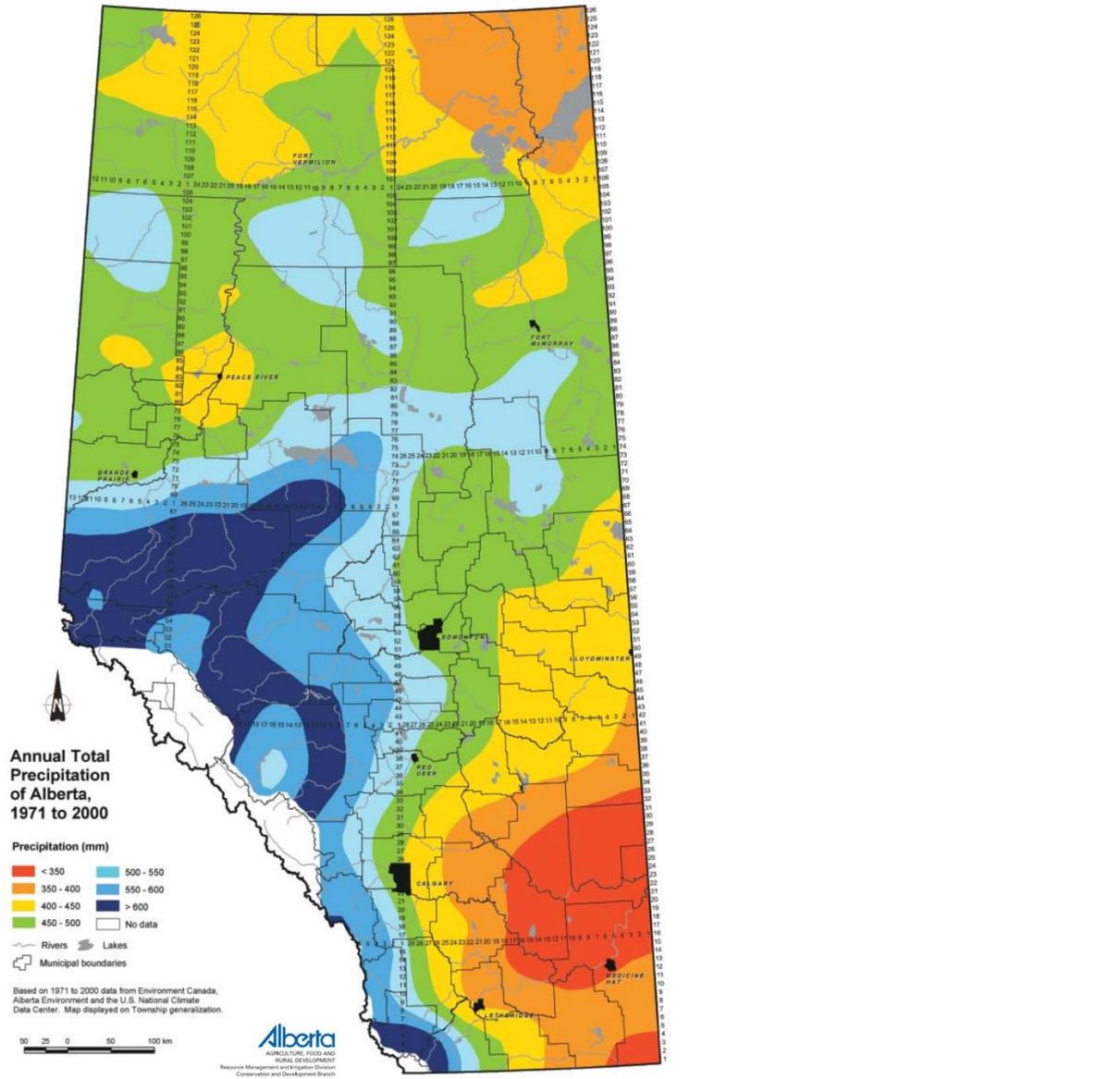


Figure 16: Total annual precipitation (mm/year) in Alberta from 1971-2000, from Alberta Agriculture, Food and Rural Development (2005).

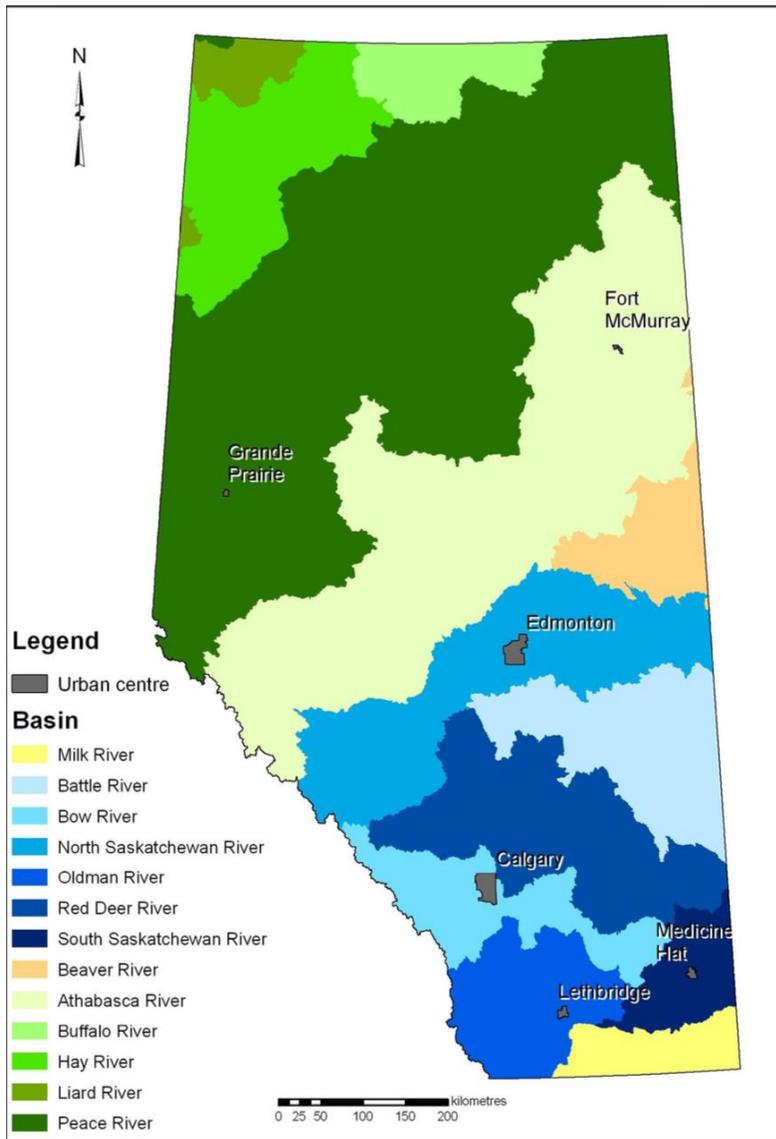


Figure 17: Map of Alberta's major river basins, from Lemay and Guha (2009).

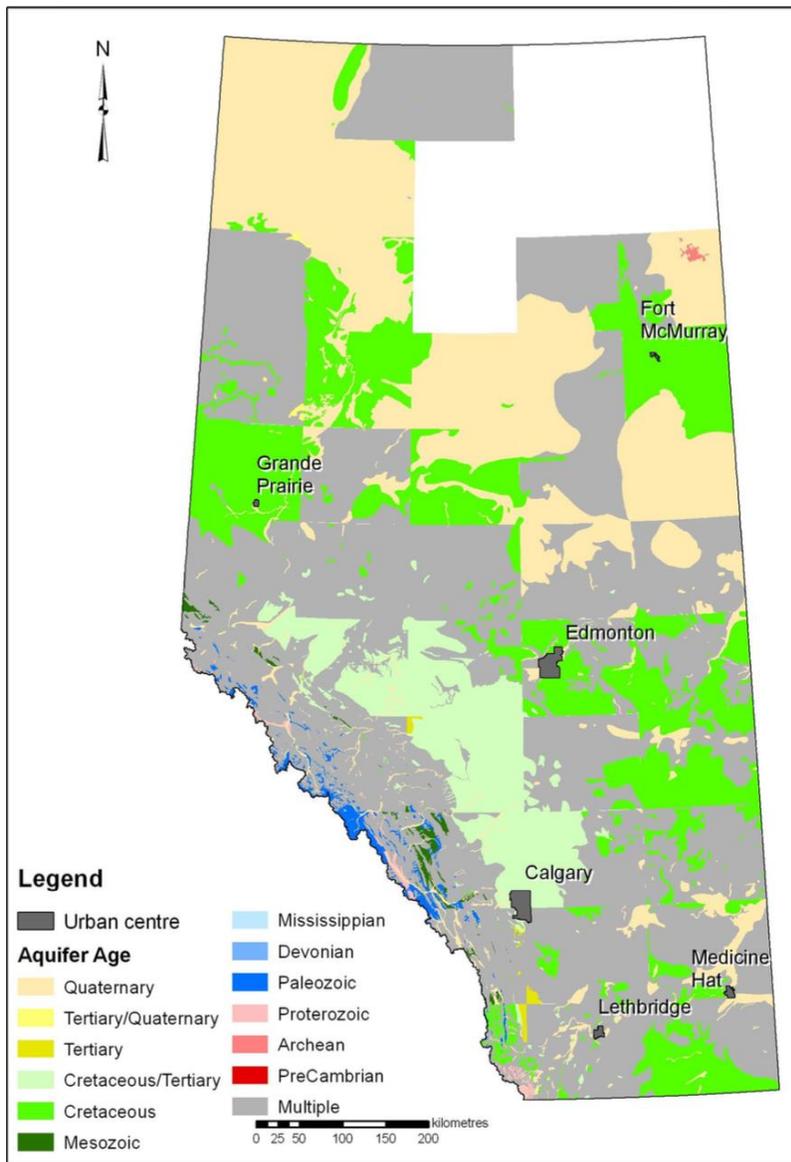


Figure 18: Map of the age of Alberta aquifers, from Lemay and Guha (2009).

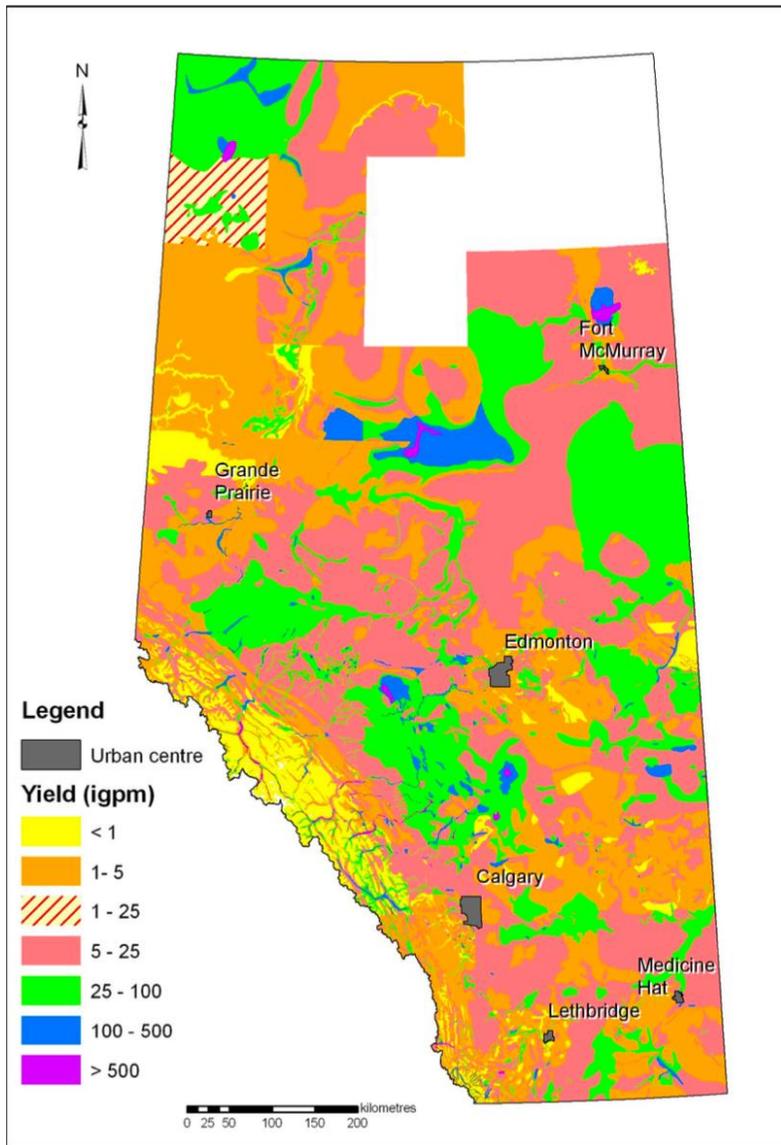


Figure 19: Water well yields in Alberta in imperial gallons per minute, c. 2009, from Lemay and Guha (2009).

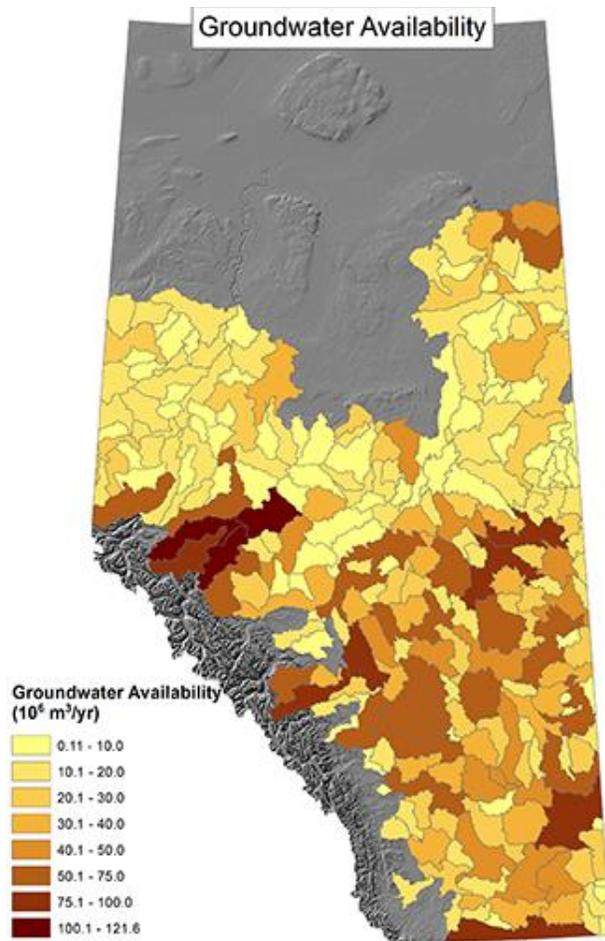


Figure 20: Non-saline groundwater availability in Alberta, c.2020, from Alberta Geological Survey (2020).

Appendix B: GOWN Monitoring Well Aquifer Classification Tables

Table 4: Classification of analyzed Paskapoo Aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
None Listed	Cynthia Shallow_0992	Paskapoo Aquifer (due to location, sandstone lithology)	-115.5908735	53.36302932	34.75	960.1481	Unlisted	2013-03-16	Good	Yes
Paskapoo	Crestomere Lake Obs1_0291	Paskapoo Aquifer	-113.9724026	52.74520015	134.8	924.626	Battle River	1989-10-30	Good	Yes
None Listed	Rocky Mountain House Shallow_0980	Paskapoo Aquifer (due to location, sandstone lithology)	-114.9247474	52.27333882	28.96	1003.964	Unlisted	2013-01-07	Good	Yes
None Listed	Sundre South Shallow_0983	Paskapoo Aquifer (due to location, sandstone and shale lithology)	-114.5609521	51.9194477	28.04	1090.717	Unlisted	2012-12-20	Good	Yes
Paskapoo/Lacombe Member	Elnora #7_0127	Paskapoo Aquifer	-113.6424342	51.93813164	45.7	1025.167	Red Deer River	1962-05-23	Good	Yes
Paskapoo/Haynes Member	Irricana 2376E_0223	Paskapoo Aquifer	-113.6141024	51.33197541	60.67	922.015	Red Deer River	1985-11-17	Good	Yes
Paskapoo/Willow Creek	Okotoks Land Fill 2378E_0217	Paskapoo Aquifer	-113.9767346	50.65048119	42.7	1163.345	Bow River	1985-11-21	Good	Yes
Paskapoo	Paddle River 81-1-A_0345	Paskapoo Aquifer	-115.1226687	53.86222039	73	727.4149	Athabasca River	1981-07-30	Good	Yes
Paskapoo	Raven 87-1_0384	Paskapoo	-114.6837494	52.05720766	36.6	1065.086	Red Deer River	1987-10-02	Good	Yes
Paskapoo	Warburg 2185E_0315	Paskapoo	-114.23472	53.11728	17.7	850.95	North Saskatchewan River	1983-06-30	Good	Yes

Table 5: Classification of analyzed Horseshoe Canyon Aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Horseshoe Canyon	Barons 615E_0117	Horseshoe Canyon	-113.076599	49.99294816	19.81	964.897	Oldman River	1971-03-01	Good	Yes
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Horseshoe Canyon	-112.8547445	52.96838572	78	739.439	Battle River	1985-01-30	Good	No
Horseshoe Canyon	Leduc_0153	Horseshoe Canyon	-113.5428333	53.256	22.1	737.61	North Saskatchewan River	1956-01-01	Good	Yes (in an agricultural town)

Table 6: Classification of analyzed southern Alberta aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Milk River Aquifer	Foremost Town_0221	Milk River Aquifer	-111.4436616	49.47771417	228.6	888	South Saskatchewan River	1987-11-01	Good	Yes (in the middle of an agricultural town)
Blood Reserve/Bearpaw	Del Bonita 70-3_0101	Bearpaw Formation	-112.8544186	49.02731989	73.2	1313.237	Milk River	1970-09-01	Good	Yes
Lethbridge Valley	Orton 1514E_0111	Lethbridge Valley Aquifer	-113.2987759	49.72788347	50.3	947.661	Oldman River	1990-08-22	Good	Yes
Lethbridge Valley	McNally_0110	Lethbridge Valley Aquifer	-112.732713	49.64014196	76.2	917.981	Oldman River	1969-05-01	Good	Yes
Oldman	Viking 2600E_0298	Oldman Aquifer	-111.7898466	53.16117303	103.6	699.009	Battle River	1990-08-20	Good	Yes
Mud Valley	Mud Lake 1537E_0112	Mud Valley Aquifer	-113.5106857	49.75703806	36.58	971.031	Oldman River	1970-08-20	Good	Yes
Porcupine Valley	Okotoks 05-1 South_0786	Porcupine Valley	-113.8822442	50.77233916	60.35	1073.748	Bow River	2005-03-07	Excellent	Yes

Table 7: Classification of analyzed Peace River Valley region aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Grimshaw Gravels	Fairview 8-73_0340	Grimshaw Gravels Aquifer	-117.9997805	56.18924458	37.5	673.13	Peace River	1974-02-04	Excellent	Yes
Grimshaw Gravels	Grimshaw Kerdale_0339	Grimshaw Gravels Aquifer	-117.82111111	56.18916667	37	662.034	Peace River	1965-07-30	Excellent	Yes
Grimshaw Gravels	Grimshaw Mercier_0338	Grimshaw Gravels Aquifer	-117.61	56.22611111	19.2	645.4	Peace River	1965-01-01	Excellent	Yes
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Grimshaw Gravels Aquifer	-117.6366667	56.24666667	21	650	Peace River	1966-01-01	Excellent	Yes

Table 8: Classification analyzed Calgary Valley aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Calgary Valley	Canmore Tourist Info_0760	Calgary Valley Aquifer	-115.3664401	51.107313	85.3	1315.463	Bow River	2000-07-23	Good	No
Calgary Valley	Carseland 85-1_0220	Calgary Valley Aquifer	-113.4668574	50.844665	65	960.574	Bow River	1985-10-31	Good	Yes
Calgary Valley	Cluny 85-2 South_0219	Calgary Valley Aquifer	-112.8428626	50.854361	14.3	954.43	Bow River	1985-11-08	Good	Yes
Calgary Valley	Exshaw_0759	Calgary Valley Aquifer	-115.1541928	51.058938	219.5	1291.795	Bow River	2000-07-25	Good	Yes

Table 9: Classification of analyzed Surficial aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Surficial	Milk River 56-1_0103	Surficial	-111.89	49.1438	7.6	991.46	Milk River	1956-01-01	Good	Yes
Surficial	Hays East_3053	Surficial	-111.687866802	49.9923535926667	10.06	744.251	Bow River	1995-06-01	Excellent	Yes
Surficial	Hays 2523E_0279	Surficial	-111.9175175	50.135247	29.26	775.146	Oldman River	1988-10-01	Good	Yes
Surficial	High River 2580E_0287	Surficial	-113.8599574	50.638372	7.92	1031.461	Bow River	1990-06-21	Excellent	Yes
Surficial	Kirkpatrick Lake 86-3 East_0230	Surficial	-111.44527	51.95366	11	775.468	Sounding Creek	1986-07-07	Good	Yes
Buried Valley	Many Springs_0364	Surficial	-115.11535	51.07367	33.8	1284.61	Bow River	1981-03-11	Good	No
Surficial	Medicine Hat North_3050	Surficial	-110.67452	50.19841	6.1	704.451	South Saskatchewan River	1991-09-18	Excellent	Yes
Surficial	Rockyford_3026	Surficial	-113.24593	51.18592	6.25	888.361	Red Deer River	1989-01-14	Good	Yes
Surficial/Interfill	Waterton Dam #5_0105	Surficial	-113.63367	49.31964	12.2	1175.131	Oldman River	1964-10-23	Excellent	Yes
Surficial	Watino 2353E_0369	Surficial	-117.72317	55.71764	8.8	562.123	Peace River	1985-08-13	Excellent	Yes
Surficial	La Crete 2447E_0380	Surficial	-116.02278	58.22278	15.2	290.566	Peace River	1987-07-26	Excellent	Yes
Surficial	Innisfree 2403E_0235	Surficial	-111.4474082	53.341765	17	650.638	North Saskatchewan River	1986-06-28	Good	Yes
Surficial	Leedale Shallow_3022	Surficial	-114.57716	52.53724	10.06	987.89	Red Deer River	1990-05-02	Excellent	Yes
Surficial	Bruderheim 2343E #1 North_0178	Surficial	-112.9750875	53.875871	10	619.574	North Saskatchewan River	1985-03-27	Good	Yes
Surficial	Bruderheim North_3069	Surficial	-112.9254166	53.862854	7.01	619.918	North Saskatchewan River	1991-09-24	Good	Yes
Surficial	Cooking Lake 1348E North_0157	Surficial	-112.8290187	53.38762	34	753.7785	North Saskatchewan River	1974-10-30	Good	No

Surficial	Devon #2 North_0159	Surficial	-113.6917627	53.388434	7.62	695.5	North Saskatchewan River	1965- 01-01	Good	Yes
Surficial	Carmangay West_3010	Surficial	-113.2149306	50.097191	4.75	950.368	Oldman River	1989- 09-28	Good	Yes
Surficial	Cypress Hills 2293E_0107	Surficial	-110.2517004	49.633894	14.4	1436.888	South Saskatchewan River	1984- 09-27	Good	Yes

Table 10: Classification of miscellaneous Alberta aquifer monitoring wells.

Listed Aquifer in GOWN	Well Identification Name	Aquifer Placed In	Location Data		Well Depth (m)	Elevation (m)	River Basin	Drill Date	Data Quality Category (See Table 1)	Agriculturally Significant?
			Longitude	Latitude						
Lea Park	Dewberry 2410E_0237	Lea Park Aquifer	-110.5460871	53.517606	12.2	603.474	North Saskatchewan River	1986-08-09	Good	Yes
Irvine Valley	Ross Creek 2286E_0114	Irvine Valley Aquifer	-110.4612253	49.988373	73.7	728.835	South Saskatchewan River	1984-09-13	Good	Yes

Appendix C: GOWN Monitoring Well Recovery Curve Classification Tables

Appendix C1: Recovery Curve Classification of Paskapoo Aquifer Monitoring Wells

Table 11: Recovery curve classification of Crestomere Lake Obs1_0291 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Crestomere Lake Obs1_0291	Inconclusive	1992-03-07 0:00	1992-06-16 0:00	101	70.383	70.114	0.269	Yes	No	January-March and June-August	March-May, August, November-December
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	1996-04-28 0:00	1996-12-05 0:00	221	71.349	70.951	0.398				
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	1997-05-18 0:00	1997-08-27 0:00	101	71.122	70.686	0.436				
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	1998-04-02 0:00	1998-11-21 0:00	233	71.301	70.707	0.594				
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	2000-06-03 0:00	2001-01-05 0:00	216	70.386	70.087	0.299				
Paskapoo	Crestomere Lake Obs1_0291	Inconclusive	2001-11-17 0:00	2002-06-05 0:00	200	70.399	70.177	0.222				
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	2002-12-02 0:00	2003-06-30 0:00	210	70.453	69.905	0.548				
Paskapoo	Crestomere Lake Obs1_0291	Recharge Present	2004-05-19 0:00	2005-03-28 0:00	313	70.212	69.774	0.438				
Paskapoo	Crestomere Lake Obs1_0291	Inconclusive	2013-07-08 0:00	2014-01-09 0:00	185	69.937	69.665	0.272				
Paskapoo	Crestomere Lake Obs1_0291	Inconclusive	2016-08-18 0:00	2017-06-09 0:00	295	70.136	69.76	0.376				
Paskapoo	Crestomere Lake Obs1_0291	Inconclusive	2018-08-20 0:00	2019-01-06 0:00	139	70.197	70.005	0.192				

Table 12: Recovery curve classification of Cynthia Shallow_0992 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Cynthia Shallow_0992	No Recharge	2014-04-12 0:00	2014-05-17 0:00	35	19.433	18.395	1.038	Yes	Yes	May-July	March-May
Paskapoo	Cynthia Shallow_0992	Recharge Present	2015-03-16 0:00	2015-05-12 0:00	57	19.42	18.98	0.44				
Paskapoo	Cynthia Shallow_0992	Recharge Present	2016-05-19 0:00	2016-06-14 0:00	26	19.431	18.998	0.433				
Paskapoo	Cynthia Shallow_0992	Recharge Present	2016-08-23 0:00	2016-09-13 0:00	21	19.213	18.409	0.804				
Paskapoo	Cynthia Shallow_0992	Inconclusive	2018-04-22 0:00	2018-05-20 0:00	28	19.224	18.587	0.637				
Paskapoo	Cynthia Shallow_0992	Inconclusive	2019-05-03 0:00	2019-07-24 0:00	82	19.082	16.913	2.169				
Paskapoo	Cynthia Shallow_0992	Recharge Present	2022-06-15 0:00	2022-07-12 0:00	27	19.169	17.475	1.694				

Table 13: Recovery curve classification of Rocky Mountain House Shallow_0980 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Rocky Mountain House Shallow_0980	Recharge Present	2013-05-21 0:00	2013-07-02 0:00	42	11.11	10.291	0.819	Yes	Yes	June- July	May- June
Paskapoo	Rocky Mountain House Shallow_0980	Inconclusive	2014-06-07 0:00	2014-06-23 0:00	16	10.442	10.173	0.269				
Paskapoo	Rocky Mountain House Shallow_0980	Inconclusive	2015-06-08 0:00	2015-06-23 0:00	15	10.942	10.587	0.355				
Paskapoo	Rocky Mountain House Shallow_0980	Inconclusive	2016-08-21 0:00	2016-10-14 0:00	54	10.728	10.418	0.31				
Paskapoo	Rocky Mountain House Shallow_0980	Inconclusive	2017-05-23 0:00	2017-06-20 0:00	28	10.889	10.215	0.674				
Paskapoo	Rocky Mountain House Shallow_0980	No Recharge	2018-06-10 0:00	2018-07-05 0:00	25	11.198	10.635	0.563				
Paskapoo	Rocky Mountain House Shallow_0980	Recharge Present	2019-06-02 0:00	2019-07-07 0:00	35	11.409	10.173	1.236				

Table 14: Recovery curve classification of Sundre South Shallow_0983 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Sundre South Shallow_0983	Recharge Present	2014-04-06 0:00	2014-04-27 0:00	21	16.627	15.951	0.676	Yes	Consistent ending season	Late Spring-Summer, November-December	March-April
Paskapoo	Sundre South Shallow_0983	Recharge Present	2016-07-14 0:00	2016-11-05 0:00	114	17.372	16.821	0.551				
Paskapoo	Sundre South Shallow_0983	Recharge Present	2017-03-16 0:00	2017-06-26 0:00	102	16.98	16.617	0.363				
Paskapoo	Sundre South Shallow_0983	No Recharge	2018-04-11 0:00	2018-05-20 0:00	39	17.477	16.601	0.876				
Paskapoo	Sundre South Shallow_0983	No Recharge	2019-03-21 0:00	2019-12-02 0:00	256	17.553	16.7	0.853				
Paskapoo	Sundre South Shallow_0983	Inconclusive	2020-04-15 0:00	2020-08-06 0:00	113	16.99	15.735	1.255				
Paskapoo	Sundre South Shallow_0983	Recharge Present	2022-03-16 0:00	2022-08-13 0:00	150	17.272	16.267	1.005				

Table 15: Recovery curve classification of Elnora #7_0127 well, Paskapoo Aquifer

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Elnora #7_0127	Recharge Present	1965-03-22 0:00	1965-08-05 0:00	136	40.539	38.343	2.196	Yes	Consistent ending season	April-May, July-September	March-April, July
Paskapoo	Elnora #7_0127	Inconclusive	1966-03-10 0:00	1966-08-09 0:00	152	40.449	36.965	3.484				
Paskapoo	Elnora #7_0127	Inconclusive	1967-04-08 0:00	1967-07-03 0:00	86	38.233	36.186	2.047				
Paskapoo	Elnora #7_0127	Inconclusive	1969-03-19 0:00	1969-04-17 0:00	29	38.613	37.787	0.826				
Paskapoo	Elnora #7_0127	Recharge Present	1970-03-22 0:00	1970-04-12 0:00	21	38.525	37.862	0.663				
Paskapoo	Elnora #7_0127	Inconclusive	1971-03-15 0:00	1971-05-12 0:00	58	37.716	36.761	0.955				
Paskapoo	Elnora #7_0127	Recharge Present	1972-03-09 0:00	1972-04-13 0:00	35	38.275	37.558	0.717				
Paskapoo	Elnora #7_0127	Recharge Present	1974-04-05 0:00	1974-06-03 0:00	59	38.264	36.065	2.199				
Paskapoo	Elnora #7_0127	Inconclusive	1978-04-02 0:00	1978-11-21 0:00	233	38.795	38.329	0.466				
Paskapoo	Elnora #7_0127	No Recharge	1990-03-09 0:00	1990-09-10 0:00	185	40.866	39.533	1.333				
Paskapoo	Elnora #7_0127	Inconclusive	1995-02-22 0:00	1995-12-13 0:00	294	40.399	39.741	0.658				
Paskapoo	Elnora #7_0127	Inconclusive	2003-03-23 0:00	2003-07-27 0:00	126	39.634	38.09	1.544				
Paskapoo	Elnora #7_0127	No Recharge	2004-07-03 0:00	2004-10-14 0:00	103	39.228	38.98	0.248				
Paskapoo	Elnora #7_0127	Recharge Present	2007-03-22 0:00	2007-07-10 0:00	110	38.765	31.285	7.48				
Paskapoo	Elnora #7_0127	Inconclusive	2008-07-30 0:00	2008-10-16 0:00	78	37.858	37.549	0.309				
Paskapoo	Elnora #7_0127	Recharge Present	2010-03-08 0:00	2010-07-21 0:00	135	38.488	34.315	4.173				
Paskapoo	Elnora #7_0127	Inconclusive	2011-04-03 0:00	2011-07-15 0:00	103	37.731	34.029	3.702				

Paskapoo	Elnora #7_0127	Inconclusive	2013- 03-30 0:00	2013- 08-02 0:00	125	38.195	36.377	1.818
Paskapoo	Elnora #7_0127	No Recharge	2014- 03-11 0:00	2014- 08-13 0:00	155	37.884	35.812	2.072
Paskapoo	Elnora #7_0127	Inconclusive	2017- 06-05 0:00	2017- 09-02 0:00	89	38.171	36.594	1.577
Paskapoo	Elnora #7_0127	Recharge Present	2018- 04-17 0:00	2018- 05-08 0:00	21	38.04	37.863	0.177
Paskapoo	Elnora #7_0127	Recharge Present	2020- 04-15 0:00	2020- 09-02 0:00	140	38.736	37.553	1.183

Table 16: Recovery curve classification for Irricana 2376E_0223 well, Paskapoo Aquifer

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Irricana 2376E	Recharge Present	1992-08-16 0:00	1992-12-15 0:00	121	10.243	9.943	0.3	Yes	Consistent ending season	Early to Late Winter, June-July	August
Paskapoo	Irricana 2376E	Inconclusive	1993-08-11 0:00	1993-12-07 0:00	118	10.75	10.445	0.305				
Paskapoo	Irricana 2376E	No Recharge	1995-08-25 0:00	1996-04-29 0:00	248	11.959	11.571	0.388				
Paskapoo	Irricana 2376E	Inconclusive	1996-05-25 0:00	1996-07-31 0:00	67	12.199	12.003	0.196				
Paskapoo	Irricana 2376E	No Recharge	1996-08-26 0:00	1997-03-18 0:00	204	12.433	11.903	0.53				
Paskapoo	Irricana 2376E	Inconclusive	1997-08-12 0:00	1998-01-11 0:00	152	12.83	12.363	0.467				
Paskapoo	Irricana 2376E	No Recharge	1998-08-15 0:00	1999-02-04 0:00	173	13.295	13.04	0.255				
Paskapoo	Irricana 2376E	Inconclusive	1999-08-11 0:00	1999-10-15 0:00	65	13.986	13.597	0.389				
Paskapoo	Irricana 2376E	Recharge Present	1999-10-21 0:00	1999-12-09 0:00	49	13.738	13.593	0.145				
Paskapoo	Irricana 2376E	Inconclusive	2001-09-04 0:00	2001-12-10 0:00	97	15.547	15.128	0.419				
Paskapoo	Irricana 2376E	Inconclusive	2002-08-13 0:00	2003-05-12 0:00	272	16.237	15.509	0.728				
Paskapoo	Irricana 2376E	Inconclusive	2003-08-18 0:00	2003-12-10 0:00	114	16.494	15.812	0.682				
Paskapoo	Irricana 2376E	Recharge Present	2004-08-11 0:00	2005-01-19 0:00	161	16.558	15.897	0.661				
Paskapoo	Irricana 2376E	Recharge Present	2005-08-09 0:00	2005-12-09 0:00	122	16.841	15.86	0.981				
Paskapoo	Irricana 2376E	Inconclusive	2006-06-09 0:00	2006-07-14 0:00	35	15.994	15.868	0.126				
Paskapoo	Irricana 2376E	Recharge Present	2007-08-15 0:00	2008-07-23 0:00	343	15.459	14.365	1.094				
Paskapoo	Irricana 2376E	Recharge Present	2008-08-13 0:00	2009-05-08 0:00	268	14.776	13.727	1.049				

Paskapoo	Irricana 2376E	Recharge Present	2009- 08-12 0:00	2010- 06-29 0:00	321	14.178	13.194	0.984
Paskapoo	Irricana 2376E	Inconclusive	2010- 08-11 0:00	2011- 07-26 0:00	349	13.625	12.273	1.352
Paskapoo	Irricana 2376E	Recharge Present	2011- 08-14 0:00	2012- 07-14 0:00	335	12.757	11.913	0.844
Paskapoo	Irricana 2376E	Recharge Present	2014- 08-13 0:00	2015- 03-18 0:00	217	10.525	9.702	0.823
Paskapoo	Irricana 2376E	Recharge Present	2016- 08-11 0:00	2017- 04-29 0:00	261	9.749	9.062	0.687
Paskapoo	Irricana 2376E	Recharge Present	2018- 08-14 0:00	2018- 12-19 0:00	127	9.338	8.526	0.812
Paskapoo	Irricana 2376E	Inconclusive	2019- 08-12 0:00	2020- 04-02 0:00	234	9.044	8.31	0.734
Paskapoo	Irricana 2376E	Recharge Present	2020- 05-19 0:00	2020- 07-18 0:00	60	8.596	8.353	0.243
Paskapoo	Irricana 2376E	Inconclusive	2021- 08-13 0:00	2022- 03-31 0:00	230	9.54	8.253	1.287

Table 17: Recovery curve classification of Okotoks Land Fill 2378E_0217 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2005-06-20 0:00	2005-12-31 0:00	194	30.534	26.695	3.839	Yes	Yes	October-December	May-June
Paskapoo	Okotoks Land Fill 2378E	No Recharge	2006-06-24 0:00	2006-10-15 0:00	113	27.973	27.323	0.65				
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2008-06-27 0:00	2008-11-12 0:00	138	29.731	28.971	0.76				
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2010-06-11 0:00	2010-11-07 0:00	149	29.938	28.267	1.671				
Paskapoo	Okotoks Land Fill 2378E	No Recharge	2011-05-13 0:00	2011-09-25 0:00	135	29.12	25.682	3.438				
Paskapoo	Okotoks Land Fill 2378E	No Recharge	2012-07-06 0:00	2012-10-15 0:00	101	28.236	27.644	0.592				
Paskapoo	Okotoks Land Fill 2378E	No Recharge	2013-06-28 0:00	2014-01-09 0:00	195	29.137	28.139	0.998				
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2014-04-29 0:00	2014-10-20 0:00	174	28.859	26.052	2.807				
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2018-04-23 0:00	2018-11-27 0:00	218	29.675	28.973	0.702				
Paskapoo	Okotoks Land Fill 2378E	Recharge Present	2020-05-08 0:00	2020-11-13 0:00	189	29.538	28.333	1.205				
Paskapoo	Okotoks Land Fill 2378E	No Recharge	2022-06-25 0:00	2022-12-27 0:00	185	29.915	29.196	0.719				

Table 18: Recovery curve classification of Paddle River 81-1-A_0345 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Paddle River 81-1-A	Inconclusive	2012-06-09 0:00	2012-09-07 0:00	90	19.292	19.095	0.197	Yes	Yes	May- July	September- November
Paskapoo	Paddle River 81-1-A	Recharge Present	2012-10-31 0:00	2013-05-15 0:00	196	19.364	19.04	0.324				
Paskapoo	Paddle River 81-1-A	Inconclusive	2013-11-09 0:00	2014-05-09 0:00	181	19.488	19.061	0.427				
Paskapoo	Paddle River 81-1-A	Recharge Present	2014-05-26 0:00	2014-07-06 0:00	41	19.256	19.146	0.11				
Paskapoo	Paddle River 81-1-A	Recharge Present	2014-11-06 0:00	2015-04-28 0:00	173	19.363	19.022	0.341				
Paskapoo	Paddle River 81-1-A	Inconclusive	2015-09-28 0:00	2016-04-11 0:00	196	19.659	19.167	0.492				
Paskapoo	Paddle River 81-1-A	Inconclusive	2016-05-16 0:00	2016-06-21 0:00	36	19.211	19.135	0.076				
Paskapoo	Paddle River 81-1-A	Recharge Present	2016-08-19 0:00	2017-05-15 0:00	269	19.204	18.816	0.388				
Paskapoo	Paddle River 81-1-A	Recharge Present	2018-10-19 0:00	2019-03-12 0:00	144	19.101	18.836	0.265				
Paskapoo	Paddle River 81-1-A	Recharge Present	2019-09-25 0:00	2020-05-22 0:00	240	18.887	18.543	0.344				
Paskapoo	Paddle River 81-1-A	Inconclusive	2020-10-15 0:00	2021-05-24 0:00	221	18.97	18.765	0.205				
Paskapoo	Paddle River 81-1-A	Inconclusive	2021-10-22 0:00	2022-05-26 0:00	216	19.074	18.805	0.269				
Paskapoo	Paddle River 81-1-A	Recharge Present	2022-06-14 0:00	2022-07-15 0:00	31	18.888	18.83	0.058				
Paskapoo	Paddle River 81-1-A	Recharge Present	2022-09-12 0:00	2023-04-15 0:00	215	19.245	18.887	0.358				

Table 19: Recovery curve classification of Raven 87-1_0384 well, Paskapoo Aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Paskapoo	Raven 87-1	Recharge Present	1989-03-31 0:00	1989-04-16 0:00	16	28.138	27.867	0.271	Yes	Yes	March-May, July	March
Paskapoo	Raven 87-1	Recharge Present	1992-02-23 0:00	1992-03-05 0:00	11	27.897	27.697	0.2				
Paskapoo	Raven 87-1	Inconclusive	1992-05-24 0:00	1992-06-28 0:00	35	27.881	27.757	0.124				
Paskapoo	Raven 87-1	Recharge Present	1993-02-28 0:00	1993-04-17 0:00	48	27.999	27.572	0.427				
Paskapoo	Raven 87-1	Recharge Present	1994-03-01 0:00	1994-04-14 0:00	44	27.99	27.798	0.192				
Paskapoo	Raven 87-1	Inconclusive	1995-04-18 0:00	1995-08-30 0:00	134	27.975	27.523	0.452				
Paskapoo	Raven 87-1	Recharge Present	1997-03-18 0:00	1997-04-29 0:00	42	27.94	27.154	0.786				
Paskapoo	Raven 87-1	Recharge Present	1998-03-20 0:00	1998-04-10 0:00	21	27.871	27.602	0.269				
Paskapoo	Raven 87-1	Inconclusive	1999-03-16 0:00	1999-03-26 0:00	10	27.832	27.719	0.113				
Paskapoo	Raven 87-1	Inconclusive	2001-03-10 0:00	2001-04-27 0:00	48	27.936	27.708	0.228				
Paskapoo	Raven 87-1	Inconclusive	2002-04-09 0:00	2002-04-23 0:00	14	28.058	27.912	0.146				
Paskapoo	Raven 87-1	Recharge Present	2003-03-18 0:00	2003-05-15 0:00	58	28.113	27.328	0.785				
Paskapoo	Raven 87-1	Inconclusive	2004-03-08 0:00	2004-04-05 0:00	28	28.056	27.917	0.139				
Paskapoo	Raven 87-1	Recharge Present	2005-03-03 0:00	2005-09-30 0:00	211	28.138	27.232	0.906				
Paskapoo	Raven 87-1	Recharge Present	2007-03-09 0:00	2007-07-29 0:00	142	27.815	26.555	1.26				
Paskapoo	Raven 87-1	Recharge Present	2011-03-29 0:00	2011-06-30 0:00	93	28.057	27.301	0.756				
Paskapoo	Raven 87-1	Recharge Present	2012-03-14 0:00	2012-07-01 0:00	109	27.826	27.435	0.391				

Paskapoo	Raven 87-1	Recharge Present	2013-03-25 0:00	2013-07-11 0:00	108	27.849	27.194	0.655				
Paskapoo	Raven 87-1	Recharge Present	2014-04-06 0:00	2014-05-09 0:00	33	27.775	27.095	0.68				
Paskapoo	Raven 87-1	Recharge Present	2016-07-12 0:00	2016-11-24 0:00	135	28.024	27.732	0.292				
Paskapoo	Raven 87-1	Inconclusive	2017-03-15 0:00	2017-05-03 0:00	49	27.796	27.498	0.298				
Paskapoo	Raven 87-1	Recharge Present	2020-04-12 0:00	2020-08-01 0:00	111	27.96	26.701	1.259				

Table 20: Recovery curve classification of Warburg 2185E_0315 well, Paskapoo aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping During Recovery Season?	Consistent?	Start Date	End Date
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m				
Paskapoo	Warburg 2185	Inconclusive	1985-03-13 0:00	1985-05-27 0:00	75	9.196	8.263	0.933	Yes	No	June-October	February-March. September
Paskapoo	Warburg 2185	Recharge Present	1985-09-08 0:00	1985-10-22 0:00	44	9.441	8.949	0.492				
Paskapoo	Warburg 2185	Inconclusive	1986-03-06 0:00	1986-06-01 0:00	87	9.784	8.453	1.331				
Paskapoo	Warburg 2185	Inconclusive	1986-09-25 0:00	1986-10-12 0:00	17	8.981	8.346	0.635				
Paskapoo	Warburg 2185	Recharge Present	1989-04-01 0:00	1989-08-20 0:00	141	10.009	8.332	1.677				
Paskapoo	Warburg 2185	Recharge Present	1990-02-25 0:00	1990-07-07 0:00	132	9.634	7.389	2.245				
Paskapoo	Warburg 2185	Recharge Present	1991-02-04 0:00	1991-07-08 0:00	154	9.808	7.809	1.999				
Paskapoo	Warburg 2185	Inconclusive	1993-03-10 0:00	1993-05-30 0:00	81	10.351	9.825	0.526				
Paskapoo	Warburg 2185	Recharge Present	1994-03-05 0:00	1994-07-17 0:00	134	10.429	9.633	0.796				
Paskapoo	Warburg 2185	Inconclusive	1995-03-25 0:00	1995-06-11 0:00	78	10.576	10.217	0.359				
Paskapoo	Warburg 2185	Inconclusive	1995-07-28 0:00	1995-09-02 0:00	36	10.372	10.12	0.252				

Appendix C2: Recovery Curve Classification of Horseshoe Canyon Aquifer Monitoring Wells

Table 21: Recovery curve classification of Barons 615E_0117 well, Horseshoe Canyon aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1971-09-21 0:00	1971-12-09 0:00	79	2.218	1.832	0.386	Yes	No	May-July	January-March
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1972-03-11 0:00	1972-04-26 0:00	46	2.328	1.318	1.01				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1973-02-17 0:00	1973-04-12 0:00	54	2.318	1.849	0.469				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1974-02-24 0:00	1974-06-17 0:00	113	2.893	1.953	0.94				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1977-02-15 0:00	1977-05-04 0:00	78	2.763	2.235	0.528				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1979-02-01 0:00	1979-03-10 0:00	37	2.504	1.653	0.851				
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1979-08-11 0:00	1979-09-27 0:00	47	2.8	1.985	0.815				
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1981-02-22 0:00	1981-06-17 0:00	115	2.6	1.897	0.703				
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1982-12-27 0:00	1983-06-02 0:00	157	2.936	2.341	0.595				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1985-08-26 0:00	1985-10-22 0:00	57	3.183	2.764	0.419				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1986-03-06 0:00	1986-06-14 0:00	100	3.028	2.731	0.297				
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1986-09-28 0:00	1986-12-23 0:00	86	3.141	2.902	0.239				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1990-02-23 0:00	1990-08-22 0:00	180	3.83	3.4	0.43				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1991-02-03 0:00	1991-07-14 0:00	161	3.745	3.186	0.559				
Horseshoe Canyon	Barons 615E_0117	Inconclusive	1992-04-24 0:00	1992-08-06 0:00	104	3.558	2.854	0.704				
Horseshoe Canyon	Barons 615E_0117	Recharge Present	1995-02-26 0:00	1995-05-14 0:00	77	2.642	1.936	0.706				

Horseshoe Canyon	Barons 615E_0117	Inconclusive	1998-03-10 0:00	1998-07-05 0:00	117	2.937	1.919	1.018
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2001-03-22 0:00	2001-05-14 0:00	53	3.017	2.565	0.452
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2002-03-06 0:00	2002-06-23 0:00	109	3.468	2.049	1.419
Horseshoe Canyon	Barons 615E_0117	Inconclusive	2005-01-21 0:00	2005-07-01 0:00	161	2.774	1.337	1.437
Horseshoe Canyon	Barons 615E_0117	Inconclusive	2008-02-09 0:00	2008-06-15 0:00	127	2.303	1.261	1.042
Horseshoe Canyon	Barons 615E_0117	Inconclusive	2009-02-27 0:00	2009-05-11 0:00	73	2.613	1.891	0.722
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2010-01-06 0:00	2010-06-19 0:00	164	2.547	0.93	1.617
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2011-03-11 0:00	2011-06-08 0:00	89	2.087	0.776	1.311
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2012-10-03 0:00	2012-11-29 0:00	57	2.332	1.863	0.469
Horseshoe Canyon	Barons 615E_0117	Inconclusive	2013-02-14 0:00	2013-06-23 0:00	129	2.634	1.748	0.886
Horseshoe Canyon	Barons 615E_0117	Inconclusive	2014-03-11 0:00	2014-06-20 0:00	101	2.917	1.813	1.104
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2017-02-13 0:00	2017-05-12 0:00	88	3.335	2.877	0.458
Horseshoe Canyon	Barons 615E_0117	Recharge Present	2018-03-30 0:00	2018-05-16 0:00	47	3.82	3.141	0.679

Table 22: Recovery curve classification of Camrose Regional Landfill 85-1_0149 well, Horseshoe Canyon aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	1993-09-09 0:00	1994-03-18 0:00	190	39.691	39.591	0.1	Yes	No	March-April	July-October
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	1994-08-04 0:00	1994-12-01 0:00	119	39.672	39.592	0.08				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	1996-09-10 0:00	1997-03-23 0:00	194	39.666	39.519	0.147				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	1998-09-17 0:00	1999-03-25 0:00	189	39.707	39.579	0.128				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2001-09-14 0:00	2002-04-15 0:00	213	39.691	39.605	0.086				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2003-01-15 0:00	2003-05-07 0:00	112	39.695	39.582	0.113				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2003-09-28 0:00	2005-04-08 0:00	558	39.709	39.509	0.2				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2005-08-12 0:00	2005-11-10 0:00	90	39.668	39.52	0.148				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2006-07-21 0:00	2007-05-05 0:00	288	39.702	39.523	0.179				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2008-12-03 0:00	2009-03-15 0:00	102	39.707	39.622	0.085				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2009-10-10 0:00	2011-04-01 0:00	538	39.752	39.544	0.208				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2012-10-05 0:00	2013-04-13 0:00	190	39.758	39.639	0.119				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2013-10-14 0:00	2014-04-04 0:00	172	39.736	39.597	0.139				

Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2014-08-23 0:00	2015-03-09 0:00	198	39.681	39.574	0.107				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Inconclusive	2015-06-29 0:00	2017-04-14 0:00	655	39.673	39.476	0.197				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Inconclusive	2017-09-04 0:00	2018-04-28 0:00	236	39.652	39.508	0.144				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2018-08-20 0:00	2019-03-12 0:00	204	39.667	39.542	0.125				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2019-10-10 0:00	2020-07-09 0:00	273	39.608	39.487	0.121				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2020-09-30 0:00	2021-03-02 0:00	153	39.624	39.543	0.081				
Horseshoe Canyon	Camrose Regional Landfill 85-1_0149	Recharge Present	2021-08-18 0:00	2022-03-20 0:00	214	39.647	39.551	0.096				

Table 23: Recovery curve classification of Leduc_0153 well, Horseshoe Canyon aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Horseshoe Canyon	Leduc_0153	Recharge Present	1973-04-03 0:00	1973-08-16 0:00	135	5.225	4.489	0.736	Yes	Yes	August-October	April-June
Horseshoe Canyon	Leduc_0153	Recharge Present	1980-04-23 0:00	1980-09-18 0:00	148	6.561	5.705	0.856				
Horseshoe Canyon	Leduc_0153	Recharge Present	1982-06-18 0:00	1982-08-01 0:00	44	6.441	5.961	0.48				
Horseshoe Canyon	Leduc_0153	Recharge Present	1983-05-28 0:00	1983-07-26 0:00	59	6.448	5.918	0.53				
Horseshoe Canyon	Leduc_0153	Recharge Present	1985-04-06 0:00	1985-10-02 0:00	179	6.65	5.963	0.687				
Horseshoe Canyon	Leduc_0153	Inconclusive	1993-04-29 0:00	1993-08-24 0:00	117	6.301	5.876	0.425				
Horseshoe Canyon	Leduc_0153	Inconclusive	1994-05-04 0:00	1994-10-20 0:00	169	6.24	5.704	0.536				

Appendix C3: Recovery Curve Classification of Southern Alberta Aquifers Monitoring Wells

Table 24: Recovery curve classification of Foremost Town_0221 well, Milk River aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Milk River	Foremost Town_0221	Inconclusive (too short time)	1957-04-10 0:00	1957-04-22 0:00	12	47.524	46.674	0.85	Yes	No	January-March, June-August	March-May, August, November-December
Milk River	Foremost Town_0221	Recharge Present	1957-06-01 0:00	1957-06-29 0:00	28	49.885	48.984	0.901				
Milk River	Foremost Town_0221	Inconclusive	1957-07-29 0:00	1957-12-19 0:00	143	51.142	48.919	2.223				
Milk River	Foremost Town_0221	Recharge Present	1958-08-20 0:00	1958-10-14 0:00	55	54.007	49.157	4.85				
Milk River	Foremost Town_0221	Inconclusive	1959-03-09 0:00	1959-05-06 0:00	58	52.71	49.01	3.7				

Table 25: Recovery curve classification of Del Bonita 70-3_0101 well, Bearpaw formation aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	1987-03-05 0:00	1987-05-03 0:00	59	18.772	17.872	0.9	Yes	No	May-June	February-April
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	1989-03-08 0:00	1989-05-14 0:00	67	20.176	18.57	1.606				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1989-08-04 0:00	1990-01-18 0:00	167	18.603	17.294	1.309				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1990-03-19 0:00	1990-06-10 0:00	83	17.975	16.797	1.178				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1991-02-05 0:00	1991-08-24 0:00	200	18.688	15.136	3.552				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1993-02-11 0:00	1993-05-16 0:00	94	18.993	17.564	1.429				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1993-06-22 0:00	1993-11-16 0:00	147	17.761	15.047	2.714				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1994-03-25 0:00	1994-07-01 0:00	98	16.301	15.38	0.921				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1995-03-26 0:00	1995-08-08 0:00	135	17.524	11.034	6.49				
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	1996-04-24 0:00	1996-06-24 0:00	61	15.867	15.267	0.6				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	1997-02-06 0:00	1997-06-15 0:00	129	17.147	15.787	1.36				
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	1998-03-14 0:00	1998-05-19 0:00	66	18.175	17.509	0.666				
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	1999-02-26 0:00	1999-05-23 0:00	86	18.128	17.583	0.545				
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	2000-02-26 0:00	2000-05-01 0:00	65	19.448	18.591	0.857				
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	2001-03-03 0:00	2001-05-13 0:00	71	20.184	19.331	0.853				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	2005-05-29 0:00	2005-11-08 0:00	163	20.72	13.014	7.706				
Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	2010-03-14 0:00	2010-07-22 0:00	130	21.436	9.567	11.869				

Bearpaw Formation	Del Bonita 70-3_0101	Recharge Present	2014-06-26 0:00	2014-08-26 0:00	61	18.969	13.797	5.172
Bearpaw Formation	Del Bonita 70-3_0101	Inconclusive	2018-03-19 0:00	2018-05-29 0:00	71	20.369	16.226	4.143

Table 26: Recovery curve classification of Orton 1514E_0111 well, Lethbridge Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Lethbridge Valley	Orton 1514E_0111	No Recharge	1985-08-03 3:00	1986-02-26 2:00	207	21.27	19.22	2.05	No	Consistent ending season	February-May	August-September
Lethbridge Valley	Orton 1514E_0111	Inconclusive	1986-08-29 3:00	1986-11-15 2:00	78	20.64	19.39	1.25				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	1990-08-16 3:00	1991-03-09 2:00	205	21.87	19.51	2.36				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	1991-09-03 3:00	1992-01-16 2:00	135	21.51	19.73	1.78				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	1992-08-19 3:00	1993-03-01 2:00	194	20.92	19.37	1.55				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	1993-11-02 2:00	1994-01-18 2:00	77	20.04	19.48	0.56				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	1995-09-04 3:00	1996-04-15 3:00	224	20.98	19.5	1.48				
Lethbridge Valley	Orton 1514E_0111	No Recharge	1998-09-12 3:00	1999-01-28 2:00	138	22.61	19.59	3.02				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	1999-08-27 3:00	2000-03-16 2:00	202	22.89	19.81	3.08				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	2000-09-16 3:00	2001-04-11 3:00	207	22.16	20.19	1.97				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2001-09-26 3:00	2002-05-19 3:00	235	23.16	20.13	3.03				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2002-07-24 3:00	2003-03-23 2:00	242	22.69	19.79	2.9				
Lethbridge Valley	Orton 1514E_0111	No Recharge	2003-09-06 3:00	2004-03-12 2:00	188	23.46	19.99	3.47				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2005-08-06 3:00	2006-03-05 2:00	211	22.77	19.64	3.13				
Lethbridge Valley	Orton 1514E_0111	Recharge Present	2006-09-09 3:00	2007-03-08 2:00	180	22.81	19.82	2.99				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2007-07-30 3:00	2008-06-15 3:00	321	25.04	20.39	4.65				
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2008-08-15 3:00	2009-05-15 3:00	273	23.33	19.92	3.41				

Lethbridge Valley	Orton 1514E_0111	Inconclusive	2009-09-18 3:00	2010-05-08 3:00	232	22.27	19.67	2.6
Lethbridge Valley	Orton 1514E_0111	Recharge Present	2010-08-27 3:00	2010-10-31 3:00	65	21.7	19.85	1.85
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2011-08-29 3:00	2012-02-20 2:00	175	22.89	20.49	2.4
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2012-09-25 3:00	2013-02-27 2:00	155	23.36	20.74	2.62
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2013-09-17 3:00	2014-04-27 3:00	222	23.16	20.88	2.28
Lethbridge Valley	Orton 1514E_0111	No Recharge	2014-08-14 3:00	2015-04-12 3:00	241	23.73	20.7	3.03
Lethbridge Valley	Orton 1514E_0111	No Recharge	2015-08-05 3:00	2016-02-15 2:00	194	24.45	20.93	3.52
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2016-06-23 3:00	2017-02-23 2:00	245	24.48	20.8	3.68
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2017-09-08 3:00	2018-04-22 3:00	226	24.7	20.85	3.85
Lethbridge Valley	Orton 1514E_0111	No Recharge	2018-08-23 3:00	2019-03-31 3:00	220	24.6	21.03	3.57
Lethbridge Valley	Orton 1514E_0111	No Recharge	2019-08-09 3:00	2020-04-13 3:00	248	25.49	21.25	4.24
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2021-07-30 3:00	2022-03-12 2:00	225	26.59	21.26	5.33
Lethbridge Valley	Orton 1514E_0111	Inconclusive	2022-08-18 3:00	2023-04-23 3:00	248	25.89	21.35	4.54

Table 27: Recovery curve classification of McNally_0110 well, Lethbridge Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Lethbridge Valley	McNally_0110	Recharge Present	1971-05-28 0:00	1971-12-20 0:00	206	49.327	48.436	0.891	Yes	No	November-February	August-October
Lethbridge Valley	McNally_0110	Inconclusive	1972-10-19 0:00	1973-02-19 0:00	123	49.088	48.732	0.356				
Lethbridge Valley	McNally_0110	Inconclusive	2013-09-18 0:00	2013-11-16 0:00	59	49.801	49.468	0.333				
Lethbridge Valley	McNally_0110	Inconclusive	2019-08-19 0:00	2020-04-20 0:00	245	49.788	49.041	0.747				

Table 28: Recovery curve classification of Viking 2600E_0298 well, Oldman aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Oldman Aquifer	Viking 2600E_0298	Recharge Present	1992-10-06 0:00	1993-05-08 0:00	214	12.635	12.488	0.147	Yes	Yes	March-May	September-November
Oldman Aquifer	Viking 2600E_0298	Recharge Present	1994-09-21 0:00	1995-03-22 0:00	182	12.597	12.468	0.129				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	1996-09-11 0:00	1997-04-21 0:00	222	12.598	12.387	0.211				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	1997-10-20 0:00	1998-03-26 0:00	157	12.59	12.511	0.079				
Oldman Aquifer	Viking 2600E_0298	Inconclusive	1998-09-17 0:00	1999-05-18 0:00	243	12.678	12.541	0.137				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2001-11-26 0:00	2002-04-22 0:00	147	12.693	12.591	0.102				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2002-09-22 0:00	2003-05-07 0:00	227	12.717	12.574	0.143				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2004-08-18 0:00	2005-03-29 0:00	223	12.706	12.514	0.192				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2008-11-20 0:00	2009-04-22 0:00	153	12.696	12.584	0.112				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2009-10-10 0:00	2010-07-13 0:00	276	12.747	12.581	0.166				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2010-11-03 0:00	2011-04-20 0:00	168	12.667	12.504	0.163				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2012-10-04 0:00	2013-04-27 0:00	205	12.684	12.55	0.134				
Oldman Aquifer	Viking 2600E_0298	No Recharge	2013-10-28 0:00	2014-06-27 0:00	242	12.729	12.616	0.113				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2014-11-11 0:00	2015-04-01 0:00	141	12.753	12.605	0.148				
Oldman Aquifer	Viking 2600E_0298	Inconclusive	2015-09-05 0:00	2016-07-11 0:00	310	12.767	12.615	0.152				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2017-09-15 0:00	2018-04-22 0:00	219	12.692	12.538	0.154				
Oldman Aquifer	Viking 2600E_0298	Recharge Present	2018-09-06 0:00	2019-03-27 0:00	202	12.751	12.579	0.172				

Oldman Aquifer	Viking 2600E_0298	Recharge Present	2019- 09-06 0:00	2020- 04-21 0:00	228	12.65	12.507	0.143			
Oldman Aquifer	Viking 2600E_0298	Inconclusive	2021- 11-01 0:00	2022- 05-07 0:00	187	12.74	12.6	0.14			

Table 29: Recovery curve classification of Mud Lake 1537E_0112 well, Mud Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1980-03-17 0:00	1980-06-11 0:00	86	12.255	11.689	0.566	Yes	No	November-February, June-July	July-August
Mud Valley	Mud Lake 1537E_0112	Inconclusive	1981-01-05 0:00	1981-03-19 0:00	73	12.128	11.838	0.29				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1981-05-04 0:00	1981-06-29 0:00	56	12.228	11.589	0.639				
Mud Valley	Mud Lake 1537E_0112	Inconclusive	1982-02-20 0:00	1982-04-06 0:00	45	12.212	11.999	0.213				
Mud Valley	Mud Lake 1537E_0112	Inconclusive	1982-05-16 0:00	1982-07-05 0:00	50	12.139	11.88	0.259				
Mud Valley	Mud Lake 1537E_0112	Inconclusive	1986-04-25 0:00	1986-06-08 0:00	44	12.166	11.915	0.251				
Mud Valley	Mud Lake 1537E_0112	No Recharge	1986-08-08 0:00	1986-11-11 0:00	95	12.273	12.049	0.224				
Mud Valley	Mud Lake 1537E_0112	No Recharge	1987-07-16 0:00	1987-09-11 0:00	57	12.408	12.258	0.15				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1988-09-03 0:00	1989-06-30 0:00	300	12.588	11.948	0.64				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1989-08-22 0:00	1990-06-16 0:00	298	12.251	11.757	0.494				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1991-06-16 0:00	1991-07-08 0:00	22	12.461	11.957	0.504				
Mud Valley	Mud Lake 1537E_0112	No Recharge	1992-06-12 0:00	1992-09-15 0:00	95	12.399	11.819	0.58				
Mud Valley	Mud Lake 1537E_0112	Inconclusive	1993-05-30 0:00	1993-10-15 0:00	138	12.14	11.557	0.583				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1996-08-25 0:00	1997-01-26 0:00	154	12.798	12.241	0.557				
Mud Valley	Mud Lake 1537E_0112	Inconclusive (too short time)	1997-05-16 0:00	1997-05-27 0:00	11	12.729	12.25	0.479				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1997-08-05 0:00	1998-01-13 0:00	161	12.88	12.176	0.704				
Mud Valley	Mud Lake 1537E_0112	Recharge Present	1998-05-13 0:00	1998-07-05 0:00	53	12.752	11.902	0.85				

Mud Valley	Mud Lake 1537E_0112	Recharge Present	1998-09-04 0:00	1999-02-28 0:00	177	12.981	12.217	0.764
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2000-07-19 0:00	2001-04-10 0:00	265	13.987	12.775	1.212
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2001-08-13 0:00	2002-06-14 0:00	305	14.293	12.784	1.509
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2002-07-14 0:00	2003-02-09 0:00	210	13.794	12.636	1.158
Mud Valley	Mud Lake 1537E_0112	No Recharge	2003-07-23 0:00	2004-01-31 0:00	192	14.057	12.787	1.27
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2004-08-01 0:00	2005-01-16 0:00	168	13.752	12.57	1.182
Mud Valley	Mud Lake 1537E_0112	Inconclusive (too short time)	2005-05-30 0:00	2005-06-13 0:00	14	13.607	12.546	1.061
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2005-08-06 0:00	2005-12-07 0:00	123	13.619	11.96	1.659
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2006-09-04 0:00	2007-04-20 0:00	228	13.23	12.364	0.866
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2007-07-30 0:00	2008-02-03 0:00	188	13.907	12.778	1.129
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2008-03-22 0:00	2008-06-12 0:00	82	13.177	11.079	2.098
Mud Valley	Mud Lake 1537E_0112	No Recharge	2012-09-21 0:00	2013-01-13 0:00	114	13.373	12.696	0.677
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2013-09-04 0:00	2013-11-03 0:00	60	13.152	12.481	0.671
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2014-08-12 0:00	2014-12-01 0:00	111	13.258	12.141	1.117
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2016-07-10 0:00	2017-03-13 0:00	246	13.302	12.401	0.901
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2017-07-30 0:00	2017-11-03 0:00	96	13.36	12.664	0.696
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2018-08-10 0:00	2018-11-20 0:00	102	13.561	12.791	0.77
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2019-08-08 0:00	2019-11-28 0:00	112	13.679	12.616	1.063
Mud Valley	Mud Lake 1537E_0112	Inconclusive	2020-08-18 0:00	2020-11-13 0:00	87	13.688	12.59	1.098
Mud Valley	Mud Lake 1537E_0112	Recharge Present	2021-08-03 0:00	2022-01-07 0:00	157	13.794	12.776	1.018

Table 30: Recovery curve classification of Okotoks 05-1 South_0786 well, Porcupine Valley aquifer.

Aquifer	Well Name	Recovery Season				Water Levels			Pumping Season			
		Recovery Curve Type	Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Porcupine Valley	Okotoks 05-1 South_0786	Inconclusive	2008-04-01 0:00	2008-07-20 0:00	110	33.818	33.411	0.407	Yes	Yes	June-July	March-April
Porcupine Valley	Okotoks 05-1 South_0786	Recharge Present	2009-03-17 0:00	2009-06-13 0:00	88	33.622	33.352	0.27				
Porcupine Valley	Okotoks 05-1 South_0786	Inconclusive	2010-03-19 0:00	2010-07-12 0:00	115	33.973	33.483	0.49				
Porcupine Valley	Okotoks 05-1 South_0786	Inconclusive	2011-03-22 0:00	2011-07-14 0:00	114	33.792	33.061	0.731				
Porcupine Valley	Okotoks 05-1 South_0786	Recharge Present	2012-04-08 0:00	2012-07-03 0:00	86	33.569	33.166	0.403				
Porcupine Valley	Okotoks 05-1 South_0786	Recharge Present	2014-03-11 0:00	2014-05-18 0:00	68	33.273	32.911	0.362				

Appendix C4: Recovery Curve Classification of Peace River Valley Region Aquifers Monitoring Wells

Table 31: Recovery curve classification of Fairview 8-73_0340 well, Grimshaw Gravels aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping During Recovery Season?	Pumping Season		
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m		Consistent?	Start Date	End Date
Grimshaw Gravels	Fairview 8-73_0340	No Recharge	1986-04-04 0:00	1986-08-22 0:00	140	25.987	25.798	0.189	Yes	Consistent ending season	July-September	February-April
Grimshaw Gravels	Fairview 8-73_0340	Recharge Present	1990-03-19 0:00	1990-07-23 0:00	126	26.086	25.893	0.193				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	1992-02-23 0:00	1992-07-12 0:00	140	26.021	25.879	0.142				
Grimshaw Gravels	Fairview 8-73_0340	Recharge Present	1994-03-28 0:00	1994-07-26 0:00	120	26.087	25.929	0.158				
Grimshaw Gravels	Fairview 8-73_0340	No Recharge	1996-04-03 0:00	1996-08-30 0:00	149	26.071	25.92	0.151				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	1997-04-03 0:00	1997-10-26 0:00	206	26.009	25.631	0.378				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2003-04-24 0:00	2003-09-06 0:00	135	26.102	25.804	0.298				
Grimshaw Gravels	Fairview 8-73_0340	No Recharge	2005-03-07 0:00	2005-08-19 0:00	165	25.965	25.719	0.246				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2007-04-18 0:00	2007-08-04 0:00	108	25.924	25.677	0.247				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2011-04-27 0:00	2011-06-09 0:00	43	25.994	25.918	0.076				
Grimshaw Gravels	Fairview 8-73_0340	Recharge Present	2012-04-04 0:00	2012-06-12 0:00	69	26.023	25.897	0.126				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2013-04-27 0:00	2013-09-20 0:00	146	26.042	25.832	0.21				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2015-03-04 0:00	2015-06-18 0:00	106	26.097	25.889	0.208				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2017-03-30 0:00	2017-08-12 0:00	135	26.077	25.885	0.192				
Grimshaw Gravels	Fairview 8-73_0340	No Recharge	2018-04-22 0:00	2018-10-14 0:00	175	25.986	25.791	0.195				
Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2020-04-14 0:00	2020-08-26 0:00	134	25.631	25.48	0.151				

Grimshaw Gravels	Fairview 8-73_0340	Inconclusive	2021-04-07 0:00	2021-07-20 0:00	104	25.549	25.427	0.122			
Grimshaw Gravels	Fairview 8-73_0340	No Recharge	2022-04-06 0:00	2022-09-02 0:00	149	25.511	25.356	0.155			

Table 32: Recovery curve classification of Grimshaw Kerndale_0339 well, Grimshaw Gravels aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	1978-04-21 0:00	1978-07-15 0:00	85	17.484	17.378	0.106	Yes	Consistent ending season	July-September	April
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	1979-04-26 0:00	1979-09-22 0:00	149	17.549	17.381	0.168				
Grimshaw Gravels	Grimshaw Kerndale_0339	No Recharge	1985-04-06 0:00	1985-07-20 0:00	105	17.859	17.634	0.225				
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	1994-04-17 0:00	1994-08-20 0:00	125	17.923	17.712	0.211				
Grimshaw Gravels	Grimshaw Kerndale_0339	No Recharge	1996-04-13 0:00	1996-10-18 0:00	188	17.903	17.657	0.246				
Grimshaw Gravels	Grimshaw Kerndale_0339	No Recharge	1997-04-24 0:00	1998-01-12 0:00	263	17.757	17.338	0.419				
Grimshaw Gravels	Grimshaw Kerndale_0339	Inconclusive	2003-04-24 0:00	2003-09-09 0:00	138	17.94	17.616	0.324				
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	2007-04-17 0:00	2007-10-15 0:00	181	17.675	17.364	0.311				
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	2011-04-12 0:00	2011-08-22 0:00	132	17.772	17.593	0.179				
Grimshaw Gravels	Grimshaw Kerndale_0339	Inconclusive	2012-04-04 0:00	2012-09-08 0:00	157	17.748	17.57	0.178				
Grimshaw Gravels	Grimshaw Kerndale_0339	Recharge Present	2013-04-27 0:00	2013-09-15 0:00	141	17.76	17.46	0.3				

Table 33: Recovery curve classification of Grimshaw Mercier_0338 well, Grimshaw Gravels aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Grimshaw Gravels	Grimshaw Mercier_0338	Recharge Present	1997-03-16 0:00	1997-10-31 0:00	229	5.255	4.467	0.788	Yes	N/A	October	March

Table 34: Recovery curve classification of Grimshaw Nissan 66-1_0379 well, Grimshaw Gravels aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	1992-02-25 0:00	1992-06-22 0:00	118	13.391	13.212	0.179	Yes	Consistent ending season	June-January	February-April
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	No Recharge	1994-04-12 0:00	1994-07-22 0:00	101	13.407	13.323	0.084				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	1995-04-14 0:00	1995-05-14 0:00	30	13.421	13.402	0.019				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	1996-04-06 0:00	1996-08-16 0:00	132	13.488	13.373	0.115				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	No Recharge	1997-04-21 0:00	1998-01-21 0:00	275	13.43	12.916	0.514				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2003-04-23 0:00	2003-09-11 0:00	141	13.525	13.39	0.135				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2004-04-05 0:00	2004-06-11 0:00	67	13.425	13.389	0.036				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2005-03-12 0:00	2005-11-10 0:00	243	13.416	13.149	0.267				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2007-04-15 0:00	2007-10-04 0:00	172	13.316	13.002	0.314				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2008-04-15 0:00	2008-07-10 0:00	86	13.069	12.929	0.14				
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2009-04-13 0:00	2009-06-16 0:00	64	13.014	12.926	0.088				

Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2011-04-21 0:00	2011-08-20 0:00	121	13.233	13.091	0.142
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2012-04-07 0:00	2012-07-17 0:00	101	13.177	13.079	0.098
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2013-04-27 0:00	2013-11-14 0:00	201	13.183	12.881	0.302
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2014-05-26 0:00	2014-07-18 0:00	53	13.332	13.302	0.03
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2015-03-14 0:00	2015-06-11 0:00	89	13.41	13.288	0.122
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	No Recharge	2016-03-30 0:00	2017-11-23 0:00	603	13.444	12.99	0.454
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2018-04-22 0:00	2018-06-25 0:00	64	13.055	12.931	0.124
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2019-03-27 0:00	2019-05-28 0:00	62	13.058	12.998	0.06
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2020-04-15 0:00	2020-10-10 0:00	178	12.618	12.47	0.148
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Recharge Present	2021-04-10 0:00	2021-06-05 0:00	56	12.542	12.467	0.075
Grimshaw Gravels	Grimshaw Nissan 66-1_0379	Inconclusive	2022-04-06 0:00	2022-07-18 0:00	103	12.623	12.507	0.116

Appendix C5: Recovery Curve Classification of Calgary Valley Aquifer Monitoring Wells

Table 35: Recovery curve classification of Canmore Tourist Info_0760 well, Calgary Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2002-05-12 0:00	2002-06-29 0:00	48	5.425	1.982	3.443	Yes	Yes	June-July	March-May
Calgary Valley	Canmore Tourist Info_0760	Inconclusive	2003-04-07 0:00	2003-06-21 0:00	75	5.002	2.573	2.429				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2004-03-22 0:00	2004-07-04 0:00	104	5.397	2.669	2.728				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2005-04-04 0:00	2005-06-24 0:00	81	5.307	2.342	2.965				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2006-03-20 0:00	2006-06-17 0:00	89	5.454	2.612	2.842				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2007-03-21 0:00	2007-06-08 0:00	79	5.767	1.747	4.02				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2008-04-28 0:00	2008-07-05 0:00	68	4.643	2.437	2.206				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2009-04-06 0:00	2009-06-18 0:00	73	4.735	2.786	1.949				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2011-04-23 0:00	2011-06-24 0:00	62	4.571	2.226	2.345				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2012-04-01 0:00	2012-06-26 0:00	86	5.425	1.87	3.555				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2013-05-02 0:00	2013-06-22 0:00	51	4.587	1.452	3.135				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2014-04-18 0:00	2014-06-26 0:00	69	4.402	2.672	1.73				
Calgary Valley	Canmore Tourist Info_0760	Inconclusive	2015-04-15 0:00	2015-06-10 0:00	56	4.964	2.763	2.201				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2016-02-29 0:00	2016-07-18 0:00	140	5.043	2.968	2.075				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2017-04-10 0:00	2017-06-03 0:00	54	4.86	2.136	2.724				
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2018-03-31 0:00	2018-05-28 0:00	58	4.365	2.379	1.986				

Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2019-05-07 0:00	2019-06-04 0:00	28	4.159	2.463	1.696			
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2020-03-21 0:00	2020-06-28 0:00	99	4.762	2.175	2.587			
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2021-03-01 0:00	2021-06-06 0:00	97	4.815	2.218	2.597			
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2022-04-24 0:00	2022-06-24 0:00	61	4.673	2.435	2.238			
Calgary Valley	Canmore Tourist Info_0760	Recharge Present	2023-04-02 0:00	2023-05-22 0:00	50	2.674	2.674	2.174			

Table 36: Recovery curve classification of Carseland 85-1_0220 well, Calgary Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Calgary Valley	Carseland 85-1_0220	Recharge Present	1986-08-23 0:00	1987-04-03 0:00	223	36.979	34.621	2.358	Inconclusive	Yes	April	July-August
Calgary Valley	Carseland 85-1_0220	Recharge Present	1990-08-18 0:00	1991-04-01 0:00	226	39.099	36.785	2.314				
Calgary Valley	Carseland 85-1_0220	Recharge Present	2000-07-15 0:00	2001-04-19 0:00	278	42.43	41.095	1.335				
Calgary Valley	Carseland 85-1_0220	Recharge Present	2001-08-29 0:00	2002-06-17 0:00	292	42.244	41.037	1.207				
Calgary Valley	Carseland 85-1_0220	Recharge Present	2004-04-25 0:00	2018-04-22 0:00	5110	41.122	31.531	9.591				

Table 37: Recovery curve classification of Cluny 85-2 South_0219 well, Calgary Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1986-09-27 0:00	1986-12-21 0:00	85	12.71	12.629	0.081	Yes	No	July-December	March-August
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1990-06-06 0:00	1990-08-26 0:00	81	13.041	13.002	0.039				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1991-05-14 0:00	1991-09-10 0:00	119	13.093	12.958	0.135				
Calgary Valley	Cluny 85-2 South_0219	No Recharge	1992-06-14 0:00	1992-11-19 0:00	158	13.092	12.938	0.154				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1994-03-16 0:00	1994-04-29 0:00	44	12.966	12.906	0.06				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1994-05-20 0:00	1994-12-11 0:00	205	12.917	12.698	0.219				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1995-06-05 0:00	1995-10-08 0:00	125	12.84	12.663	0.177				
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	1996-03-16 0:00	1996-12-02 0:00	261	12.747	12.519	0.228				
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	1997-04-03 0:00	1997-05-15 0:00	42	12.576	11.781	0.795				
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	1998-04-06 0:00	1998-05-12 0:00	36	12.126	12.074	0.052				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	1998-07-02 0:00	1998-08-21 0:00	50	12.121	11.95	0.171				
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	1999-05-15 0:00	1999-09-20 0:00	128	12.226	11.87	0.356				
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2002-06-06 0:00	2002-08-18 0:00	73	12.522	12.433	0.089				
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2004-06-16 0:00	2004-10-20 0:00	126	12.331	12.277	0.054				
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2007-04-19 0:00	2007-10-16 0:00	180	11.95	1.452	10.498				
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2008-05-23 0:00	2008-07-19 0:00	57	11.626	11.502	0.124				
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2009-03-14 0:00	2009-03-31 0:00	17	11.702	11.614	0.088				

Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2009-08-03 0:00	2009-09-18 0:00	46	11.761	11.635	0.126
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2010-04-23 0:00	2010-08-18 0:00	117	11.864	11.204	0.66
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	2011-03-16 0:00	2011-05-26 0:00	71	11.516	10.977	0.539
Calgary Valley	Cluny 85-2 South_0219	Inconclusive (too short time)	2012-06-24 0:00	2012-07-24 0:00	30	11.437	11.287	0.15
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2013-03-27 0:00	2013-07-26 0:00	121	11.581	11.351	0.23
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	2014-04-03 0:00	2014-08-15 0:00	134	11.684	11.438	0.246
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	2015-08-22 0:00	2015-10-10 0:00	49	11.765	11.712	0.053
Calgary Valley	Cluny 85-2 South_0219	No Recharge	2016-07-05 0:00	2016-09-13 0:00	70	11.931	11.718	0.213
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2017-06-16 0:00	2017-08-09 0:00	54	12.006	11.963	0.043
Calgary Valley	Cluny 85-2 South_0219	Recharge Present	2018-04-09 0:00	2018-06-09 0:00	61	12.098	11.793	0.305
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2020-05-26 0:00	2020-09-22 0:00	119	12.214	11.989	0.225
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2022-06-05 0:00	2022-09-19 0:00	106	12.403	11.968	0.435
Calgary Valley	Cluny 85-2 South_0219	Inconclusive	2023-03-20 0:00	2023-05-04 0:00	45	12.16	11.964	0.196

Table 38: Recovery curve classification of Exshaw_0759 well, Calgary Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Calgary Valley	Exshaw_0759	Inconclusive	2002-04-06 0:00	2002-06-13 0:00	68	3.245	0.061	3.184	Yes	Yes	May-July	March-April
Calgary Valley	Exshaw_0759	Inconclusive	2003-04-06 0:00	2003-05-31 0:00	55	2.972	0.881	2.091				
Calgary Valley	Exshaw_0759	Inconclusive	2004-09-07 0:00	2004-10-22 0:00	45	2.188	1.595	0.593				
Calgary Valley	Exshaw_0759	No Recharge	2005-04-18 0:00	2005-07-17 0:00	90	2.662	-0.032	2.694				
Calgary Valley	Exshaw_0759	Inconclusive	2006-04-25 0:00	2006-06-18 0:00	54	2.182	0.024	2.158				
Calgary Valley	Exshaw_0759	Inconclusive	2006-09-11 0:00	2006-09-28 0:00	17	2.009	1.564	0.445				
Calgary Valley	Exshaw_0759	No Recharge	2007-04-03 0:00	2007-06-27 0:00	85	2.591	-0.01	2.601				
Calgary Valley	Exshaw_0759	No Recharge	2008-04-24 0:00	2008-07-03 0:00	70	2.697	-0.015	2.712				
Calgary Valley	Exshaw_0759	Inconclusive	2009-04-04 0:00	2009-06-19 0:00	76	2.57	1.027	1.543				
Calgary Valley	Exshaw_0759	Recharge Present	2010-04-14 0:00	2010-06-18 0:00	65	4.167	0.795	3.372				
Calgary Valley	Exshaw_0759	Inconclusive	2010-09-11 0:00	2010-10-01 0:00	20	3.133	2.696	0.437				
Calgary Valley	Exshaw_0759	Recharge Present	2011-04-20 0:00	2011-05-29 0:00	39	4.234	-0.032	4.266				
Calgary Valley	Exshaw_0759	Recharge Present	2012-04-09 0:00	2012-06-30 0:00	82	4.274	0.388	3.886				
Calgary Valley	Exshaw_0759	Recharge Present	2013-04-11 0:00	2013-06-22 0:00	72	4.151	-0.049	4.2				
Calgary Valley	Exshaw_0759	Recharge Present	2014-04-07 0:00	2014-05-24 0:00	47	3.558	0.398	3.16				
Calgary Valley	Exshaw_0759	No Recharge	2015-04-15 0:00	2015-06-11 0:00	57	3.644	2.65	0.994				
Calgary Valley	Exshaw_0759	Inconclusive	2016-03-30 0:00	2016-05-29 0:00	60	3.967	2.75	1.217				

Calgary Valley	Exshaw_0759	Inconclusive	2017-03-31 0:00	2017-06-02 0:00	63	4.027	1.598	2.429
Calgary Valley	Exshaw_0759	Inconclusive	2018-04-10 0:00	2018-06-25 0:00	76	4.145	0.828	3.317
Calgary Valley	Exshaw_0759	Inconclusive	2019-05-04 0:00	2019-07-08 0:00	65	3.887	1.578	2.309
Calgary Valley	Exshaw_0759	Recharge Present	2020-04-07 0:00	2020-05-23 0:00	46	3.811	0.615	3.196
Calgary Valley	Exshaw_0759	Recharge Present	2021-04-14 0:00	2021-05-27 0:00	43	3.953	1.662	2.291
Calgary Valley	Exshaw_0759	Recharge Present	2022-04-18 0:00	2022-06-17 0:00	60	4.175	1.269	2.906

Appendix C6: Recovery Curve Classification of Surficial Aquifers Monitoring Wells

Table 39: Recovery curve classification of Milk River 56-1_0103 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Milk River 56-1_0103	No Recharge	1957-02-15 0:00	1957-04-06 0:00	50	2.979	1.46	1.519	Yes	Yes	March-May	February-March
Surficial	Milk River 56-1_0103	Inconclusive	1962-01-30 0:00	1962-03-31 0:00	60	3.435	2.645	0.79				
Surficial	Milk River 56-1_0103	Inconclusive	1963-02-01 0:00	1963-03-10 0:00	37	3.556	2.558	0.998				
Surficial	Milk River 56-1_0103	Recharge Present	1964-02-20 0:00	1964-05-09 0:00	79	3.657	1.205	2.452				
Surficial	Milk River 56-1_0103	No Recharge	1965-02-13 0:00	1965-04-19 0:00	65	3.062	1.137	1.925				
Surficial	Milk River 56-1_0103	Inconclusive	1966-03-12 0:00	1966-05-21 0:00	70	2.628	1.975	0.653				
Surficial	Milk River 56-1_0103	Inconclusive	1967-02-20 0:00	1967-06-11 0:00	111	2.97	0.548	2.422				
Surficial	Milk River 56-1_0103	Inconclusive	1971-02-09 0:00	1971-05-09 0:00	89	3.248	2.127	1.121				
Surficial	Milk River 56-1_0103	Recharge Present	1972-03-04 0:00	1972-04-06 0:00	33	3.701	1.792	1.909				
Surficial	Milk River 56-1_0103	No Recharge	1986-02-24 0:00	1986-05-21 0:00	86	2.732	1.645	1.087				
Surficial	Milk River 56-1_0103	Recharge Present	1986-09-13 0:00	1986-10-30 0:00	47	2.679	2.263	0.416				
Surficial	Milk River 56-1_0103	Recharge Present	1995-03-27 0:00	1995-06-19 0:00	84	2.803	1.499	1.304				
Surficial	Milk River 56-1_0103	Recharge Present	1996-02-11 0:00	1996-04-16 0:00	65	2.552	1.085	1.467				

Table 40: Recovery curve classification of Hays East_3053 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Hays East_3053	Recharge Present	1990-08-08 0:00	1990-10-12 0:00	65	2.603	2.219	0.384	Yes	Consistent starting season	October	May, August
Surficial	Hays East_3053	Inconclusive	1991-05-04 0:00	1991-10-06 0:00	155	2.592	2.196	0.396				

Table 41: Recovery curve classification of Hays 2523E_0279 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Hays 2523E_0279	Recharge Present	2020-01-25 0:00	2020-07-28 0:00	185	3.865	3.615	0.25	Yes	N/A	July	January

Table 42: Recovery curve classification of High River 2580E_0287 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	High River 2580E_0287	Recharge Present	1994-04-06 0:00	1994-06-07 0:00	62	2.848	1.753	1.095	Yes	Yes	May-June	April-May
Surficial	High River 2580E_0287	Inconclusive	2006-04-19 0:00	2006-06-17 0:00	59	2.784	1.244	1.54				
Surficial	High River 2580E_0287	Inconclusive	2007-04-04 0:00	2007-06-07 0:00	64	2.884	1.931	0.953				
Surficial	High River 2580E_0287	Inconclusive	2008-04-26 0:00	2008-05-26 0:00	30	3.017	0.564	2.453				
Surficial	High River 2580E_0287	Inconclusive	2011-05-02 0:00	2011-05-28 0:00	26	3.776	1.547	2.229				
Surficial	High River 2580E_0287	No Recharge	2017-05-03 0:00	2017-06-03 0:00	31	3.956	3.168	0.788				
Surficial	High River 2580E_0287	No Recharge	2018-03-11 0:00	2018-06-01 0:00	82	3.997	3.265	0.732				
Surficial	High River 2580E_0287	Inconclusive	2019-05-12 0:00	2019-07-08 0:00	57	3.976	3.457	0.519				
Surficial	High River 2580E_0287	Inconclusive	2020-04-09 0:00	2020-06-03 0:00	55	3.834	2.888	0.946				
Surficial	High River 2580E_0287	Inconclusive	2021-05-05 0:00	2021-06-07 0:00	33	3.941	3.402	0.539				
Surficial	High River 2580E_0287	Recharge Present	2022-05-04 0:00	2022-06-20 0:00	47	3.993	3.002	0.991				

Table 43: Recovery curve classification of Kirkpatrick Lake 86-3 East_0230 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	1991-03-16 0:00	1991-08-27 0:00	164	4.231	3.743	0.488	Yes	Yes	June-August	February-April
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	1992-02-22 0:00	1992-05-26 0:00	94	4.027	3.674	0.353				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	1993-03-16 0:00	1993-08-06 0:00	143	4.116	3.44	0.676				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	1994-03-07 0:00	1994-06-12 0:00	97	3.742	3.238	0.504				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	1995-03-13 0:00	1995-06-05 0:00	84	3.847	3.689	0.158				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	1997-03-23 0:00	1997-07-06 0:00	105	4.199	3.695	0.504				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	1999-03-28 0:00	1999-09-05 0:00	161	4.522	3.901	0.621				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2000-04-23 0:00	2000-05-21 0:00	28	4.19	4.03	0.16				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2003-03-23 0:00	2003-07-12 0:00	111	4.914	4.424	0.49				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2005-03-08 0:00	2005-12-21 0:00	288	4.907	4.169	0.738				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2010-04-09 0:00	2010-08-26 0:00	139	4.881	3.769	1.112				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2011-04-03 0:00	2011-06-29 0:00	87	3.981	3.278	0.703				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2012-03-07 0:00	2012-07-03 0:00	118	3.925	3.349	0.576				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2013-04-08 0:00	2013-07-05 0:00	88	3.918	3.24	0.678				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2014-03-20 0:00	2014-07-03 0:00	105	3.876	3.412	0.464				
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2016-02-20 0:00	2016-07-19 0:00	150	3.981	3.513	0.468				
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2017-02-11 0:00	2017-06-09 0:00	118	3.853	3.49	0.363				

Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2018- 04-18 0:00	2018- 06-21 0:00	64	4.102	3.659	0.443
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2019- 03-13 0:00	2019- 06-13 0:00	92	4.129	3.869	0.26
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2020- 03-31 0:00	2020- 08-06 0:00	128	4.269	3.68	0.589
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2021- 03-16 0:00	2021- 06-22 0:00	98	4.051	3.932	0.119
Surficial	Kirkpatrick Lake 86-3 East_0230	Recharge Present	2022- 03-16 0:00	2022- 08-01 0:00	138	4.372	3.985	0.387
Surficial	Kirkpatrick Lake 86-3 East_0230	Inconclusive	2023- 04-06 0:00	2023- 05-27 0:00	51	4.334	4.102	0.232

Table 44: Recovery curve classification of Many Springs_0364 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Many Springs_0364	Inconclusive	1995-04-15 0:00	1995-06-10 0:00	56	1.397	0.841	0.556	Yes	Yes	May-July	March-May
Surficial	Many Springs_0364	Recharge Present	1997-02-24 0:00	1997-06-01 0:00	97	1.23	0.75	0.48				
Surficial	Many Springs_0364	Inconclusive	1998-04-19 0:00	1998-06-23 0:00	65	1.335	0.739	0.596				
Surficial	Many Springs_0364	Inconclusive	2001-04-11 0:00	2001-06-08 0:00	58	1.492	1.172	0.32				
Surficial	Many Springs_0364	Inconclusive	2002-04-05 0:00	2002-06-17 0:00	73	1.511	0.908	0.603				
Surficial	Many Springs_0364	Inconclusive	2003-03-23 0:00	2003-05-17 0:00	55	1.386	1.017	0.369				
Surficial	Many Springs_0364	Inconclusive	2003-08-31 0:00	2004-01-09 0:00	131	1.276	1.131	0.145				
Surficial	Many Springs_0364	Recharge Present	2004-05-05 0:00	2004-08-27 0:00	114	1.359	0.818	0.541				
Surficial	Many Springs_0364	Inconclusive	2005-03-11 0:00	2005-06-22 0:00	103	1.133	0.182	0.951				
Surficial	Many Springs_0364	Recharge Present	2007-03-04 0:00	2007-06-22 0:00	110	1.084	0.419	0.665				
Surficial	Many Springs_0364	Inconclusive	2008-03-02 0:00	2008-05-28 0:00	87	1.181	0.5	0.681				
Surficial	Many Springs_0364	Recharge Present	2009-03-19 0:00	2009-08-16 0:00	150	1.119	0.938	0.181				
Surficial	Many Springs_0364	Inconclusive	2010-03-13 0:00	2010-06-20 0:00	99	1.225	0.77	0.455				
Surficial	Many Springs_0364	Recharge Present	2011-03-27 0:00	2011-05-29 0:00	63	1.17	0.511	0.659				
Surficial	Many Springs_0364	Recharge Present	2012-03-30 0:00	2012-06-28 0:00	90	1.204	0.726	0.478				
Surficial	Many Springs_0364	Recharge Present	2013-03-24 0:00	2013-07-03 0:00	101	1.056	0.373	0.683				
Surficial	Many Springs_0364	Recharge Present	2014-03-12 0:00	2014-05-25 0:00	74	1.14	0.619	0.521				

Surficial	Many Springs_0364	Recharge Present	2017-04-08 0:00	2017-06-11 0:00	64	1.314	0.946	0.368				
Surficial	Many Springs_0364	Inconclusive	2018-04-03 0:00	2018-06-26 0:00	84	1.325	0.912	0.413				
Surficial	Many Springs_0364	Inconclusive	2019-05-02 0:00	2019-07-09 0:00	68	1.274	1.024	0.25				
Surficial	Many Springs_0364	Recharge Present	2020-03-22 0:00	2020-06-02 0:00	72	1.289	0.809	0.48				
Surficial	Many Springs_0364	Recharge Present	2021-04-10 0:00	2021-06-06 0:00	57	1.27	0.877	0.393				
Surficial	Many Springs_0364	Recharge Present	2022-03-13 0:00	2022-06-18 0:00	97	1.16	0.776	0.384				
Surficial	Many Springs_0364	Inconclusive	2023-03-17 0:00	2023-06-18 0:00	93	1.188	0.942	0.246				

Table 45: Recovery curve classification of Medicine Hat North_3050 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Medicine Hat North_3050	Inconclusive	2020-01-14 0:00	2020-05-29 0:00	136	4.455	4.36	0.095	Yes	No	January-May	December-March
Surficial	Medicine Hat North_3050	Inconclusive (too short time)	2020-12-30 0:00	2021-01-16 0:00	17	4.508	4.478	0.03				
Surficial	Medicine Hat North_3050	Inconclusive (too short time)	2022-03-02 0:00	2022-03-18 0:00	16	4.601	4.519	0.082				

Table 46: Recovery curve classification of Rockyford_3026 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Rockyford_3026	Inconclusive	2019-03-24 0:00	2019-06-13 0:00	81	5.697	5.461	0.236	Yes	Yes	June-July	March
Surficial	Rockyford_3026	Inconclusive	2020-03-21 0:00	2020-07-23 0:00	124	5.761	5.605	0.156				
Surficial	Rockyford_3026	Inconclusive	2021-03-13 0:00	2021-03-24 0:00	11	5.81	5.755	0.055				
Surficial	Rockyford_3026	Recharge Present	2021-06-07 0:00	2021-07-17 0:00	40	5.801	5.668	0.133				

Table 47: Recovery curve classification of Waterton #5 Dam_0105 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Waterton #5 Dam_0105	Recharge Present	1970-03-09 0:00	1970-05-05 0:00	57	4.292	2.121	2.171	Yes	Consistent ending season	May-October	January-March
Surficial	Waterton #5 Dam_0105	No Recharge	1972-03-02 0:00	1972-05-28 0:00	87	4.544	2.072	2.472				
Surficial	Waterton #5 Dam_0105	No Recharge	1977-01-25 0:00	1977-08-27 0:00	214	4.874	2.041	2.833				
Surficial	Waterton #5 Dam_0105	Recharge Present	1985-02-20 0:00	1985-10-16 0:00	238	4.666	1.707	2.959				
Surficial	Waterton #5 Dam_0105	Inconclusive	2007-03-02 0:00	2007-10-06 0:00	218	4.043	1.707	2.336				
Surficial	Waterton #5 Dam_0105	Inconclusive	2008-02-21 0:00	2008-10-12 0:00	234	4.237	1.214	3.023				
Surficial	Waterton #5 Dam_0105	Inconclusive	2009-02-28 0:00	2009-07-14 0:00	136	3.621	1.683	1.938				
Surficial	Waterton #5 Dam_0105	Inconclusive	2010-01-10 0:00	2010-06-18 0:00	159	4.169	1.082	3.087				
Surficial	Waterton #5 Dam_0105	Inconclusive	2011-01-25 0:00	2011-06-09 0:00	135	4.111	1.32	2.791				
Surficial	Waterton #5 Dam_0105	No Recharge	2013-02-28 0:00	2013-06-23 0:00	115	4.942	2.329	2.613				
Surficial	Waterton #5 Dam_0105	Inconclusive	2018-03-07 0:00	2018-04-21 0:00	45	4.422	2.158	2.264				
Surficial	Waterton #5 Dam_0105	Inconclusive	2021-02-28 0:00	2021-05-27 0:00	88	3.685	2.289	1.396				
Surficial	Waterton #5 Dam_0105	Inconclusive	2022-02-03 0:00	2022-03-28 0:00	53	5.139	2.786	2.353				

Table 48: Recovery curve classification of Watino 2353E_0369 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Watino 2353E_0369	Recharge Present	1989-04-14 0:00	1989-06-10 0:00	57	3.535	3.292	0.243	Yes	Yes	May-August	March-April
Surficial	Watino 2353E_0369	Recharge Present	1990-03-19 0:00	1990-07-06 0:00	109	3.462	3.21	0.252				
Surficial	Watino 2353E_0369	Inconclusive	1991-03-29 0:00	1991-05-23 0:00	55	3.597	3.407	0.19				
Surficial	Watino 2353E_0369	Inconclusive	1992-02-24 0:00	1992-06-10 0:00	107	3.599	3.236	0.363				
Surficial	Watino 2353E_0369	Recharge Present	1993-03-23 0:00	1993-05-29 0:00	67	3.659	3.514	0.145				
Surficial	Watino 2353E_0369	Inconclusive	1993-06-23 0:00	1993-07-28 0:00	35	3.667	3.492	0.175				
Surficial	Watino 2353E_0369	Inconclusive	1994-04-01 0:00	1994-06-02 0:00	62	3.613	3.321	0.292				
Surficial	Watino 2353E_0369	Inconclusive	1995-04-05 0:00	1995-05-24 0:00	49	3.681	3.516	0.165				
Surficial	Watino 2353E_0369	Recharge Present	1997-07-05 0:00	1997-07-29 0:00	24	3.479	3.347	0.132				
Surficial	Watino 2353E_0369	Recharge Present	2002-04-19 0:00	2002-06-07 0:00	49	4.323	4.127	0.196				
Surficial	Watino 2353E_0369	No Recharge	2003-04-10 0:00	2003-07-06 0:00	87	4.402	4.079	0.323				
Surficial	Watino 2353E_0369	No Recharge	2004-04-03 0:00	2004-06-12 0:00	70	4.352	4.192	0.16				
Surficial	Watino 2353E_0369	Inconclusive	2007-04-13 0:00	2007-06-29 0:00	77	4.372	3.72	0.652				
Surficial	Watino 2353E_0369	Inconclusive	2008-04-15 0:00	2008-06-02 0:00	48	4.044	3.832	0.212				
Surficial	Watino 2353E_0369	Inconclusive	2009-04-10 0:00	2009-06-06 0:00	57	4.316	4.141	0.175				
Surficial	Watino 2353E_0369	Recharge Present	2011-04-18 0:00	2011-08-19 0:00	123	4.715	4.432	0.283				
Surficial	Watino 2353E_0369	Recharge Present	2012-04-05 0:00	2012-07-23 0:00	109	4.484	4.216	0.268				

Surficial	Watino 2353E_0369	Inconclusive	2013- 04-17 0:00	2013- 08-13 0:00	118	4.444	3.886	0.558
Surficial	Watino 2353E_0369	Recharge Present	2014- 04-11 0:00	2014- 05-26 0:00	45	4.017	3.777	0.24
Surficial	Watino 2353E_0369	Inconclusive	2015- 03-21 0:00	2015- 05-31 0:00	71	4.645	4.447	0.198
Surficial	Watino 2353E_0369	Inconclusive	2016- 03-28 0:00	2017- 06-20 0:00	449	4.73	4.043	0.687
Surficial	Watino 2353E_0369	Recharge Present	2018- 04-22 0:00	2018- 06-13 0:00	52	4.366	4.036	0.33
Surficial	Watino 2353E_0369	Inconclusive	2018- 07-19 0:00	2018- 08-06 0:00	18	4.123	4.007	0.116
Surficial	Watino 2353E_0369	Inconclusive	2019- 03-23 0:00	2019- 06-09 0:00	78	4.026	3.876	0.15
Surficial	Watino 2353E_0369	No Recharge	2019- 07-27 0:00	2019- 08-18 0:00	22	4.012	3.511	0.501
Surficial	Watino 2353E_0369	Recharge Present	2020- 04-15 0:00	2020- 07-22 0:00	98	3.576	3.007	0.569
Surficial	Watino 2353E_0369	Inconclusive	2021- 04-12 0:00	2021- 06-02 0:00	51	3.334	3.13	0.204
Surficial	Watino 2353E_0369	Inconclusive	2022- 04-06 0:00	2022- 06-28 0:00	83	3.511	2.981	0.53

Table 49: Recovery curve classification of La Crete 2447E_0380 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	La Crete 2447E_0380	Inconclusive	1999-03-28 0:00	1999-06-08 0:00	72	3.281	2.84	0.441	Yes	Yes	May-July	March-April
Surficial	La Crete 2447E_0380	Inconclusive	2000-03-29 0:00	2000-06-15 0:00	78	3.42	3.034	0.386				
Surficial	La Crete 2447E_0380	Inconclusive	2001-04-07 0:00	2001-06-23 0:00	77	3.612	3.324	0.288				
Surficial	La Crete 2447E_0380	Inconclusive	2002-04-17 0:00	2002-06-17 0:00	61	3.73	3.614	0.116				
Surficial	La Crete 2447E_0380	Inconclusive	2003-04-12 0:00	2003-07-19 0:00	98	3.886	3.745	0.141				
Surficial	La Crete 2447E_0380	No Recharge	2004-04-06 0:00	2004-06-20 0:00	75	3.952	3.674	0.278				
Surficial	La Crete 2447E_0380	No Recharge	2005-04-05 0:00	2005-07-08 0:00	94	3.962	3.32	0.642				
Surficial	La Crete 2447E_0380	Inconclusive	2007-04-03 0:00	2007-07-01 0:00	89	3.685	3.278	0.407				
Surficial	La Crete 2447E_0380	Inconclusive	2008-04-11 0:00	2008-06-23 0:00	73	3.46	3.046	0.414				
Surficial	La Crete 2447E_0380	Recharge Present	2009-04-03 0:00	2009-06-07 0:00	65	3.452	2.926	0.526				
Surficial	La Crete 2447E_0380	Inconclusive	2010-03-23 0:00	2010-06-14 0:00	83	3.494	3.029	0.465				
Surficial	La Crete 2447E_0380	Inconclusive	2011-04-06 0:00	2011-05-26 0:00	50	3.574	3.293	0.281				
Surficial	La Crete 2447E_0380	Inconclusive	2012-04-04 0:00	2012-05-24 0:00	50	3.808	3.685	0.123				
Surficial	La Crete 2447E_0380	Inconclusive	2013-04-14 0:00	2013-06-22 0:00	69	4.084	3.559	0.525				
Surficial	La Crete 2447E_0380	Inconclusive	2015-04-01 0:00	2015-05-18 0:00	47	4.663	4.499	0.164				
Surficial	La Crete 2447E_0380	Inconclusive	2016-04-07 0:00	2016-05-28 0:00	51	4.852	4.709	0.143				
Surficial	La Crete 2447E_0380	Inconclusive	2021-04-12 0:00	2021-06-19 0:00	68	4.238	3.899	0.339				

Surficial	La Crete 2447E_0380	Inconclusive	2022- 04-06 0:00	2022- 06-20 0:00	75	4.159	3.709	0.45			
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Table 50: Recovery curve classification of Innisfree 2403E_0235 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Innisfree 2403E_0235	Recharge Present	1988-02-22 0:00	1988-04-29 0:00	67	5.452	5.246	0.206	Yes	Yes, split into two pumping seasons	April-May, October-January	February-April, August-September
Surficial	Innisfree 2403E_0235	No Recharge	1988-08-17 0:00	1988-12-18 0:00	123	5.71	5.384	0.326				
Surficial	Innisfree 2403E_0235	Recharge Present	1990-09-27 0:00	1990-12-14 0:00	78	5.668	5.489	0.179				
Surficial	Innisfree 2403E_0235	Inconclusive	1991-09-17 0:00	1992-05-26 0:00	252	5.888	5.37	0.518				
Surficial	Innisfree 2403E_0235	Recharge Present	1992-09-03 0:00	1992-11-10 0:00	68	6.084	5.876	0.208				
Surficial	Innisfree 2403E_0235	Inconclusive	1993-03-02 0:00	1993-05-11 0:00	70	5.927	5.38	0.547				
Surficial	Innisfree 2403E_0235	Recharge Present	1993-09-09 0:00	1994-04-14 0:00	217	5.627	5.28	0.347				
Surficial	Innisfree 2403E_0235	Recharge Present	1994-09-24 0:00	1995-05-11 0:00	229	5.501	5.216	0.285				
Surficial	Innisfree 2403E_0235	Recharge Present	1996-09-04 0:00	1997-04-23 0:00	231	5.542	4.961	0.581				
Surficial	Innisfree 2403E_0235	Inconclusive	1997-08-31 0:00	1998-04-11 0:00	223	5.332	5.103	0.229				
Surficial	Innisfree 2403E_0235	Recharge Present	1998-09-17 0:00	1999-05-21 0:00	246	5.828	5.233	0.595				
Surficial	Innisfree 2403E_0235	Inconclusive	1999-09-26 0:00	2000-01-09 0:00	105	5.695	5.486	0.209				
Surficial	Innisfree 2403E_0235	Recharge Present	2000-02-25 0:00	2000-05-15 0:00	80	5.557	5.353	0.204				
Surficial	Innisfree 2403E_0235	Recharge Present	2001-03-06 0:00	2001-06-03 0:00	89	5.372	5.206	0.166				
Surficial	Innisfree 2403E_0235	Inconclusive	2001-09-17 0:00	2001-12-14 0:00	88	5.708	5.522	0.186				
Surficial	Innisfree 2403E_0235	Recharge Present	2002-04-09 0:00	2002-06-05 0:00	57	5.808	5.47	0.338				
Surficial	Innisfree 2403E_0235	No Recharge	2002-10-09 0:00	2002-12-15 0:00	67	6.05	5.868	0.182				

Surficial	Innisfree 2403E_0235	Recharge Present	2003- 03-17 0:00	2003- 06-08 0:00	83	6.009	5.419	0.59
Surficial	Innisfree 2403E_0235	Recharge Present	2003- 09-08 0:00	2003- 10-28 0:00	50	5.949	5.675	0.274
Surficial	Innisfree 2403E_0235	Inconclusive	2004- 02-11 0:00	2004- 06-14 0:00	124	5.848	5.484	0.364
Surficial	Innisfree 2403E_0235	Recharge Present	2004- 08-21 0:00	2005- 04-17 0:00	239	5.82	5.219	0.601
Surficial	Innisfree 2403E_0235	Recharge Present	2005- 08-15 0:00	2005- 10-07 0:00	53	5.612	5.313	0.299
Surficial	Innisfree 2403E_0235	Inconclusive	2006- 03-02 0:00	2006- 05-06 0:00	65	5.433	5.196	0.237
Surficial	Innisfree 2403E_0235	Inconclusive	2006- 09-11 0:00	2007- 04-20 0:00	221	5.744	5.127	0.617
Surficial	Innisfree 2403E_0235	Inconclusive	2007- 08-18 0:00	2008- 01-05 0:00	140	5.561	5.327	0.234
Surficial	Innisfree 2403E_0235	Recharge Present	2008- 02-09 0:00	2008- 04-10 0:00	61	5.422	5.259	0.163
Surficial	Innisfree 2403E_0235	Inconclusive	2009- 03-18 0:00	2009- 05-11 0:00	54	5.53	5.309	0.221
Surficial	Innisfree 2403E_0235	Inconclusive	2009- 09-27 0:00	2009- 11-12 0:00	46	6.009	5.763	0.246
Surficial	Innisfree 2403E_0235	Recharge Present	2010- 09-06 0:00	2011- 02-12 0:00	159	5.592	5.363	0.229
Surficial	Innisfree 2403E_0235	Recharge Present	2011- 03-11 0:00	2011- 04-25 0:00	45	5.424	5.161	0.263
Surficial	Innisfree 2403E_0235	Recharge Present	2012- 03-08 0:00	2012- 05-27 0:00	80	5.557	5.247	0.31
Surficial	Innisfree 2403E_0235	Inconclusive	2013- 09-25 0:00	2014- 01-09 0:00	106	5.525	5.377	0.148
Surficial	Innisfree 2403E_0235	Inconclusive	2014- 03-11 0:00	2014- 06-29 0:00	110	5.509	5.137	0.372
Surficial	Innisfree 2403E_0235	Recharge Present	2014- 09-08 0:00	2015- 04-01 0:00	205	5.412	5.02	0.392
Surficial	Innisfree 2403E_0235	Recharge Present	2015- 09-04 0:00	2015- 12-21 0:00	108	5.699	5.384	0.315
Surficial	Innisfree 2403E_0235	Inconclusive	2016- 01-20 0:00	2016- 04-09 0:00	80	5.438	5.224	0.214
Surficial	Innisfree 2403E_0235	Inconclusive	2016- 09-12 0:00	2017- 05-16 0:00	246	5.488	5.038	0.45
Surficial	Innisfree 2403E_0235	Recharge Present	2017- 09-12 0:00	2017- 12-15 0:00	94	5.561	5.328	0.233

Surficial	Innisfree 2403E_0235	Inconclusive	2018-03-11 0:00	2018-05-01 0:00	51	5.457	5.129	0.328			
Surficial	Innisfree 2403E_0235	Recharge Present	2018-09-09 0:00	2019-01-31 0:00	144	5.584	5.282	0.302			
Surficial	Innisfree 2403E_0235	Inconclusive	2019-03-14 0:00	2019-04-06 0:00	23	5.315	5.123	0.192			
Surficial	Innisfree 2403E_0235	No Recharge	2019-06-19 0:00	2019-07-20 0:00	31	5.328	5.133	0.195			
Surficial	Innisfree 2403E_0235	Recharge Present	2019-09-06 0:00	2020-03-28 0:00	204	5.273	5.085	0.188			
Surficial	Innisfree 2403E_0235	Inconclusive	2021-09-23 0:00	2022-05-07 0:00	226	5.532	5.124	0.408			

Table 51: Recovery curve classification of Leedale Shallow_3022 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Leedale Shallow_3022	Recharge Present	2013-05-23 0:00	2013-06-13 0:00	21	6.666	6.494	0.172	Yes	Consistent ending season	May-June, October-November	March-May
Surficial	Leedale Shallow_3022	Inconclusive	2014-03-13 0:00	2014-06-07 0:00	86	6.964	6.599	0.365				
Surficial	Leedale Shallow_3022	Recharge Present	2015-03-06 0:00	2015-04-11 0:00	36	6.992	6.818	0.174				
Surficial	Leedale Shallow_3022	Inconclusive	2017-03-19 0:00	2017-10-19 0:00	214	7.074	5.578	1.496				
Surficial	Leedale Shallow_3022	Recharge Present	2018-04-18 0:00	2018-05-14 0:00	26	6.169	5.993	0.176				
Surficial	Leedale Shallow_3022	Inconclusive	2020-04-14 0:00	2020-11-24 0:00	224	7.245	5.243	2.002				
Surficial	Leedale Shallow_3022	Recharge Present	2022-06-13 0:00	2022-08-09 0:00	57	6.878	6.476	0.402				

Table 52: Recovery curve classification of Bruderheim 2343E #1 North_0178 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	1999-03-22 0:00	1999-05-31 0:00	70	6.126	5.827	0.299	Yes	Yes	June-August	March-April
Surficial	Bruderheim 2343E #1 North_0178	No Recharge	2000-03-22 0:00	2000-07-22 0:00	122	6.44	6.224	0.216				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2001-04-23 0:00	2001-08-12 0:00	111	6.626	6.389	0.237				
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2002-04-10 0:00	2002-06-19 0:00	70	6.779	6.638	0.141				
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2003-04-03 0:00	2003-07-27 0:00	115	7.018	6.436	0.582				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2004-03-27 0:00	2004-07-28 0:00	123	6.75	6.123	0.627				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2006-03-31 0:00	2006-06-20 0:00	81	6.553	6.237	0.316				
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2007-03-21 0:00	2007-06-30 0:00	101	6.696	6.122	0.574				
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2008-03-20 0:00	2008-06-10 0:00	82	6.719	6.373	0.346				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2010-03-15 0:00	2010-07-23 0:00	130	7.041	6.683	0.358				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2011-03-30 0:00	2011-08-21 0:00	144	6.872	6.078	0.794				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2012-03-22 0:00	2012-09-01 0:00	163	6.469	6.031	0.438				
Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2013-03-28 0:00	2013-07-09 0:00	103	6.289	5.774	0.515				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2014-03-10 0:00	2014-08-04 0:00	147	6.166	5.64	0.526				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2016-03-07 0:00	2016-07-17 0:00	132	6.214	5.85	0.364				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2018-04-13 0:00	2018-06-23 0:00	71	6.138	5.764	0.374				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2019-03-16 0:00	2019-08-14 0:00	151	6.083	5.531	0.552				

Surficial	Bruderheim 2343E #1 North_0178	Inconclusive	2020- 04-07 0:00	2020- 07-27 0:00	111	5.819	5.321	0.498				
Surficial	Bruderheim 2343E #1 North_0178	Recharge Present	2021- 03-12 0:00	2021- 05-23 0:00	72	5.729	5.556	0.173				

Table 53: Recovery curve classification of Bruderheim North_3069 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Bruderheim North_3069	Inconclusive	2011-03-30 0:00	2011-07-26 0:00	118	3.377	2.338	1.039	Yes	Yes	May-July	March
Surficial	Bruderheim North_3069	Inconclusive	2012-03-08 0:00	2012-07-24 0:00	138	2.92	2.282	0.638				
Surficial	Bruderheim North_3069	Recharge Present	2013-03-23 0:00	2013-05-05 0:00	43	2.662	2.127	0.535				
Surficial	Bruderheim North_3069	Inconclusive	2014-03-09 0:00	2014-06-07 0:00	90	2.676	2.157	0.519				
Surficial	Bruderheim North_3069	Inconclusive	2015-03-06 0:00	2015-04-10 0:00	35	2.515	2.13	0.385				
Surficial	Bruderheim North_3069	Inconclusive	2016-03-07 0:00	2016-07-12 0:00	127	2.852	2.267	0.585				
Surficial	Bruderheim North_3069	Inconclusive	2017-03-16 0:00	2017-06-21 0:00	97	2.628	2.088	0.54				
Surficial	Bruderheim North_3069	Inconclusive	2018-04-08 0:00	2018-06-13 0:00	66	2.677	2.177	0.5				
Surficial	Bruderheim North_3069	Inconclusive	2019-03-13 0:00	2019-07-30 0:00	139	2.716	1.904	0.812				
Surficial	Bruderheim North_3069	Inconclusive	2020-04-07 0:00	2020-07-10 0:00	94	2.512	1.814	0.698				
Surficial	Bruderheim North_3069	Inconclusive	2021-03-12 0:00	2021-05-20 0:00	69	2.527	2.175	0.352				
Surficial	Bruderheim North_3069	Recharge Present	2022-03-17 0:00	2022-05-05 0:00	49	2.976	2.319	0.657				

Table 54: Recovery curve classification of Cooking Lake 1348E North_0157 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Cooking Lake 1348E North_057	Recharge Present	1977-09-02 0:00	1978-02-06 0:00	157	8.937	8.862	0.075	Yes	Consistent ending season	February-May	August-October
Surficial	Cooking Lake 1348E North_057	Recharge Present	1983-09-02 0:00	1984-02-18 0:00	169	9.664	9.573	0.091				
Surficial	Cooking Lake 1348E North_057	Recharge Present	1984-09-03 0:00	1985-02-21 0:00	171	9.791	9.61	0.181				
Surficial	Cooking Lake 1348E North_057	Inconclusive	1985-08-09 0:00	1986-01-03 0:00	147	9.98	9.825	0.155				
Surficial	Cooking Lake 1348E North_057	Recharge Present	1992-01-14 0:00	1992-06-12 0:00	150	9.064	8.951	0.113				
Surficial	Cooking Lake 1348E North_057	Inconclusive	1992-09-17 0:00	1993-05-10 0:00	235	9.058	8.955	0.103				
Surficial	Cooking Lake 1348E North_057	Recharge Present	1994-01-02 0:00	1994-03-14 0:00	71	9.205	9.13	0.075				
Surficial	Cooking Lake 1348E North_057	Inconclusive	2000-08-28 0:00	2001-03-02 0:00	186	8.575	8.509	0.066				
Surficial	Cooking Lake 1348E North_057	No Recharge	2001-09-11 0:00	2002-04-15 0:00	216	8.764	8.69	0.074				
Surficial	Cooking Lake 1348E North_057	No Recharge	2003-09-27 0:00	2004-02-03 0:00	129	9.295	9.216	0.079				
Surficial	Cooking Lake 1348E North_057	Inconclusive	2004-08-17 0:00	2005-04-16 0:00	242	9.379	9.179	0.2				
Surficial	Cooking Lake 1348E North_057	Inconclusive	2005-07-17 0:00	2006-04-15 0:00	272	9.256	9.066	0.19				
Surficial	Cooking Lake 1348E North_057	Inconclusive	2006-09-11 0:00	2007-06-30 0:00	292	9.314	9.026	0.288				
Surficial	Cooking Lake 1348E North_057	No Recharge	2007-08-09 0:00	2008-05-02 0:00	267	9.111	8.939	0.172				
Surficial	Cooking Lake 1348E North_057	Inconclusive	2010-11-03 0:00	2011-02-27 0:00	116	9.731	9.646	0.085				
Surficial	Cooking Lake 1348E North_057	Recharge Present	2012-10-03 0:00	2013-06-26 0:00	266	9.667	9.458	0.209				
Surficial	Cooking Lake 1348E North_057	Recharge Present	2013-10-03 0:00	2014-01-12 0:00	101	9.577	9.437	0.14				

Surficial	Cooking Lake 1348E North_057	Recharge Present	2014- 09-06 0:00	2015- 04-11 0:00	217	9.539	9.313	0.226
Surficial	Cooking Lake 1348E North_057	Recharge Present	2015- 09-04 0:00	2015- 12-21 0:00	108	9.514	9.416	0.098
Surficial	Cooking Lake 1348E North_057	Inconclusive	2017- 09-12 0:00	2018- 04-17 0:00	217	9.831	9.698	0.133
Surficial	Cooking Lake 1348E North_057	Recharge Present	2018- 09-04 0:00	2019- 01-03 0:00	121	9.974	9.841	0.133
Surficial	Cooking Lake 1348E North_057	Recharge Present	2019- 05-14 0:00	2020- 08-13 0:00	457	9.958	8.242	1.716
Surficial	Cooking Lake 1348E North_057	Inconclusive	2021- 08-18 0:00	2022- 05-07 0:00	262	9.116	8.907	0.209
Surficial	Cooking Lake 1348E North_057	Inconclusive	2022- 10-05 0:00	2023- 02-13 0:00	131	9.071	8.963	0.108

Table 55: Recovery curve classification of Devon #2 North_0159 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Devon #2 North_0159	Recharge Present	1968-02-20 0:00	1968-05-08 0:00	78	2.6	2.115	0.485	Yes	Yes	April-June	February-April
Surficial	Devon #2 North_0159	Recharge Present	1969-03-20 0:00	1969-05-08 0:00	49	2.779	2.179	0.6				
Surficial	Devon #2 North_0159	Recharge Present	1970-03-18 0:00	1970-04-30 0:00	43	2.819	2.38	0.439				
Surficial	Devon #2 North_0159	Recharge Present	1971-03-02 0:00	1971-04-22 0:00	51	2.849	2.234	0.615				
Surficial	Devon #2 North_0159	Inconclusive	1972-03-11 0:00	1972-05-20 0:00	70	2.794	1.989	0.805				
Surficial	Devon #2 North_0159	Recharge Present	1973-03-02 0:00	1973-05-08 0:00	67	2.632	2.121	0.511				
Surficial	Devon #2 North_0159	Inconclusive	1975-04-10 0:00	1975-05-17 0:00	37	2.115	1.468	0.647				
Surficial	Devon #2 North_0159	Inconclusive	1978-03-02 0:00	1978-06-01 0:00	91	2.529	2.064	0.465				
Surficial	Devon #2 North_0159	Recharge Present	1979-03-07 0:00	1979-05-19 0:00	73	2.479	1.678	0.801				
Surficial	Devon #2 North_0159	Recharge Present	1980-03-13 0:00	1980-04-26 0:00	44	2.505	1.881	0.624				
Surficial	Devon #2 North_0159	Inconclusive	1980-08-23 0:00	1980-09-18 0:00	26	2.131	1.673	0.458				
Surficial	Devon #2 North_0159	Inconclusive	1981-02-17 0:00	1981-04-24 0:00	66	2.151	1.611	0.54				
Surficial	Devon #2 North_0159	Inconclusive	1981-09-18 0:00	1981-10-11 0:00	23	2.18	1.974	0.206				
Surficial	Devon #2 North_0159	Inconclusive	1983-02-18 0:00	1983-05-08 0:00	79	2.212	1.683	0.529				
Surficial	Devon #2 North_0159	Inconclusive	1983-06-19 0:00	1983-07-06 0:00	17	2.048	1.119	0.929				
Surficial	Devon #2 North_0159	Inconclusive	1983-09-02 0:00	1983-10-30 0:00	58	1.89	1.782	0.108				
Surficial	Devon #2 North_0159	Inconclusive	1984-03-19 0:00	1984-06-08 0:00	81	2.048	1.553	0.495				

Surficial	Devon #2 North_0159	Recharge Present	1986- 02-25 0:00	1986- 05-14 0:00	78	2.436	1.489	0.947
Surficial	Devon #2 North_0159	Inconclusive	1986- 09-09 0:00	1986- 10-05 0:00	26	2.245	1.835	0.41
Surficial	Devon #2 North_0159	Inconclusive	1987- 03-16 0:00	1987- 05-22 0:00	67	2.322	1.629	0.693
Surficial	Devon #2 North_0159	Recharge Present	1989- 03-20 0:00	1989- 05-20 0:00	61	2.439	1.55	0.889
Surficial	Devon #2 North_0159	Inconclusive	1991- 03-16 0:00	1991- 06-26 0:00	102	2.12	1.067	1.053
Surficial	Devon #2 North_0159	Inconclusive	1992- 02-20 0:00	1992- 04-16 0:00	56	2.095	1.458	0.637
Surficial	Devon #2 North_0159	Inconclusive	1994- 03-03 0:00	1994- 06-16 0:00	105	2.451	1.711	0.74
Surficial	Devon #2 North_0159	Recharge Present	1995- 03-13 0:00	1995- 05-20 0:00	68	2.455	1.948	0.507
Surficial	Devon #2 North_0159	Inconclusive	1997- 03-13 0:00	1997- 06-26 0:00	105	2.065	1.186	0.879
Surficial	Devon #2 North_0159	Inconclusive	1999- 03-11 0:00	1999- 05-24 0:00	74	2.092	1.43	0.662
Surficial	Devon #2 North_0159	Inconclusive	2000- 03-16 0:00	2000- 06-20 0:00	96	2.332	1.843	0.489
Surficial	Devon #2 North_0159	Recharge Present	2002- 04-02 0:00	2002- 05-27 0:00	55	2.863	2.405	0.458
Surficial	Devon #2 North_0159	Recharge Present	2003- 03-16 0:00	2003- 05-16 0:00	61	3.118	2.256	0.862
Surficial	Devon #2 North_0159	Inconclusive	2004- 03-06 0:00	2004- 07-18 0:00	134	3.123	2.767	0.356
Surficial	Devon #2 North_0159	Inconclusive	2005- 02-28 0:00	2005- 04-18 0:00	49	3.104	2.281	0.823
Surficial	Devon #2 North_0159	Inconclusive	2006- 03-24 0:00	2006- 05-29 0:00	66	3.154	2.852	0.302
Surficial	Devon #2 North_0159	Recharge Present	2007- 03-10 0:00	2007- 05-12 0:00	63	3.223	2.247	0.976
Surficial	Devon #2 North_0159	Inconclusive	2008- 03-05 0:00	2008- 05-26 0:00	82	2.997	2.681	0.316
Surficial	Devon #2 North_0159	No Recharge	2009- 03-23 0:00	2009- 05-18 0:00	56	3.38	3.138	0.242
Surficial	Devon #2 North_0159	Inconclusive	2011- 03-26 0:00	2011- 08-01 0:00	128	3.675	2.83	0.845
Surficial	Devon #2 North_0159	Recharge Present	2012- 03-10 0:00	2012- 05-24 0:00	75	3.148	2.826	0.322

Surficial	Devon #2 North_0159	Recharge Present	2013-03-24 0:00	2013-05-07 0:00	44	3.013	2.553	0.46				
Surficial	Devon #2 North_0159	Inconclusive	2014-03-06 0:00	2014-04-28 0:00	53	3.076	2.583	0.493				
Surficial	Devon #2 North_0159	Inconclusive	2015-03-01 0:00	2015-04-19 0:00	49	3.194	2.8	0.394				
Surficial	Devon #2 North_0159	Inconclusive	2017-03-13 0:00	2017-06-03 0:00	82	3.554	2.985	0.569				
Surficial	Devon #2 North_0159	Recharge Present	2018-04-06 0:00	2018-05-11 0:00	35	3.241	2.758	0.483				
Surficial	Devon #2 North_0159	No Recharge	2019-03-12 0:00	2019-05-16 0:00	65	3.354	2.876	0.478				
Surficial	Devon #2 North_0159	Inconclusive	2020-04-04 0:00	2020-08-09 0:00	127	3.273	2.371	0.902				
Surficial	Devon #2 North_0159	Inconclusive	2021-03-05 0:00	2021-05-25 0:00	81	2.719	2.442	0.277				
Surficial	Devon #2 North_0159	Inconclusive	2022-03-11 0:00	2022-05-14 0:00	64	3.201	2.686	0.515				
Surficial	Devon #2 North_0159	Recharge Present	2023-03-19 0:00	2023-05-04 0:00	46	3.388	3.26	0.128				

Table 56: Recovery curve classification of Carmangay West_3010 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Carmangay West_3010	Recharge Present	2019-03-01 0:00	2019-05-26 0:00	86	2.529	2.253	0.276	Yes	Consistent starting season	May-June	February-March
Surficial	Carmangay West_3010	No Recharge	2020-08-26 0:00	2021-01-06 0:00	133	2.741	2.483	0.258				
Surficial	Carmangay West_3010	Inconclusive	2021-02-17 0:00	2021-05-24 0:00	96	2.663	2.391	0.272				
Surficial	Carmangay West_3010	No Recharge	2022-03-10 0:00	2022-05-05 0:00	56	2.646	2.507	0.139				
Surficial	Carmangay West_3010	Inconclusive	2022-06-03 0:00	2022-06-15 0:00	12	2.61	2.294	0.316				

Table 57: Recovery curve classification of Cypress Hills 2293E_0107 well, unlisted surficial aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Surficial	Cypress Hills 2293E_0107	No Recharge	1986-03-02 0:00	1986-04-02 0:00	31	13.115	12.595	0.52	Yes	Yes	March-May	March-May
Surficial	Cypress Hills 2293E_0107	Inconclusive	1986-05-27 0:00	1986-07-10 0:00	44	12.893	12.533	0.36				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1987-03-05 0:00	1987-04-11 0:00	37	12.863	12.207	0.656				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1991-03-19 0:00	1991-05-22 0:00	64	13.03	12.211	0.819				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1993-03-06 0:00	1993-04-11 0:00	36	13.22	11.737	1.483				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1993-06-15 0:00	1993-08-02 0:00	48	12.678	11.68	0.998				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1994-03-02 0:00	1994-03-18 0:00	16	12.657	11.983	0.674				
Surficial	Cypress Hills 2293E_0107	Recharge Present	1995-04-02 0:00	1995-04-20 0:00	18	12.887	12.234	0.653				
Surficial	Cypress Hills 2293E_0107	Inconclusive	1996-03-12 0:00	1996-04-22 0:00	41	12.982	12.351	0.631				
Surficial	Cypress Hills 2293E_0107	Inconclusive (too short time)	1997-03-19 0:00	1997-03-31 0:00	12	13.059	12.062	0.997				

Appendix C7: Recovery Curve Classification of Miscellaneous Alberta Aquifers Monitoring Wells

Table 58: Recovery curve classification of Dewberry 2410E_0237 well, Lea Park aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Lea Park	Dewberry 2410E_0237	Recharge Present	1987-02-07 0:00	1987-05-30 0:00	112	8.532	8.054	0.478	Yes	Yes	June-July	March-April
Lea Park	Dewberry 2410E_0237	Inconclusive	1988-04-08 0:00	1988-09-07 0:00	152	8.691	8.338	0.353				
Lea Park	Dewberry 2410E_0237	Recharge Present	1989-04-07 0:00	1989-08-03 0:00	118	8.889	8.238	0.651				
Lea Park	Dewberry 2410E_0237	No Recharge	1991-04-11 0:00	1991-07-14 0:00	94	8.841	8.336	0.505				
Lea Park	Dewberry 2410E_0237	Inconclusive	1992-03-07 0:00	1992-06-02 0:00	87	9.057	8.332	0.725				
Lea Park	Dewberry 2410E_0237	Inconclusive	1993-03-26 0:00	1993-07-21 0:00	117	9.235	8.781	0.454				
Lea Park	Dewberry 2410E_0237	Recharge Present	1994-04-01 0:00	1994-08-22 0:00	143	9.257	8.594	0.663				
Lea Park	Dewberry 2410E_0237	Inconclusive	1995-03-26 0:00	1995-07-02 0:00	98	9.136	8.723	0.413				
Lea Park	Dewberry 2410E_0237	Recharge Present	1996-04-10 0:00	1996-07-16 0:00	97	9.119	8.183	0.936				
Lea Park	Dewberry 2410E_0237	Recharge Present	2009-04-04 0:00	2009-07-14 0:00	101	8.759	8.007	0.752				
Lea Park	Dewberry 2410E_0237	Recharge Present	2020-04-15 0:00	2020-07-12 0:00	88	8.187	6.711	1.476				
Lea Park	Dewberry 2410E_0237	Recharge Present	2021-03-23 0:00	2021-06-15 0:00	84	8.341	7.36	0.981				
Lea Park	Dewberry 2410E_0237	Recharge Present	2022-03-22 0:00	2022-07-01 0:00	101	8.67	7.359	1.311				

Table 59: Recovery curve classification of Ross Creek 2286E_0114 well, Irvine Valley aquifer.

Aquifer	Well Name	Recovery Curve Type	Recovery Season			Water Levels			Pumping Season			
			Start Date	End Date	Length (Days)	Minimum Water Level Recovery from Surface Level, m	Maximum Observed Recovery from Surface Level, m	Apparent Recovery, m	Pumping During Recovery Season?	Consistent?	Start Date	End Date
Irvine Valley	Ross Creek 2286E_0114	No Recharge	1992-07-29 0:00	1992-10-20 0:00	83	5.155	5.094	0.061	Yes	No	March-May, October-November	March, July-September
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	1993-03-11 0:00	1993-05-06 0:00	56	5.191	5.084	0.107				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive (too short time)	1996-02-01 0:00	1996-02-18 0:00	17	4.8	4.671	0.129				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive	1996-07-29 0:00	1996-11-03 0:00	97	4.782	4.682	0.1				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	1996-12-17 0:00	1997-02-25 0:00	70	4.732	4.61	0.122				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	1997-07-28 0:00	1997-10-29 0:00	93	4.65	4.568	0.082				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	1998-06-19 0:00	1998-07-09 0:00	20	4.711	4.514	0.197				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	1998-09-05 0:00	1998-11-20 0:00	76	4.652	4.579	0.073				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive	2000-08-02 0:00	2000-09-08 0:00	37	4.958	4.911	0.047				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2002-08-08 0:00	2002-11-08 0:00	92	5.255	5.16	0.095				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive	2003-03-07 0:00	2003-05-15 0:00	69	5.213	5.101	0.112				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive	2003-06-10 0:00	2003-08-01 0:00	52	5.182	5.062	0.12				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2004-07-31 0:00	2004-10-16 0:00	77	5.105	4.972	0.133				
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2005-05-25 0:00	2005-06-21 0:00	27	5.071	4.983	0.088				
Irvine Valley	Ross Creek 2286E_0114	No Recharge	2007-07-18 0:00	2008-01-04 0:00	170	4.943	4.857	0.086				
Irvine Valley	Ross Creek 2286E_0114	Inconclusive	2008-08-03 0:00	2009-03-21 0:00	230	5.035	4.905	0.13				
Irvine Valley	Ross Creek 2286E_0114	No Recharge	2009-09-26 0:00	2010-08-18 0:00	326	5.107	4.177	0.93				

Irvine Valley	Ross Creek 2286E_0114	Inconclusive	2011-03-04 0:00	2011-06-07 0:00	95	4.303	3.804	0.499
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2012-03-24 0:00	2012-05-09 0:00	46	4.297	4.21	0.087
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2014-03-07 0:00	2014-04-27 0:00	51	4.526	4.435	0.091
Irvine Valley	Ross Creek 2286E_0114	Recharge Present	2016-09-02 0:00	2017-03-19 0:00	198	4.812	4.662	0.15
Irvine Valley	Ross Creek 2286E_0114	No Recharge	2020-09-06 0:00	2021-05-24 0:00	260	4.977	4.876	0.101

Appendix D: GOWN Monitoring Well Recovery Curve Plots for Paskapoo Aquifer Wells
Appendix D1: GOWN Monitoring Well Recovery Curve Plots for Cynthia Shallow_0992 Well

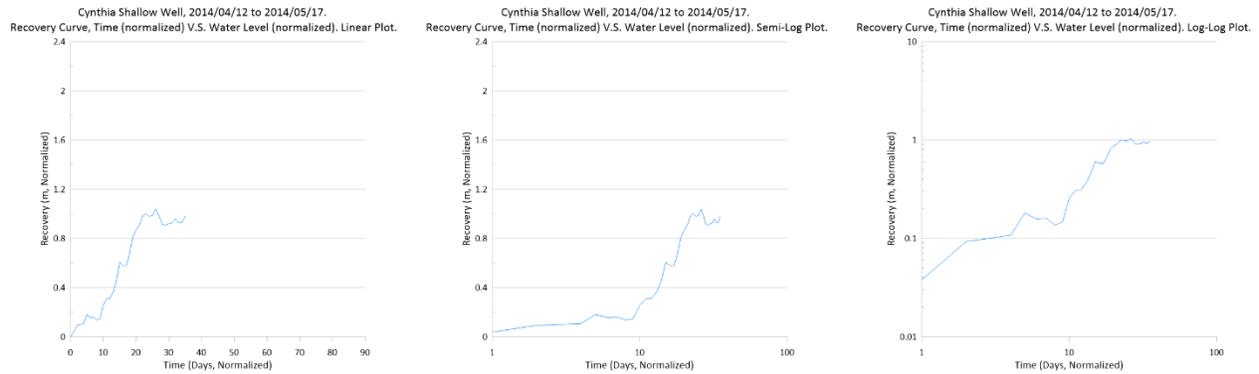


Figure 21: Recovery curve plots for Cynthia Shallow_0992 well, 2014/04/12 to 2014/05/17. Paskapoo aquifer.

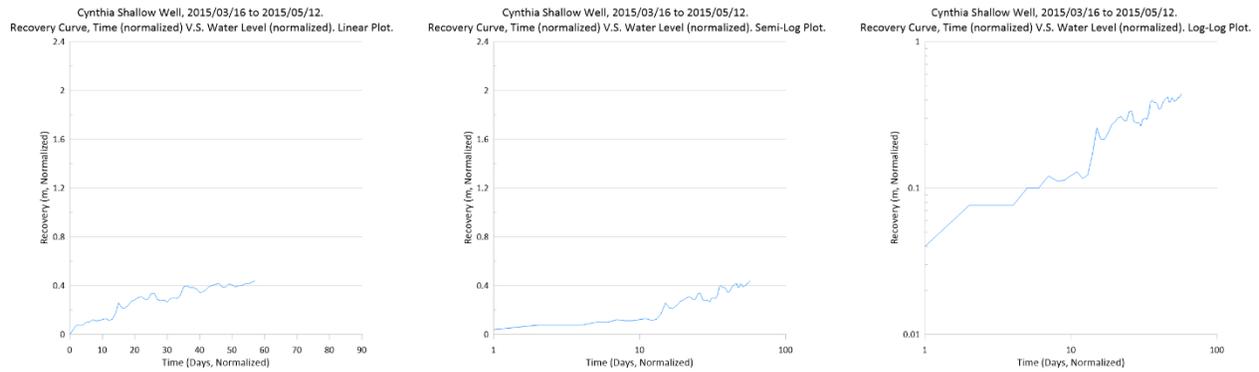


Figure 22: Recovery curve plots for Cynthia Shallow_0992 well, 2015/03/16 to 2015/05/12. Paskapoo aquifer.

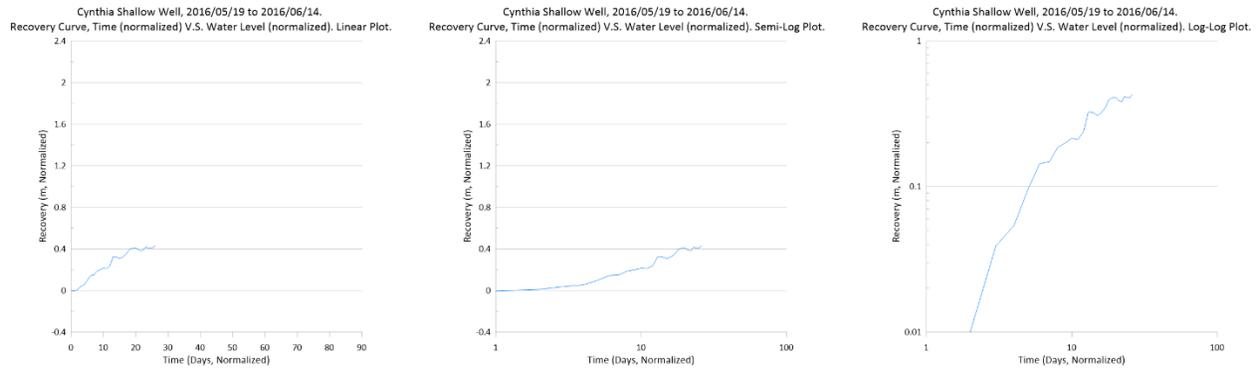


Figure 23: Recovery curve plots for Cynthia Shallow_0992 well, 2016/05/19 to 2016/06/14. Paskapoo aquifer.

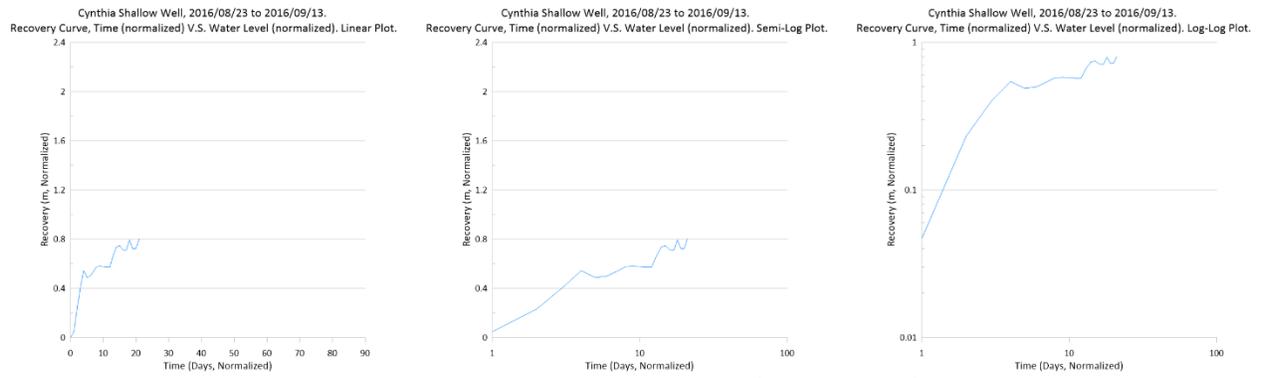


Figure 24: Recovery curve plots for Cynthia Shallow_0992 well, 2016/08/23 to 2016/09/13. Paskapoo aquifer.

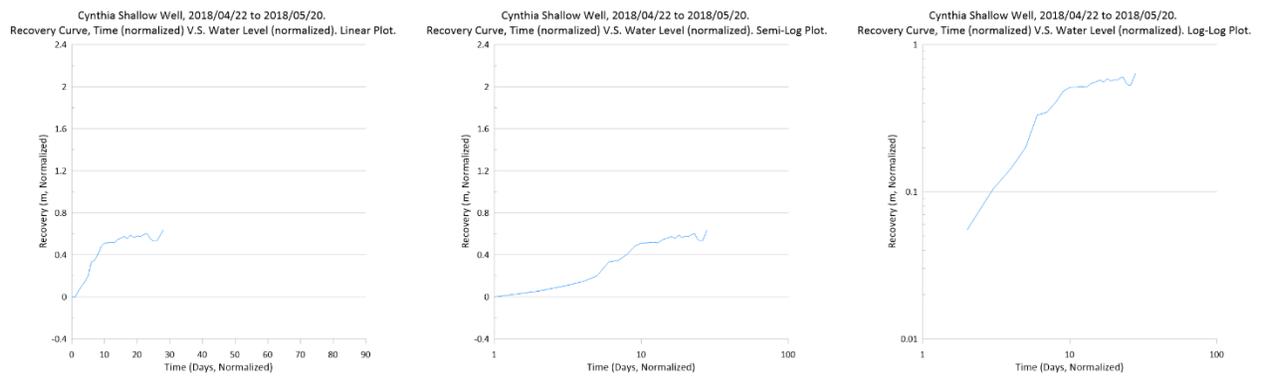


Figure 25: Recovery curve plots for Cynthia Shallow_0992 well, 2018/04/22 to 2018/05/20. Paskapoo aquifer.

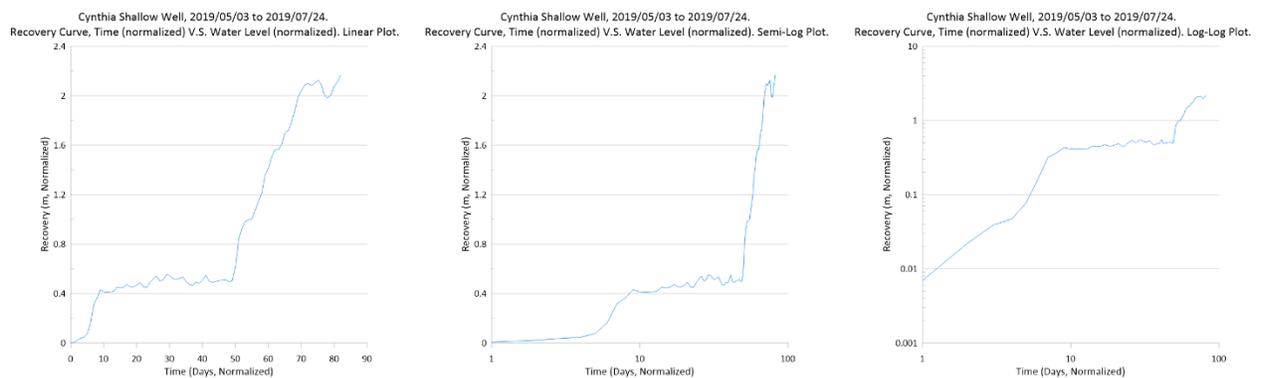


Figure 26: Recovery curve plots for Cynthia Shallow_0992 well, 2019/05/03 to 2019/07/24. Paskapoo aquifer.

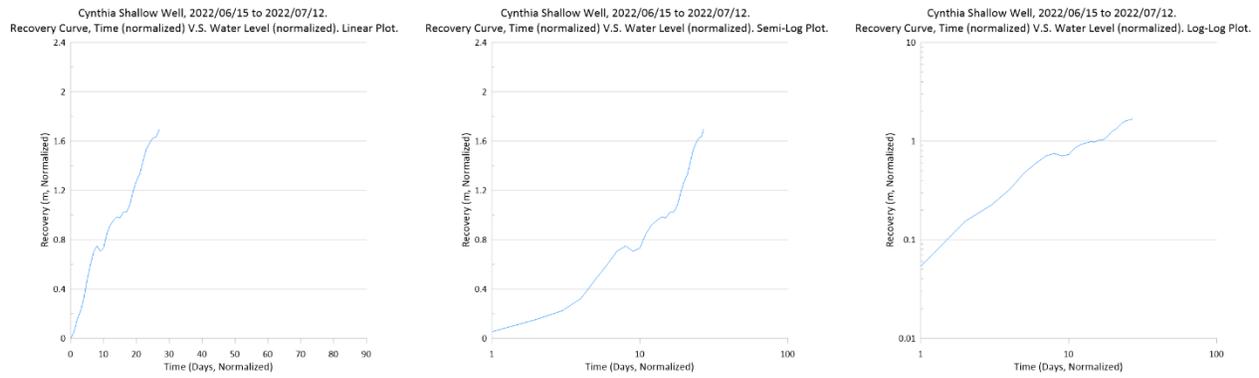


Figure 27: Recovery curve plots for Cynthia Shallow_0992 well, 2022/06/15 to 2022/07/12. Paskapoo aquifer.

Appendix D2: GOWN Monitoring Well Recovery Curve Plots for Crestomere Lake Obs1_0291 Well

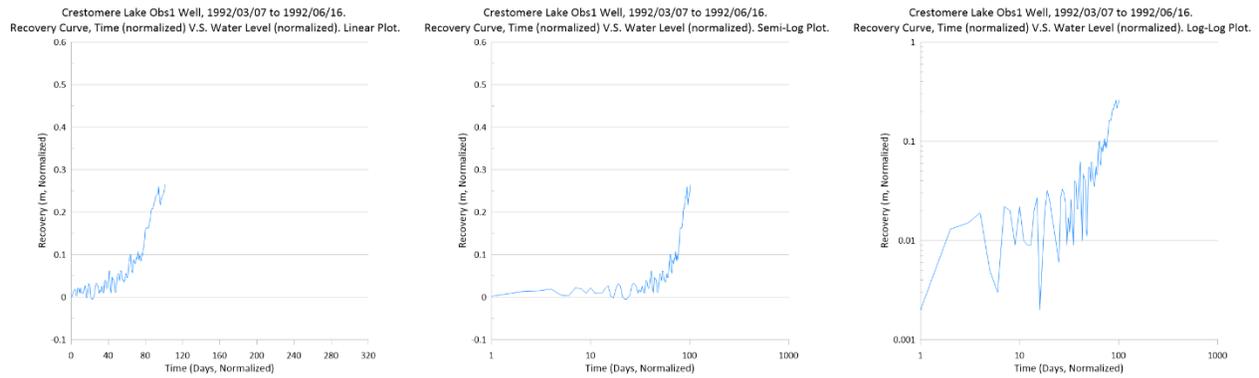


Figure 28: Recovery curve plots for Crestomere Lake Obs1_0291 well, 1992/03/07 to 1992/06/16. Paskapoo aquifer.

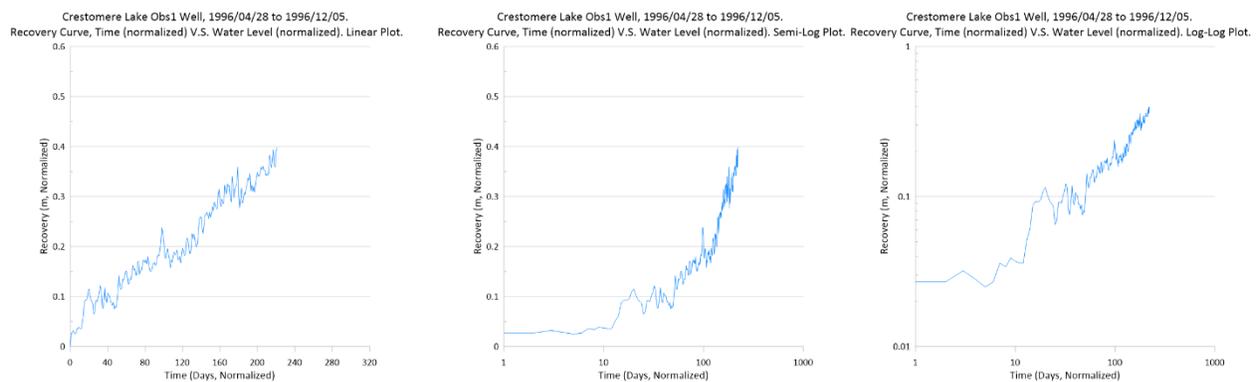


Figure 29: Recovery curve plots for Crestomere Lake Obs1_0291 well, 1996/04/28 to 1996/12/05. Paskapoo aquifer.

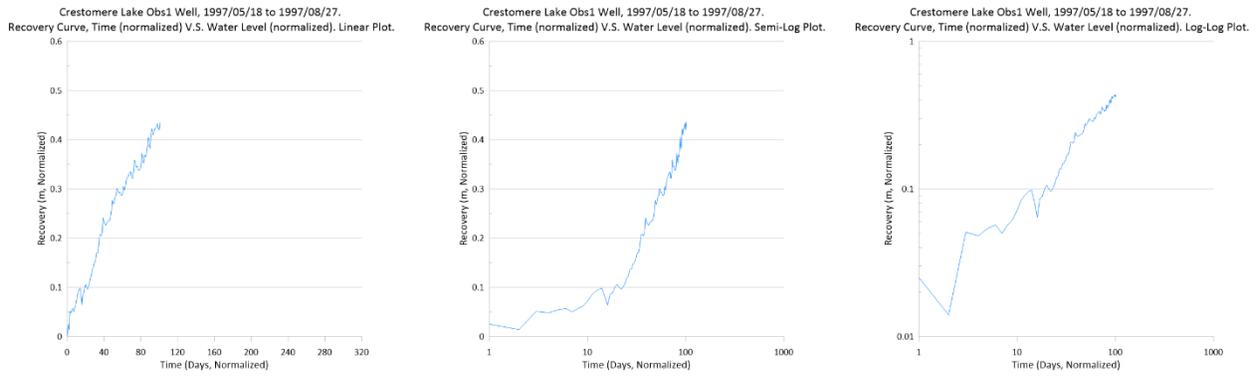


Figure 30: Recovery curve plots for Crestomere Lake Obs1_0291 well, 1997/05/18 to 1997/08/27. Paskapoo aquifer.

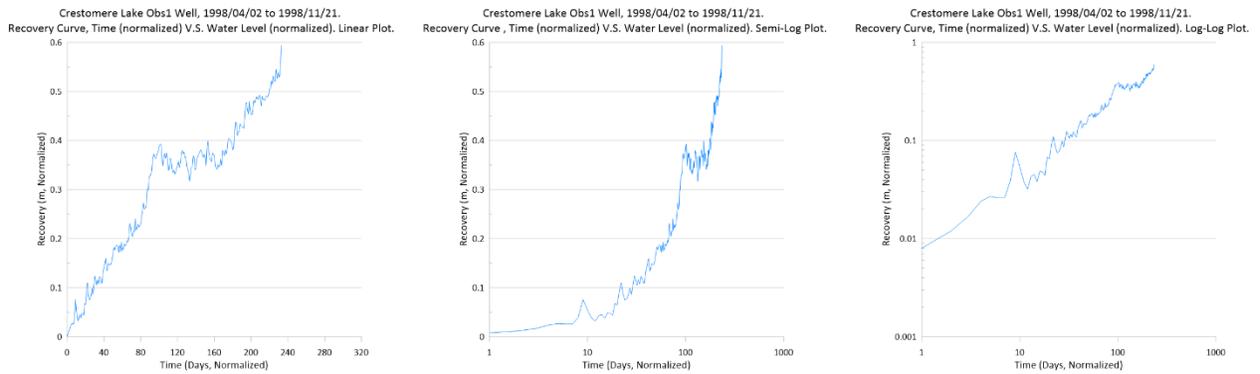


Figure 31: Recovery curve plots for Crestomere Lake Obs1_0291 well, 1998/04/02 to 1998/11/21. Paskapoo aquifer.

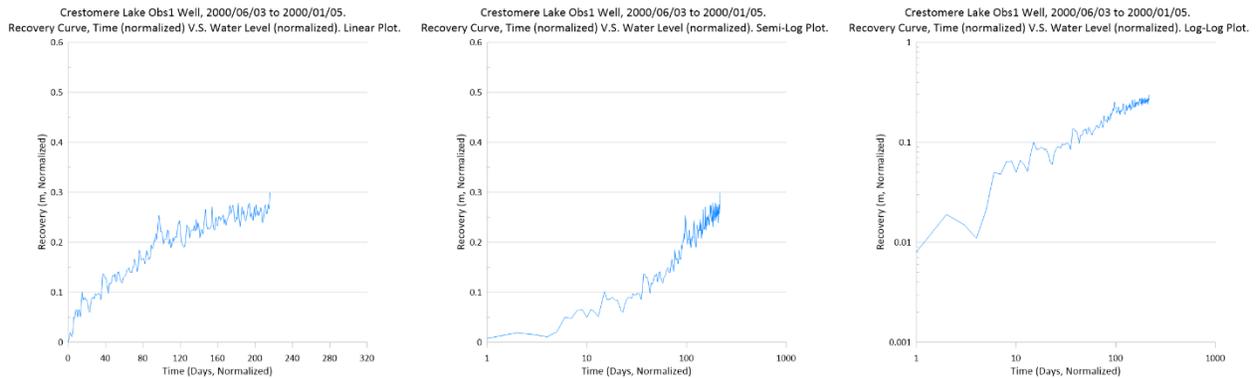


Figure 32: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2000/06/03 to 2001/06/05. Paskapoo aquifer.

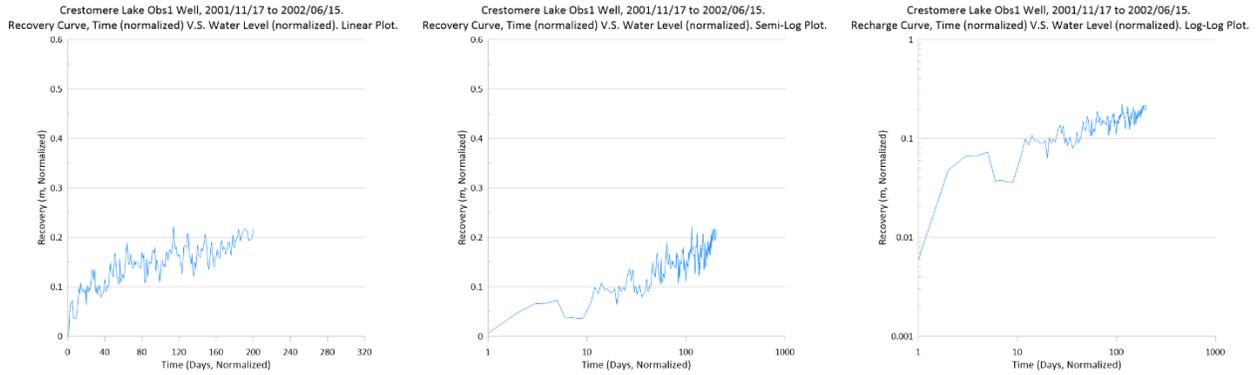


Figure 33: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2001/11/17 to 2002/06/15. Paskapoo aquifer.

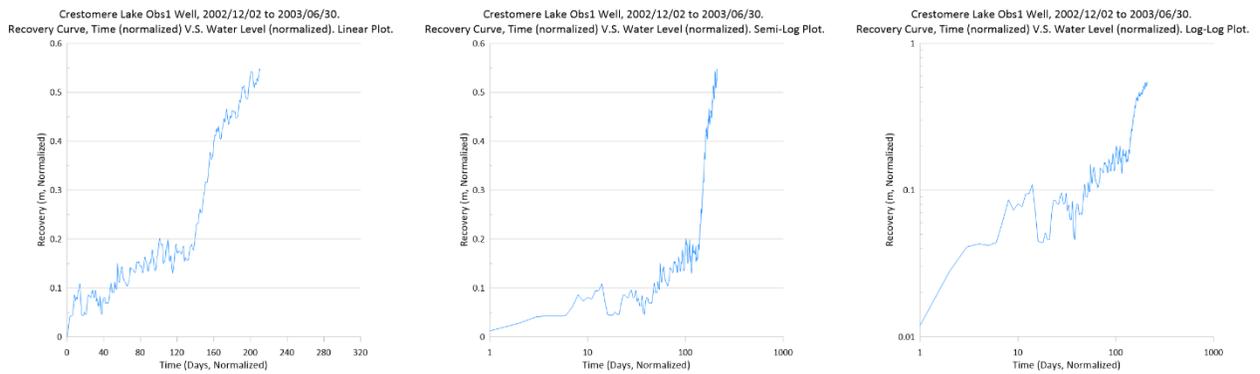


Figure 34: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2002/12/02 to 2003/06/30. Paskapoo aquifer.

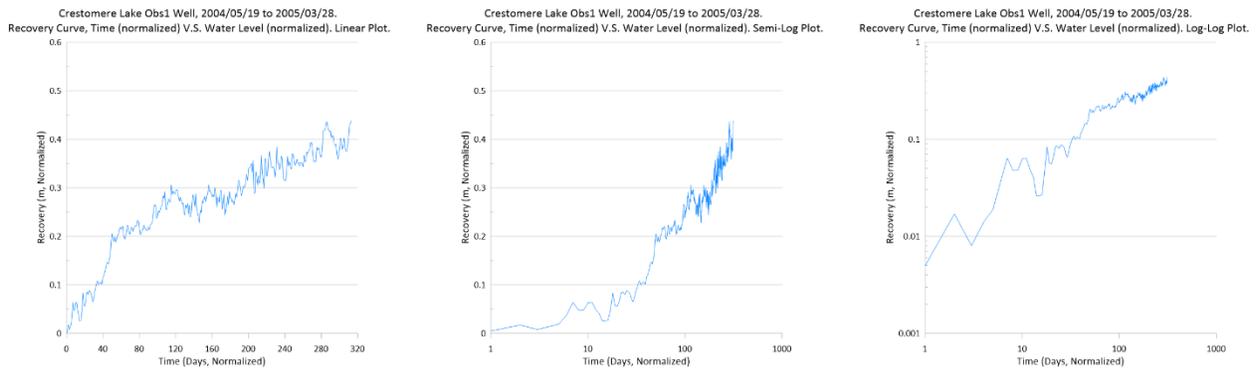


Figure 35: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2004/05/19 to 2005/03/28. Paskapoo aquifer.

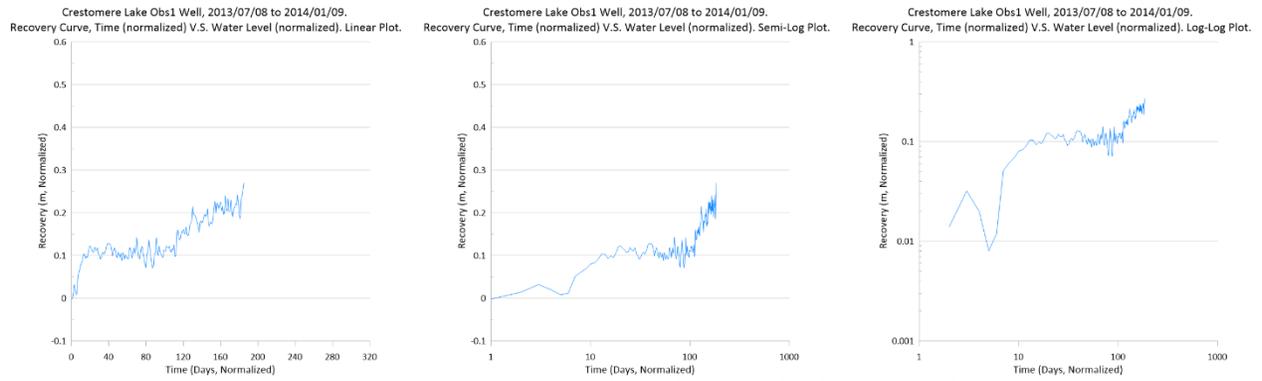


Figure 36: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2013/07/08 to 2014/01/09. Paskapoo aquifer.

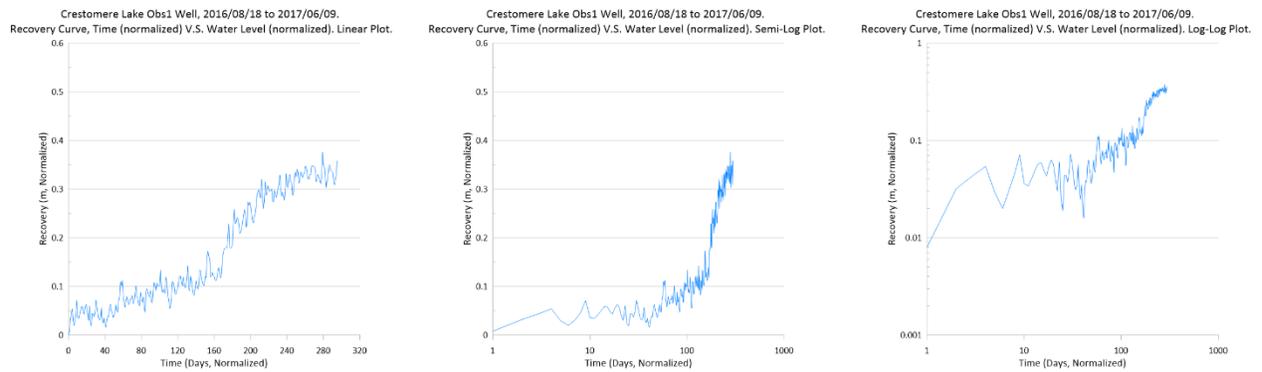


Figure 37: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2016/08/18 to 2017/06/09. Paskapoo aquifer.

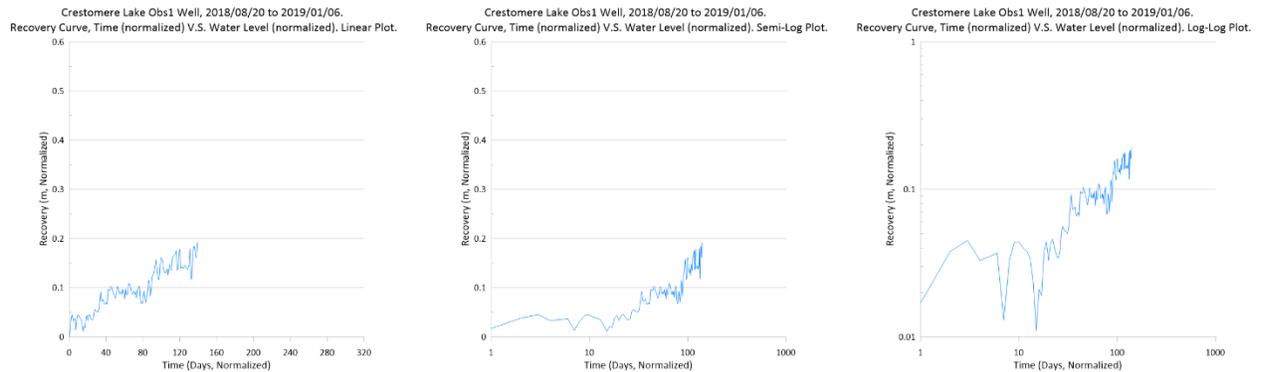


Figure 38: Recovery curve plots for Crestomere Lake Obs1_0291 well, 2018/08/20 to 2019/01/06. Paskapoo aquifer.

Appendix D3: GOWN Monitoring Well Recovery Curve Plots for Rocky Mountain House Shallow_0980 Well

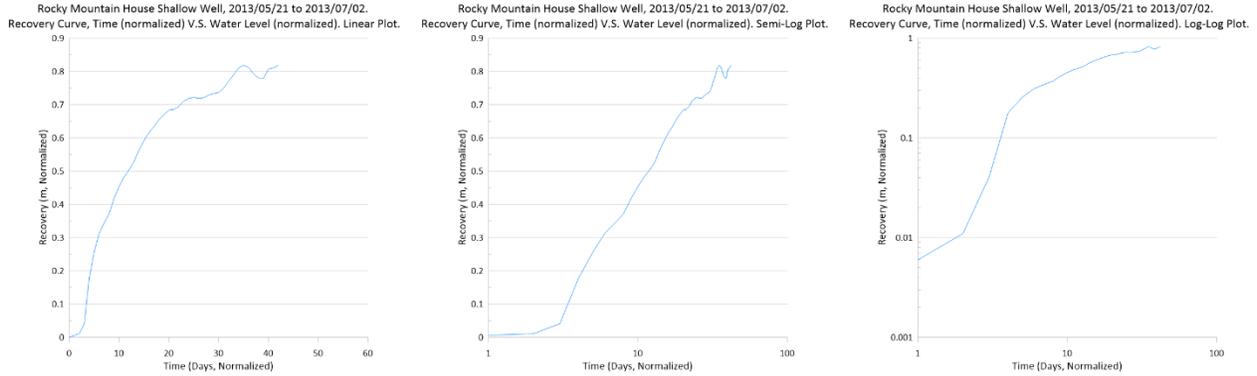


Figure 39: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2013/05/21 to 2013/07/02. Paskapoo aquifer.

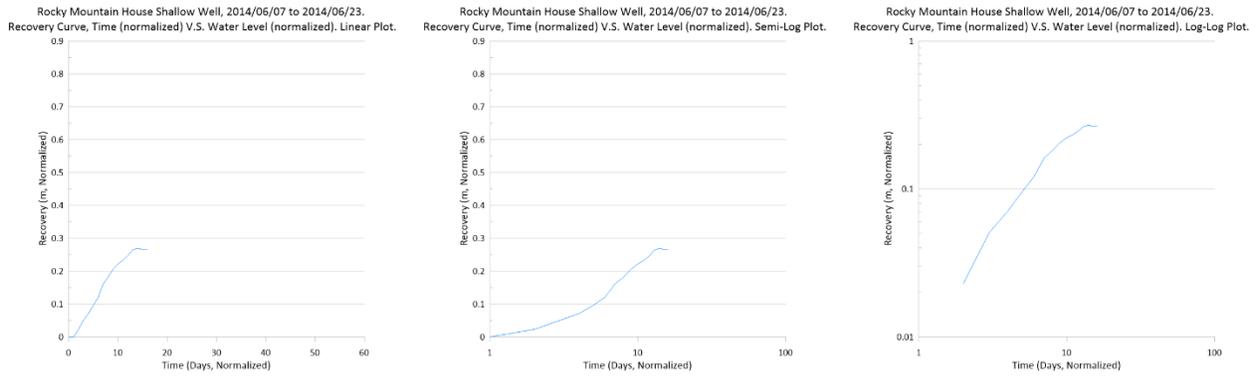


Figure 40: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2014/06/07 to 2014/06/23. Paskapoo aquifer.

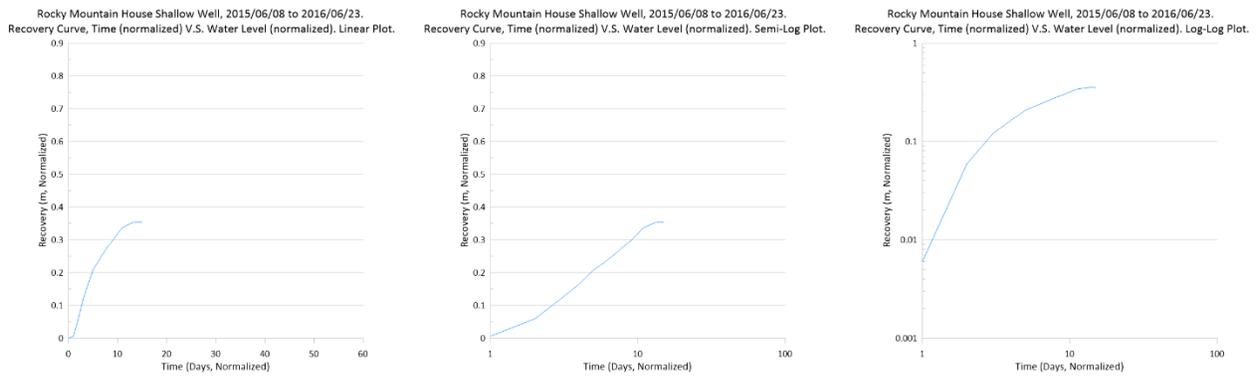
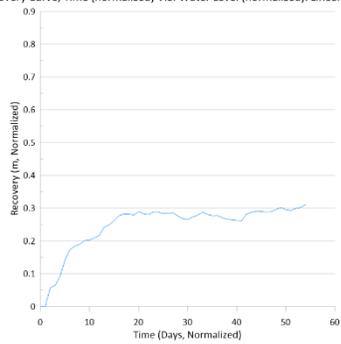
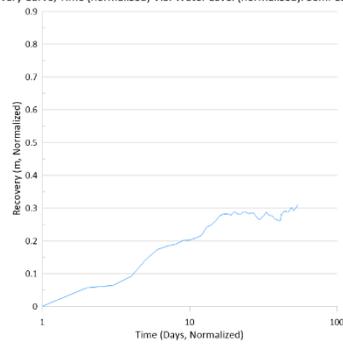


Figure 41: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2015/06/08 to 2016/06/23. Paskapoo aquifer.

Rocky Mountain House Shallow Well, 2016/08/21 to 2016/10/14.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Linear Plot.



Rocky Mountain House Shallow Well, 2016/08/21 to 2016/10/14.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Semi-Log Plot.



Rocky Mountain House Shallow Well, 2016/08/21 to 2016/10/14.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Log-Log Plot.

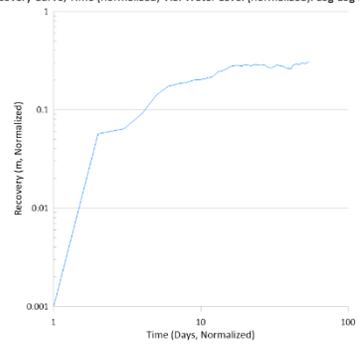
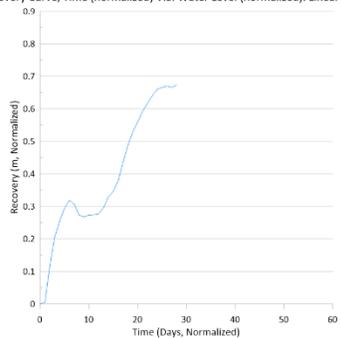
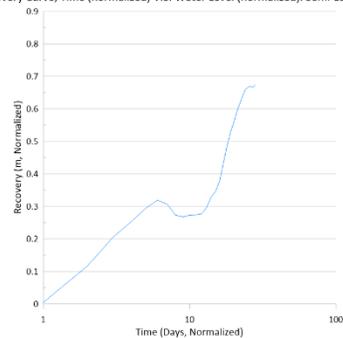


Figure 42: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2016/08/21 to 2016/10/14. Paskapoo aquifer.

Rocky Mountain House Shallow Well, 2017/05/23 to 2017/06/20.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Linear Plot.



Rocky Mountain House Shallow Well, 2017/05/23 to 2017/06/20.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Semi-Log Plot.



Rocky Mountain House Shallow Well, 2017/05/23 to 2017/06/20.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Log-Log Plot.

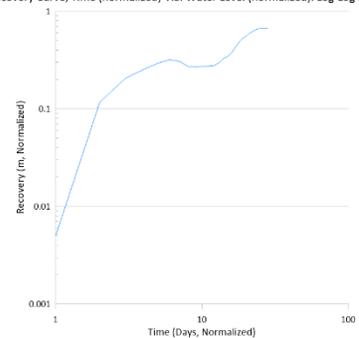
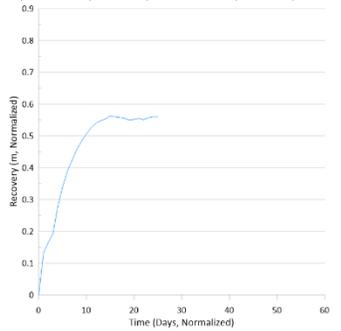
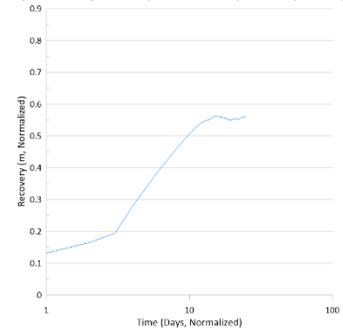


Figure 43: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2017/05/23 to 2017/06/20. Paskapoo aquifer.

Rocky Mountain House Shallow Well, 2018/06/10 to 2018/07/05.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Linear Plot.



Rocky Mountain House Shallow Well, 2018/06/10 to 2018/07/05.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Semi-Log Plot.



Rocky Mountain House Shallow Well, 2018/06/10 to 2018/07/05.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Log-Log Plot.

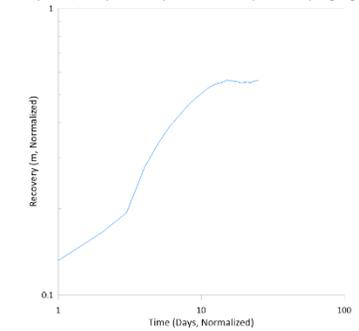


Figure 44: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2018/06/10 to 2018/07/05. Paskapoo aquifer.

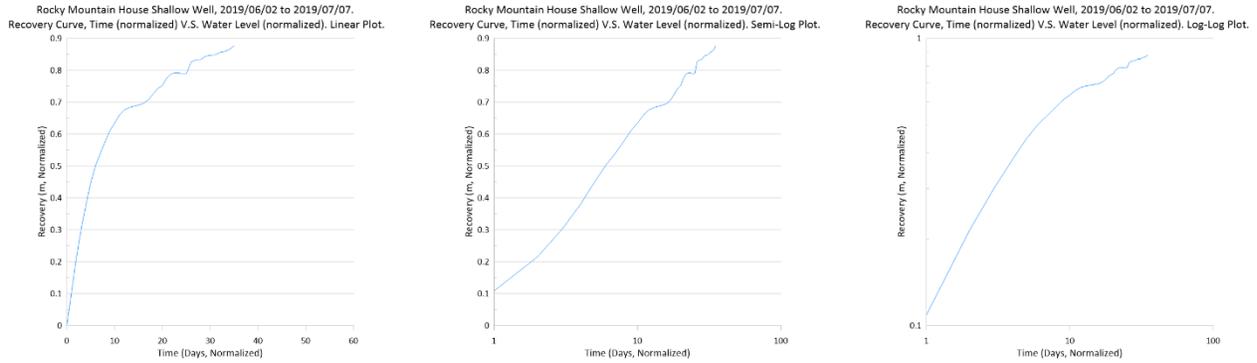


Figure 45: Recovery curve plots for Rocky Mountain House Shallow_0980 well, 2019/06/02 to 2019/07/07. Paskapoo aquifer.

Appendix D4: GOWN Monitoring Well Recovery Curve Plots for Sundre South Shallow_0983 Well

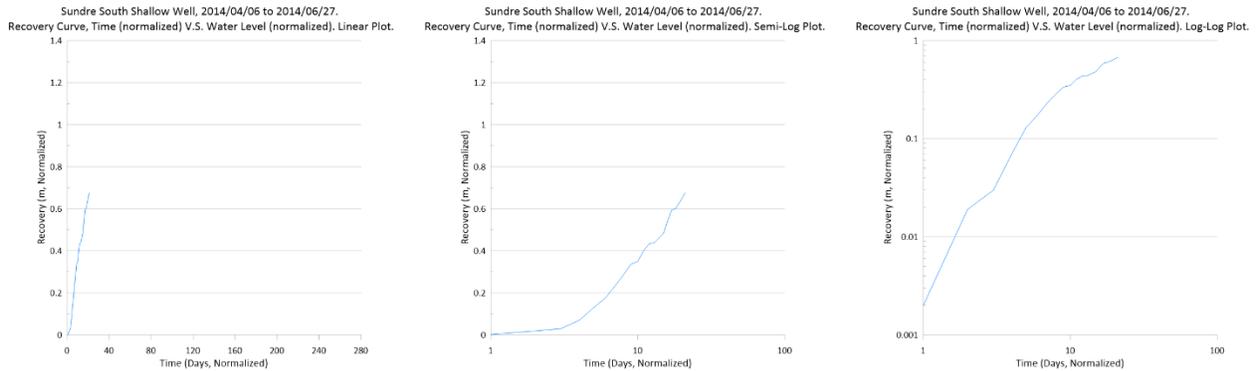


Figure 46: Recovery curve plots for Sundre South Shallow_0983 well, 2014/04/06 to 2014/06/27. Paskapoo aquifer.

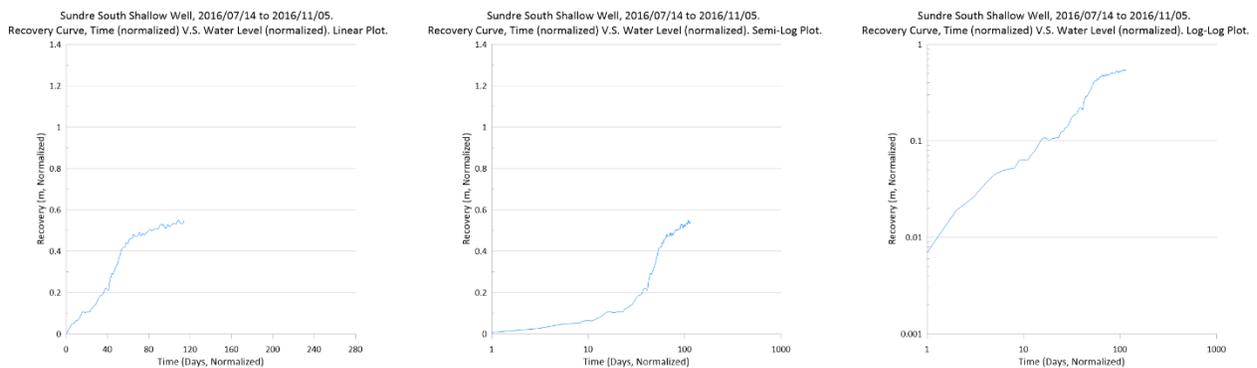


Figure 47: Recovery curve plots for Sundre South Shallow_0983 well, 2016/07/14 to 2016/11/05. Paskapoo aquifer.

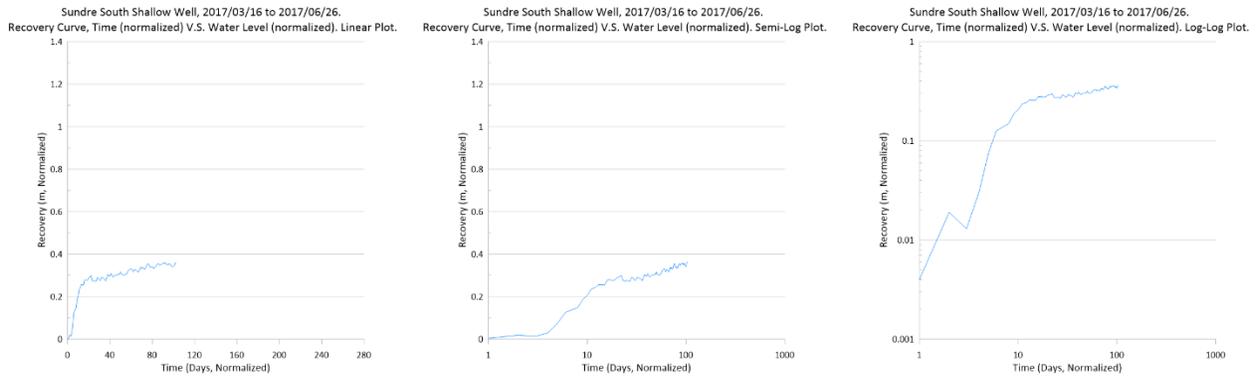


Figure 48: Recovery curve plots for Sundre South Shallow_0983 well, 2017/03/16 to 2017/06/26. Paskapoo aquifer.

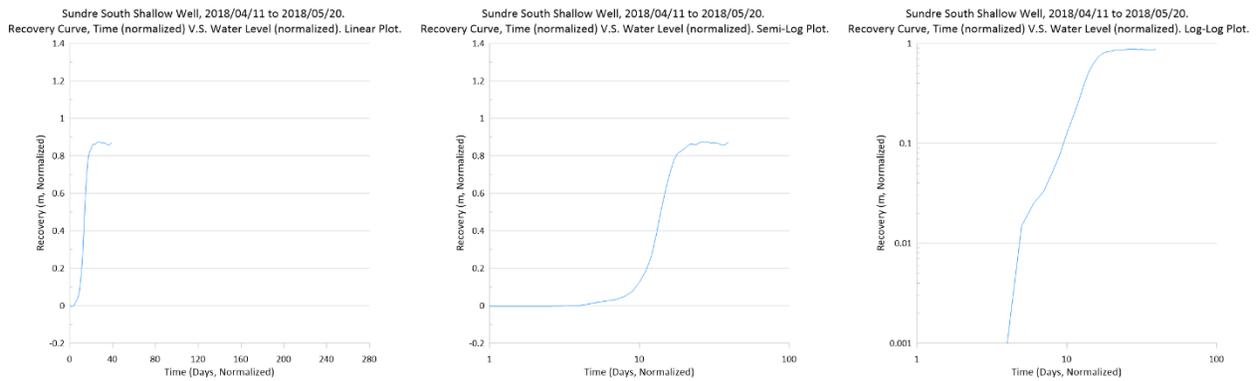


Figure 49: Recovery curve plots for Sundre South Shallow_0983 well, 2018/04/11 to 2018/05/20. Paskapoo aquifer.

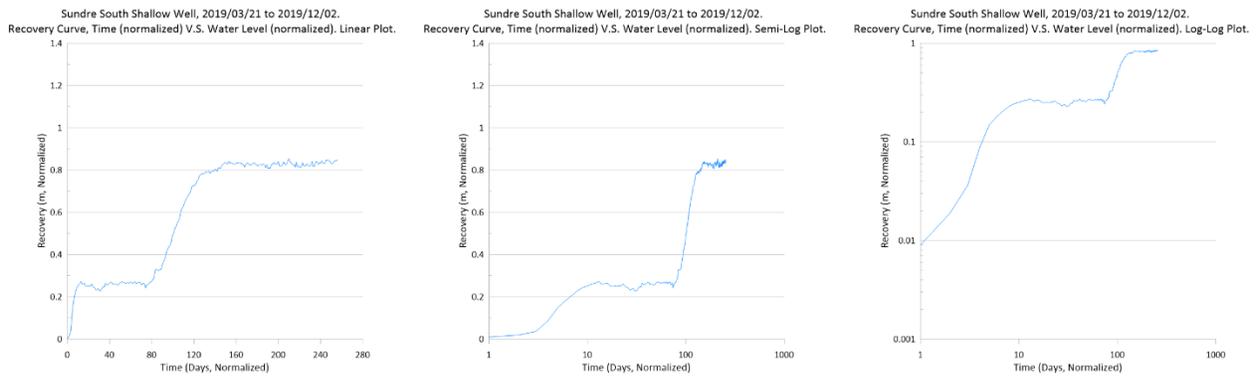


Figure 50: Recovery curve plots for Sundre South Shallow_0983 well, 2019/03/21 to 2019/12/02. Paskapoo aquifer.

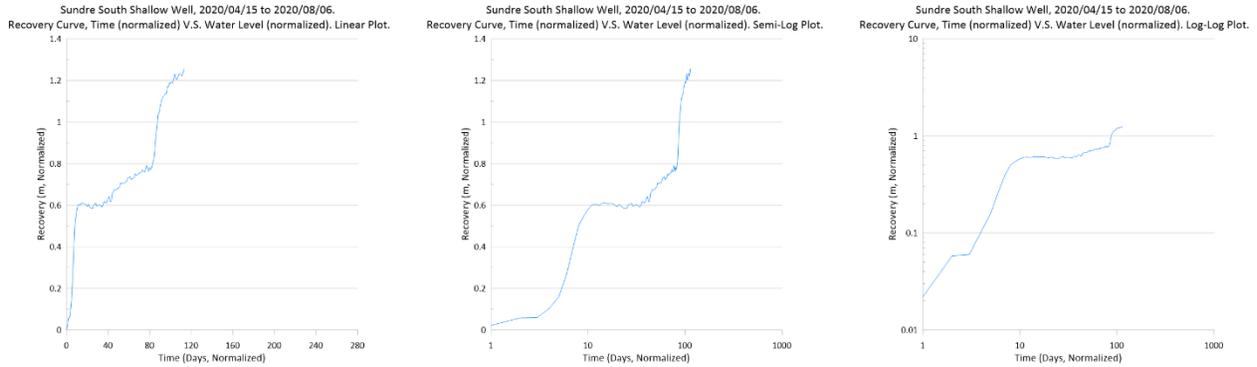


Figure 51: Recovery curve plots for Sundre South Shallow_0983 well, 2020/04/15 to 2020/08/06. Paskapoo aquifer.

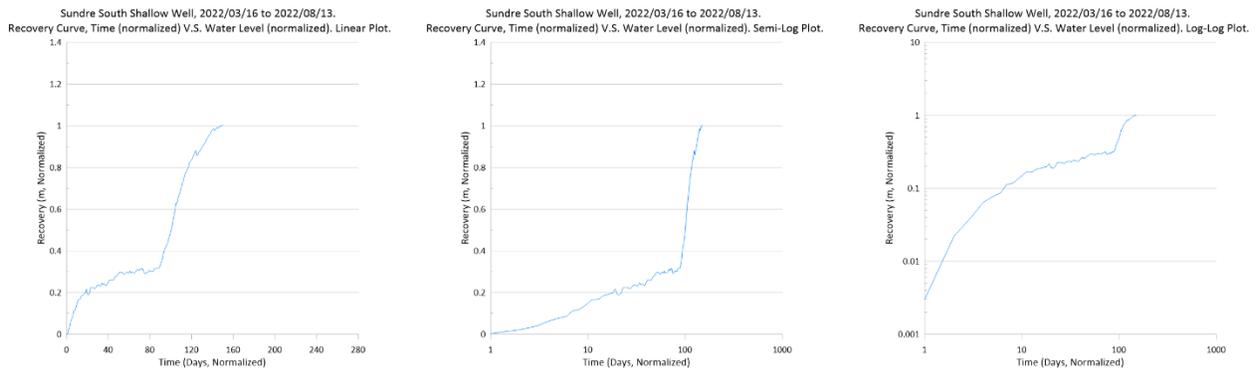


Figure 52: Recovery curve plots for Sundre South Shallow_0983 well, 2022/03/16 to 2022/08/13. Paskapoo aquifer.

Appendix D5: GOWN Monitoring Well Recovery Curve Plots for Elnora #7_0127 Well

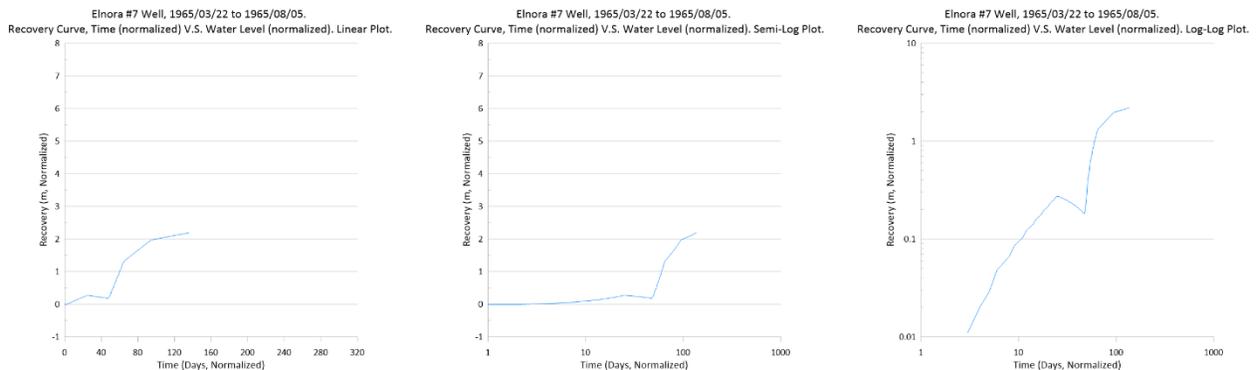


Figure 53: Recovery curve plots for Elnora #7_0127 well, 1965/03/22 to 1965/08/05. Paskapoo aquifer.

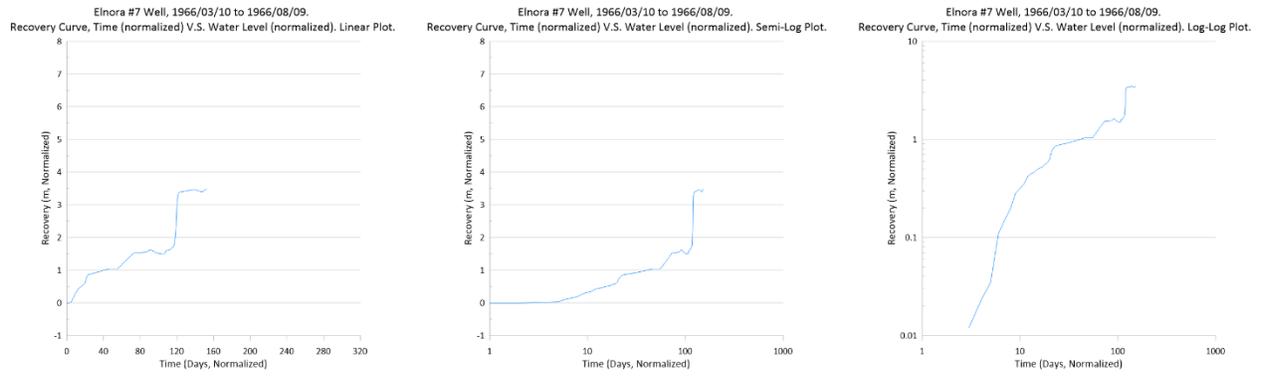


Figure 54: Recovery curve plots for Elnora #7_0127 well, 1966/03/10 to 1966/08/09. Paskapoo aquifer.

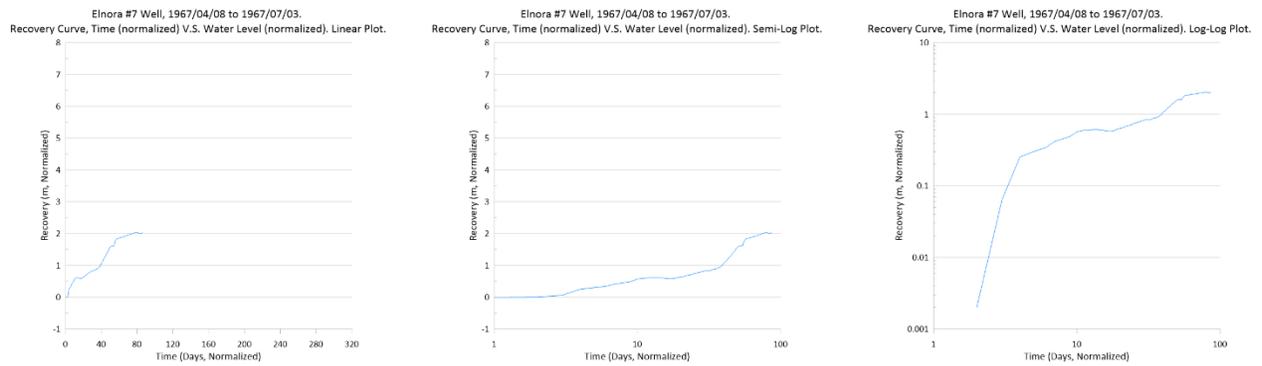


Figure 55: Recovery curve plots for Elnora #7_0127 well, 1967/04/08 to 1967/07/03. Paskapoo aquifer.

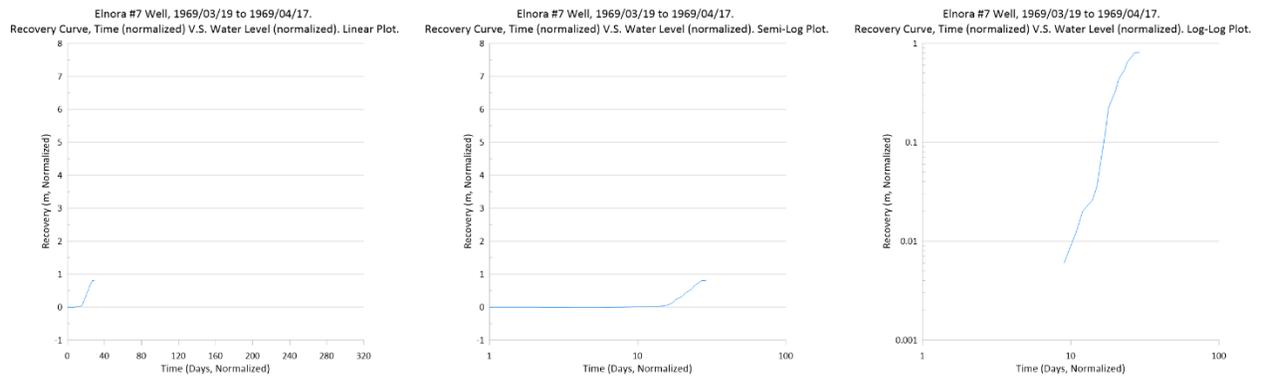


Figure 56: Recovery curve plots for Elnora #7_0127 well, 1969/03/19 to 1969/04/17. Paskapoo aquifer.

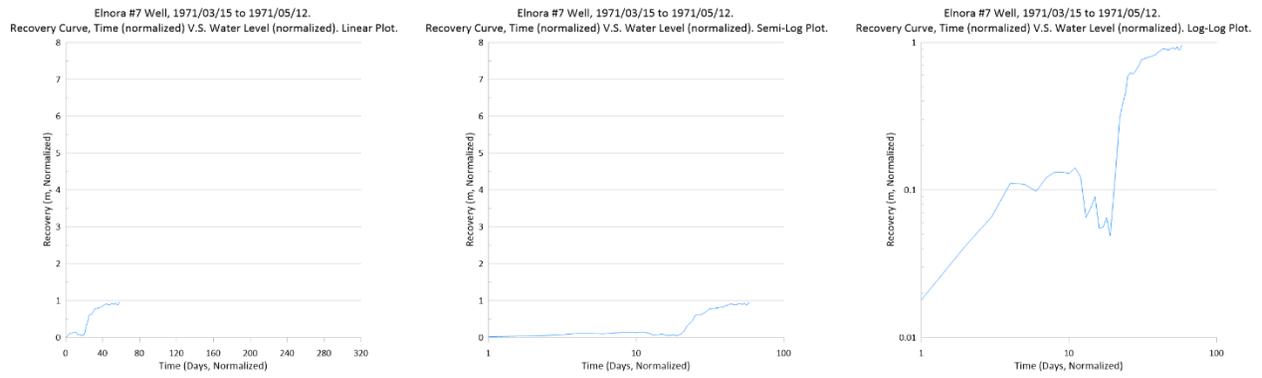


Figure 57: Recovery curve plots for Elnora #7_0127 well, 1971/03/15 to 1971/05/12. Paskapoo aquifer.

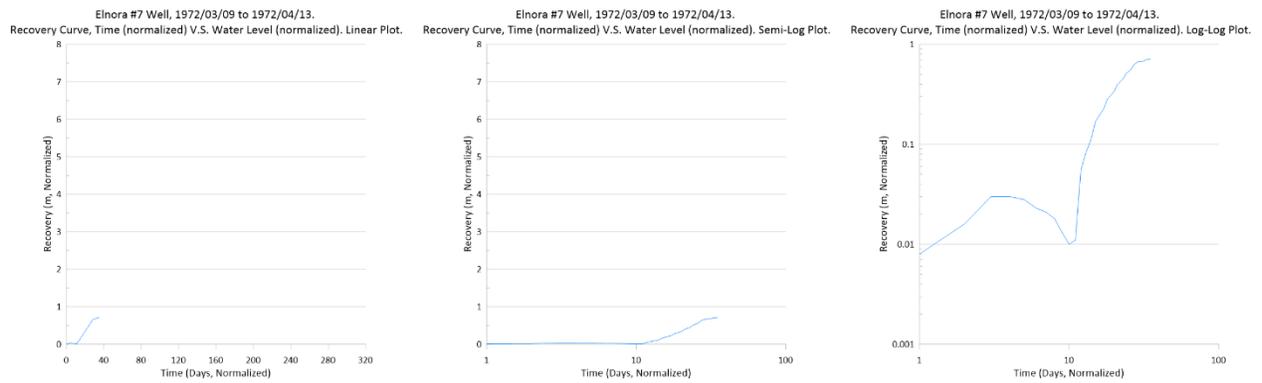


Figure 58: Recovery curve plots for Elnora #7_0127 well, 1972/03/09 to 1972/04/13. Paskapoo aquifer.

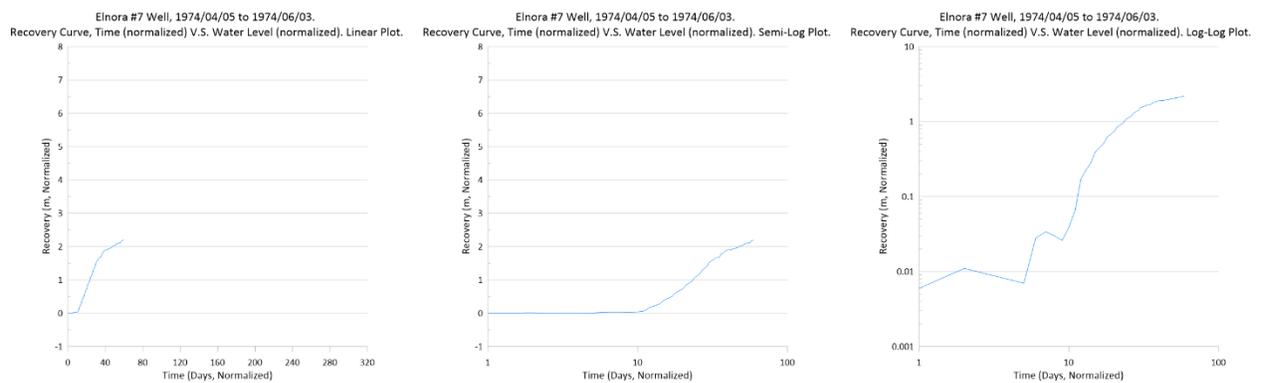


Figure 59: Recovery curve plots for Elnora #7_0127 well, 1974/04/05 to 1974/06/03. Paskapoo aquifer.

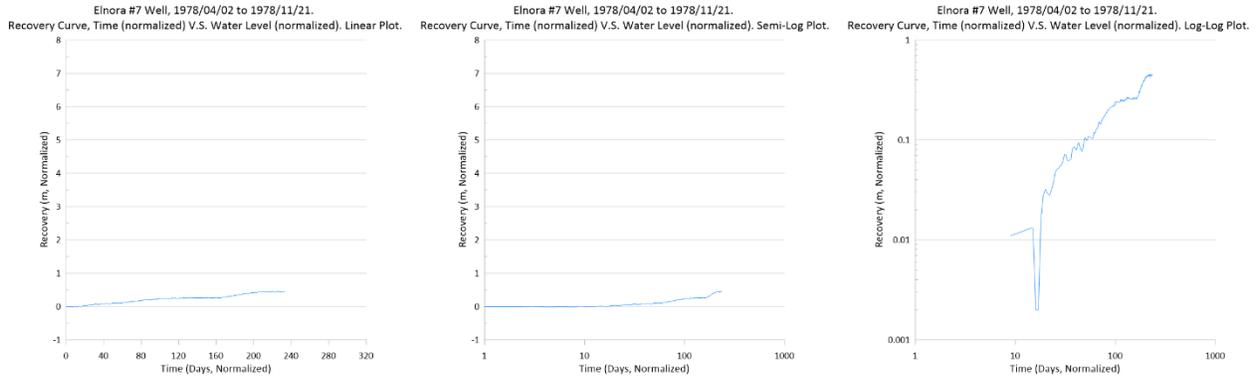


Figure 60: Recovery curve plots for Elnora #7_0127 well, 1978/04/02 to 1978/11/03. Paskapoo aquifer.

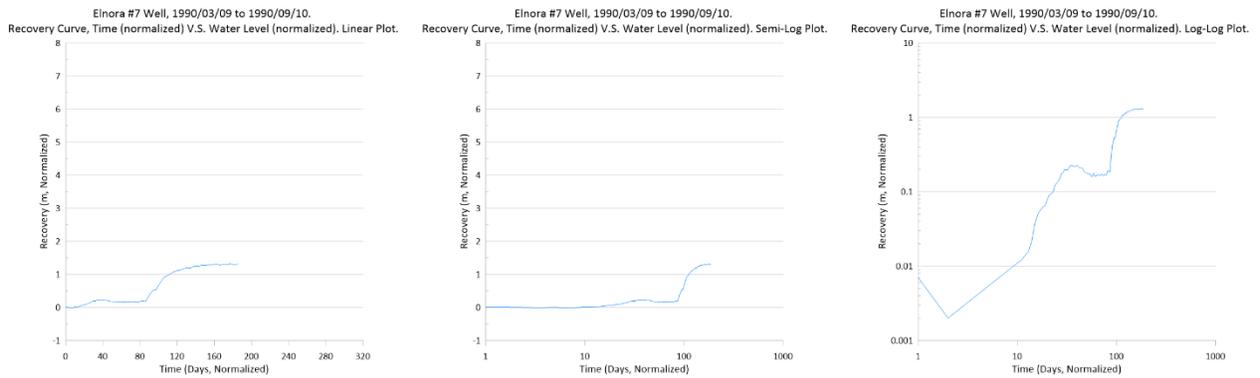


Figure 61: Recovery curve plots for Elnora #7_0127 well, 1990/03/09 to 1990/09/10. Paskapoo aquifer.

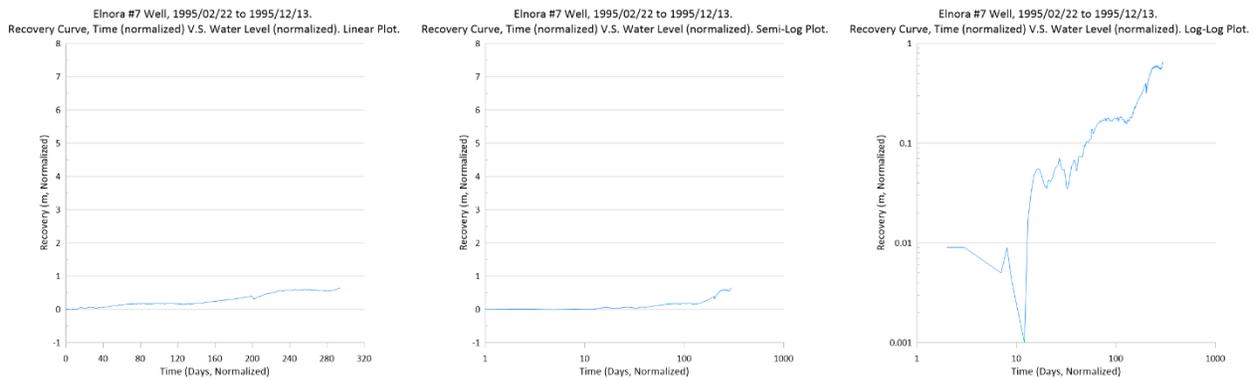


Figure 62: Recovery curve plots for Elnora #7_0127 well, 1995/02/22 to 1995/12/13. Paskapoo aquifer.

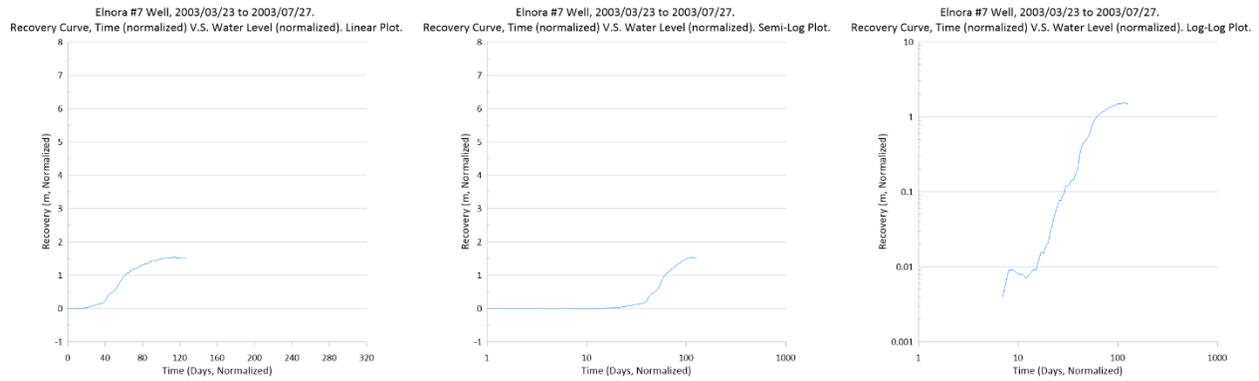


Figure 63: Recovery curve plots for Elnora #7_0127 well, 2003/03/23 to 2003/07/27. Paskapoo aquifer.

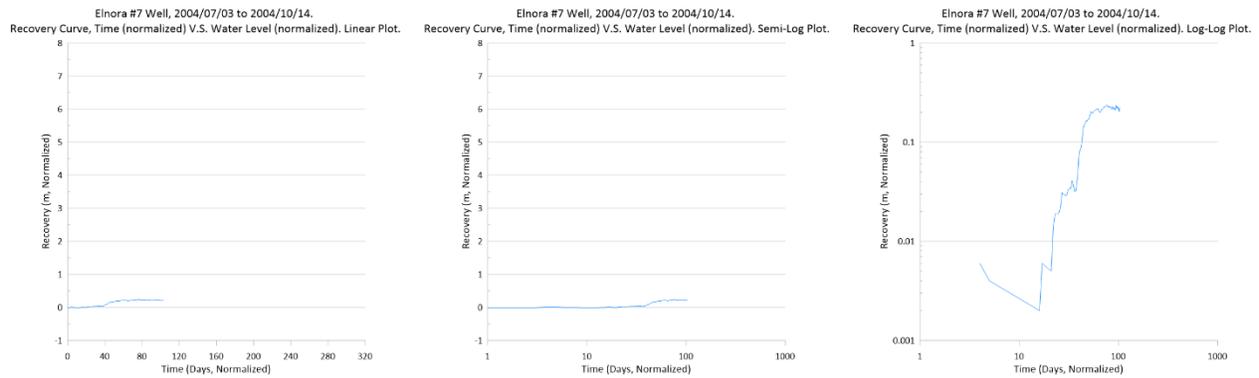


Figure 64: Recovery curve plots for Elnora #7_0127 well, 2004/07/03 to 2004/10/14. Paskapoo aquifer.

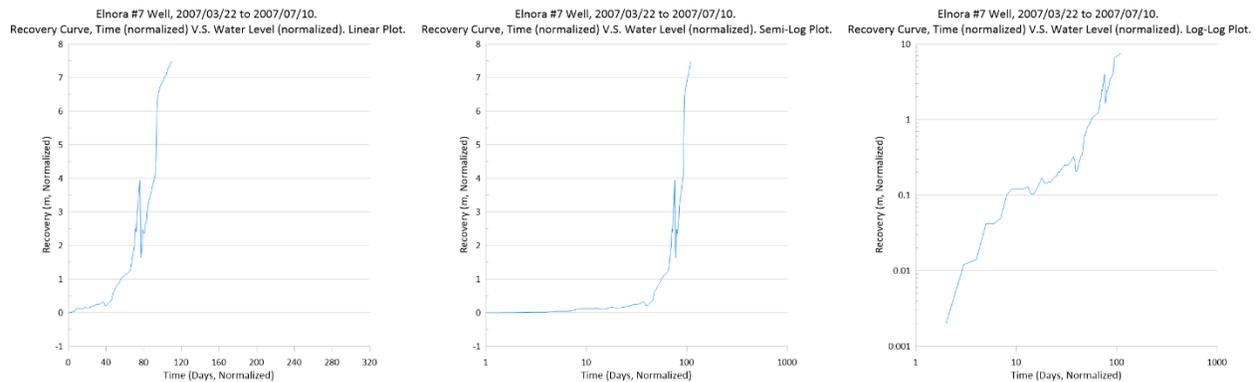


Figure 65: Recovery curve plots for Elnora #7_0127 well, 2007/03/22 to 2007/07/10. Paskapoo aquifer.

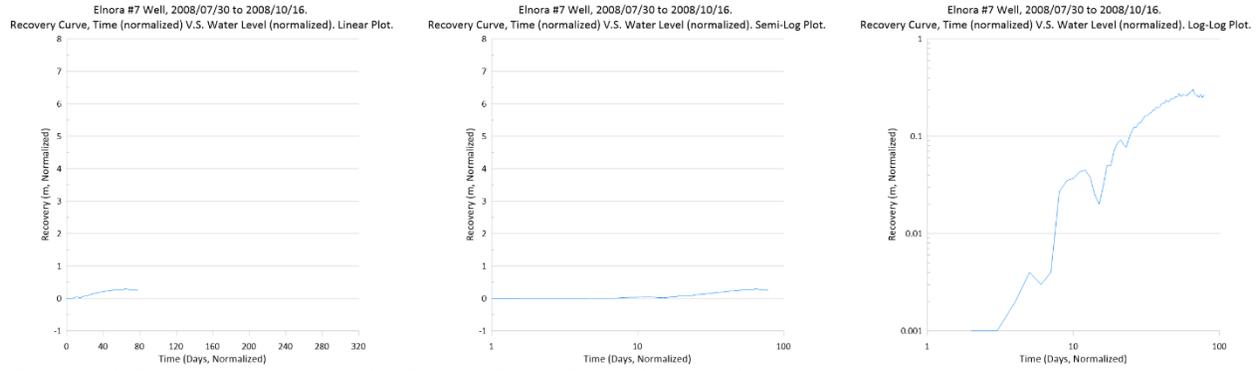


Figure 66: Recovery curve plots for Elnora #7_0127 well, 2008/07/30 to 2008/10/16. Paskapoo aquifer.

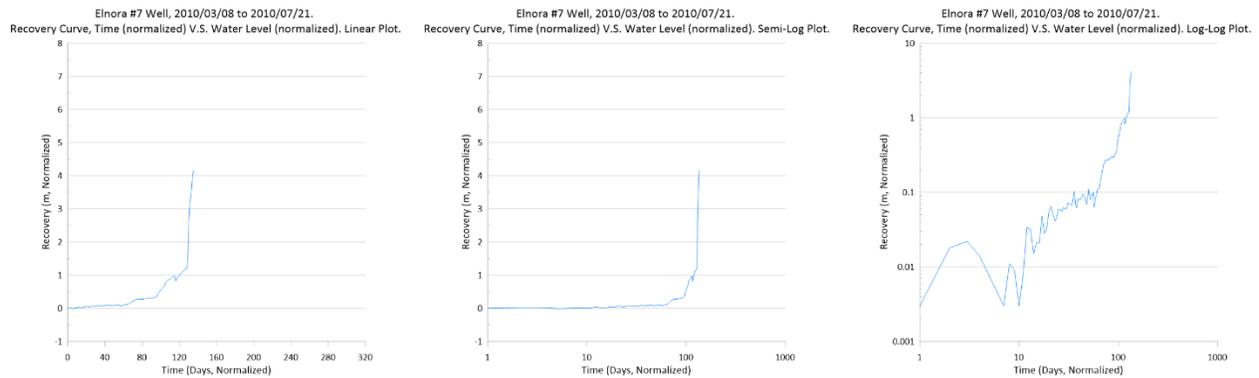


Figure 67: Recovery curve plots for Elnora #7_0127 well, 2010/03/08 to 2010/07/21. Paskapoo aquifer.

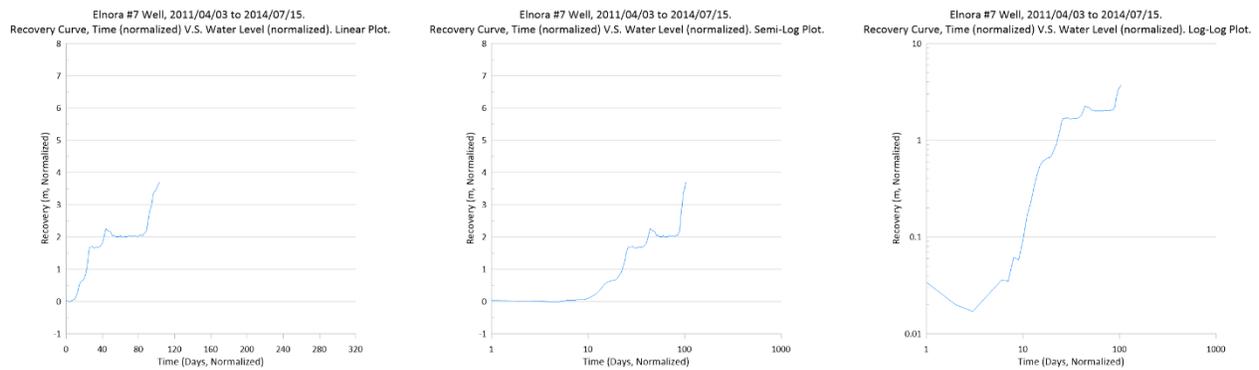


Figure 68: Recovery curve plots for Elnora #7_0127 well, 2011/04/03 to 2014/07/15. Paskapoo aquifer.

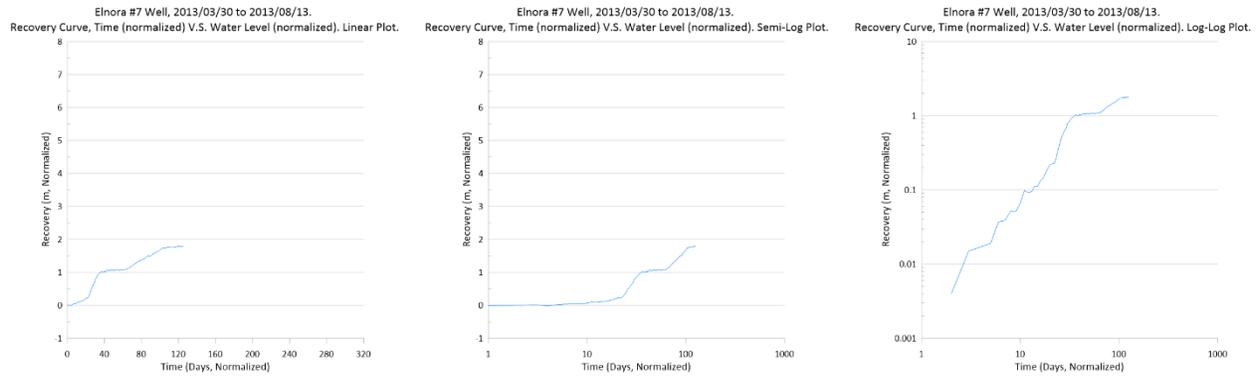


Figure 69: Recovery curve plots for Elnora #7_0127 well, 2013/03/30 to 2013/08/13. Paskapoo aquifer.

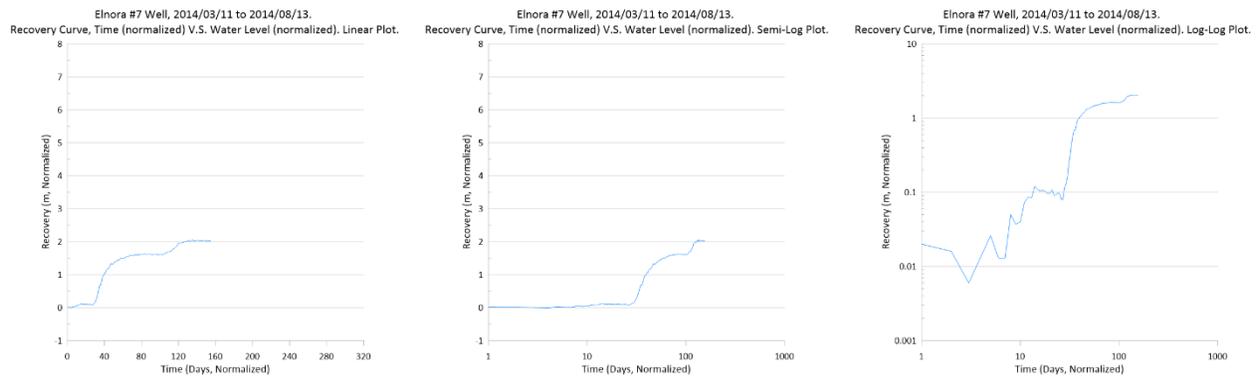


Figure 70: Recovery curve plots for Elnora #7_0127 well, 2014/03/11 to 2014/08/13. Paskapoo aquifer.

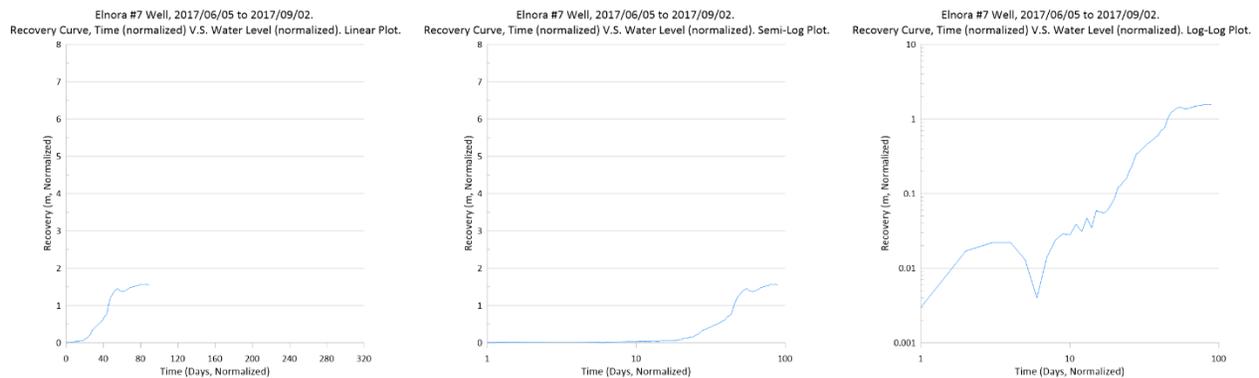


Figure 71: Recovery curve plots for Elnora #7_0127 well, 2017/06/05 to 2017/09/02. Paskapoo aquifer.

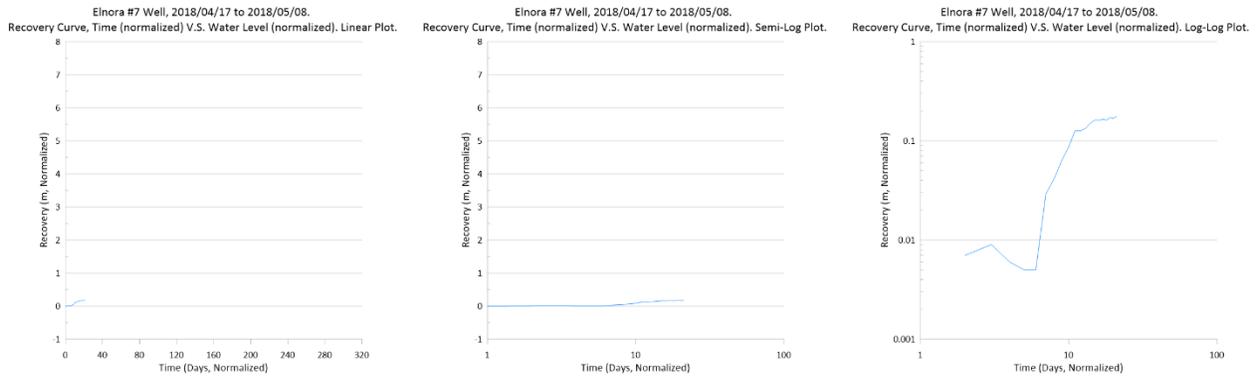


Figure 72: Recovery curve plots for Elnora #7_0127 well, 2018/04/08 to 2018/05/08. Paskapoo aquifer.

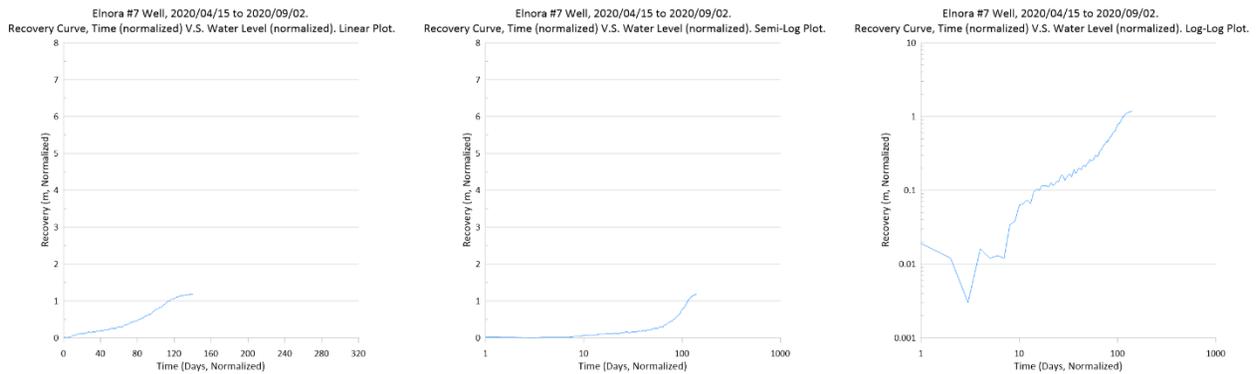


Figure 73: Recovery curve plots for Elnora #7_0127 well, 2020/04/15 to 2020/09/02. Paskapoo aquifer.

Appendix D6: GOWN Monitoring Well Recovery Curve Plots for Irricana 2376E_0217 Well

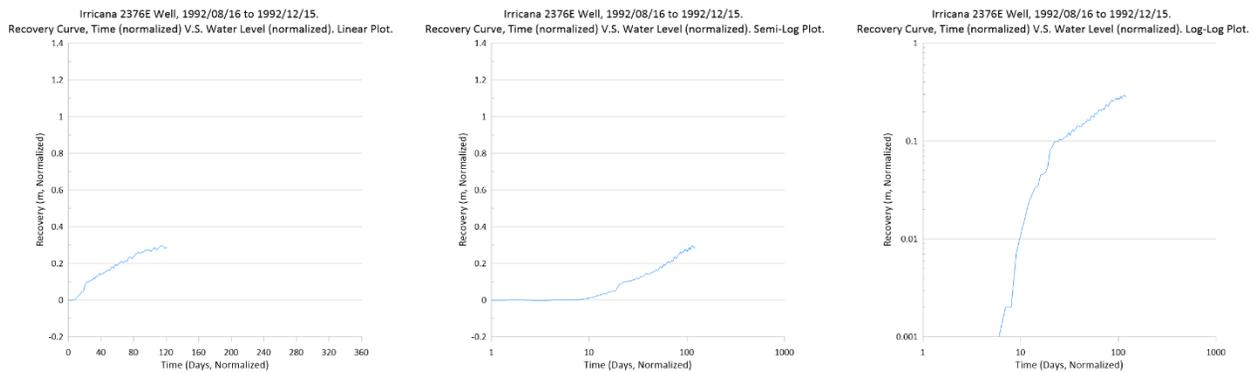


Figure 74: Recovery curve plots for Irricana 2376E_0217 well, 1992/08/16 to 1992/12/15. Paskapoo aquifer.

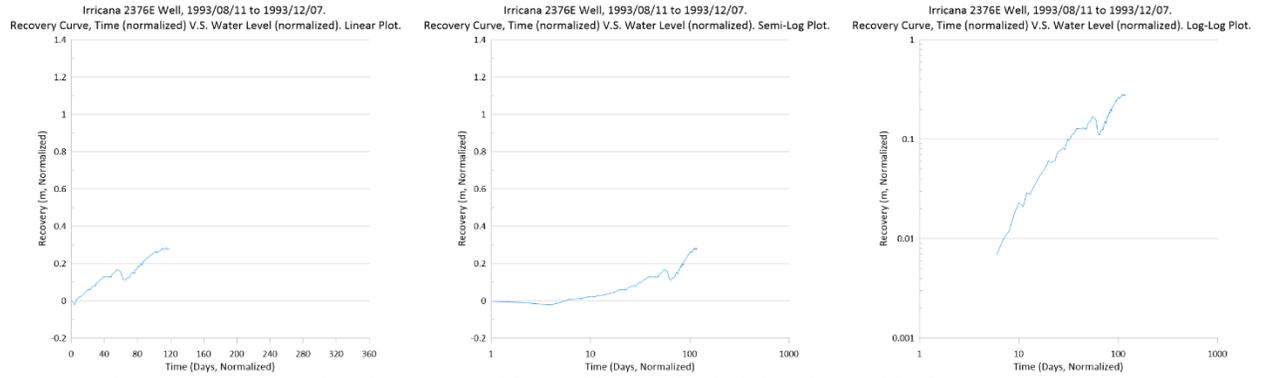


Figure 75: Recovery curve plots for Irricana 2376E_0217 well, 1993/08/11 to 1993/12/07. Paskapoo aquifer.

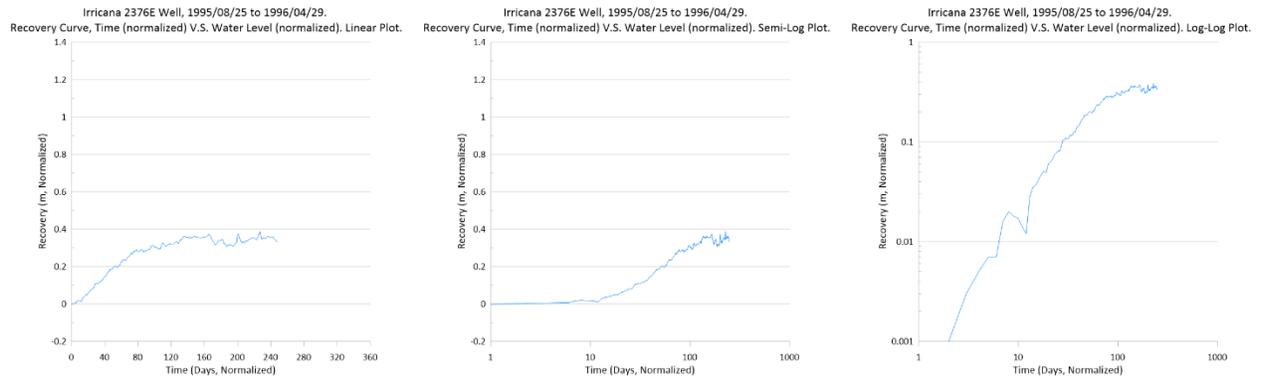


Figure 76: Recovery curve plots for Irricana 2376E_0217 well, 1995/08/25 to 1996/04/29. Paskapoo aquifer.

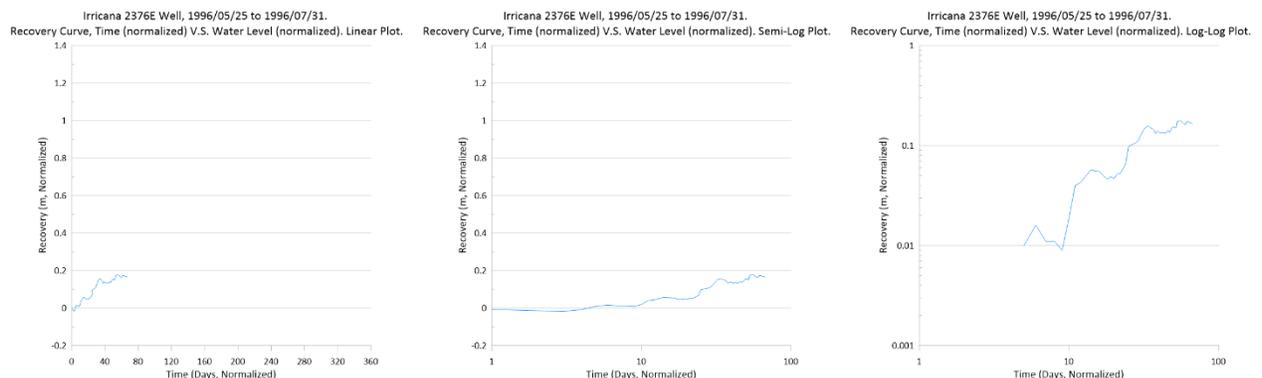


Figure 77: Recovery curve plots for Irricana 2376E_0217 well, 1996/05/25 to 1996/07/31. Paskapoo aquifer.

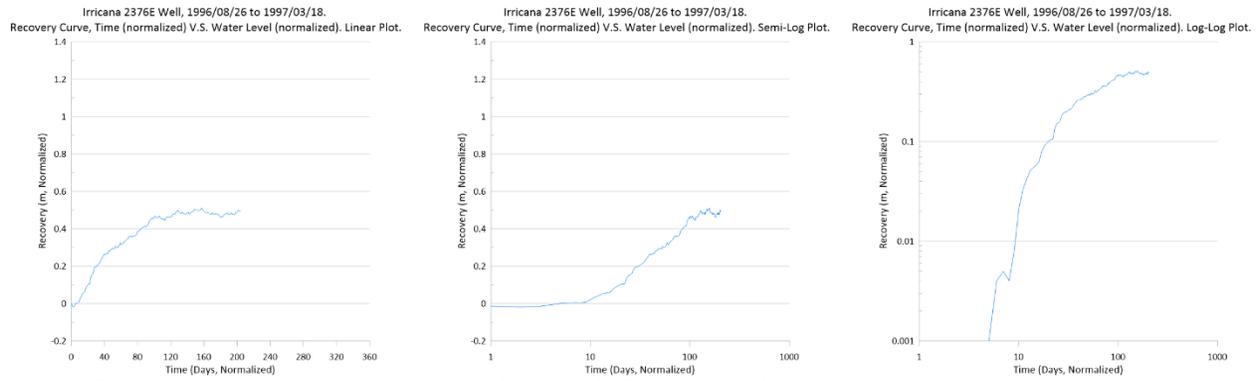


Figure 78: Recovery curve plots for Irricana 2376E_0217 well, 1996/08/26 to 1997/03/18. Paskapoo aquifer.

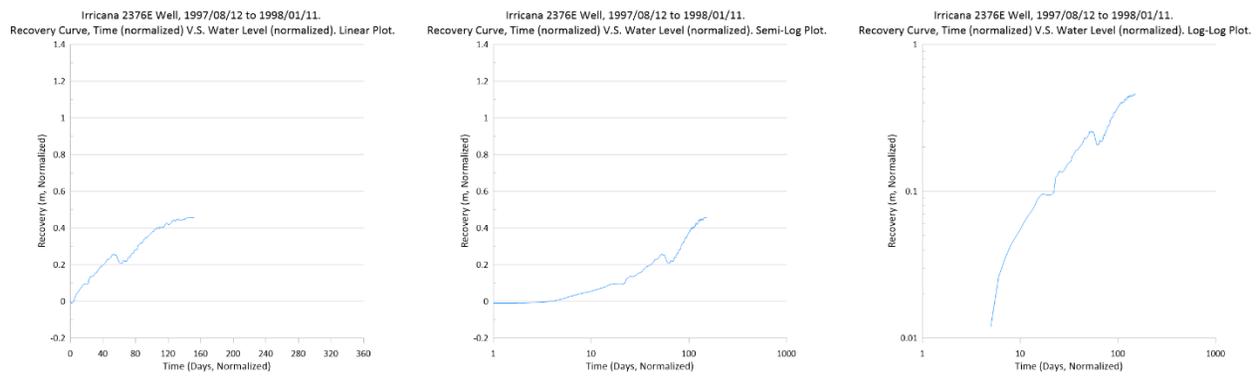


Figure 79: Recovery curve plots for Irricana 2376E_0217 well, 1997/08/12 to 1998/01/11. Paskapoo aquifer.

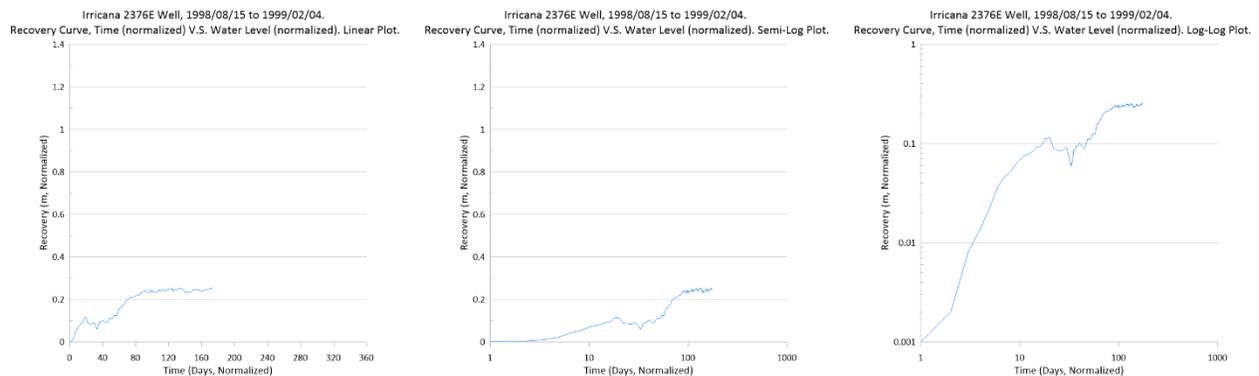


Figure 80: Recovery curve plots for Irricana 2376E_0217 well, 1998/08/15 to 1999/02/04. Paskapoo aquifer.

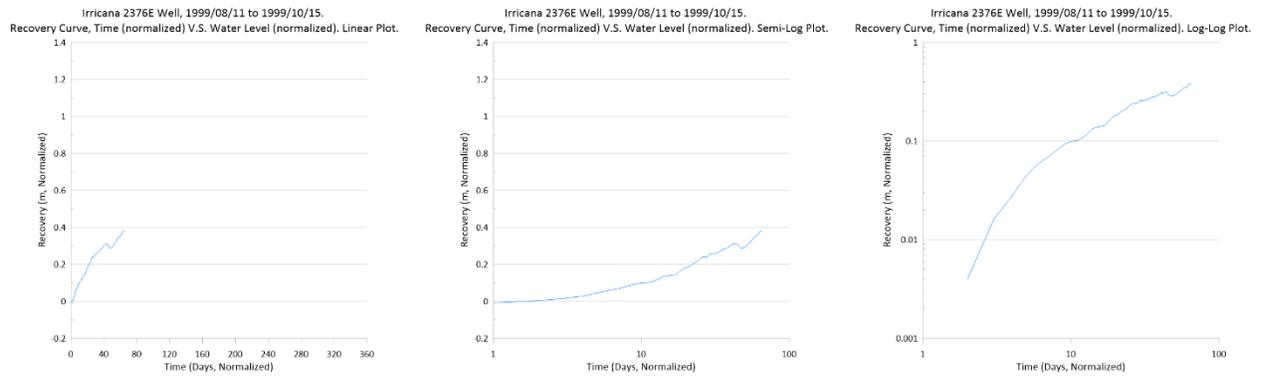


Figure 81: Recovery curve plots for Irricana 2376E_0217 well, 1999/08/11 to 1999/10/15. Paskapoo aquifer.

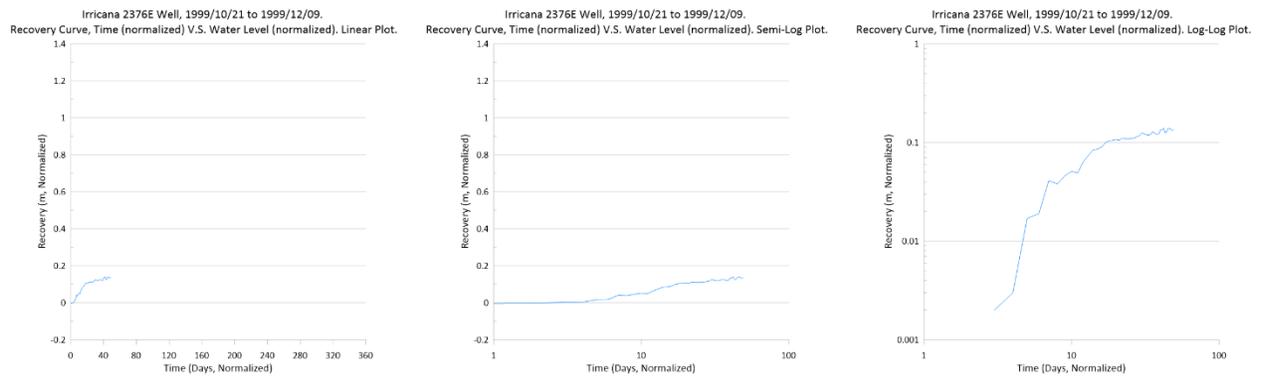


Figure 82: Recovery curve plots for Irricana 2376E_0217 well, 1999/10/21 to 1999/12/09. Paskapoo aquifer.

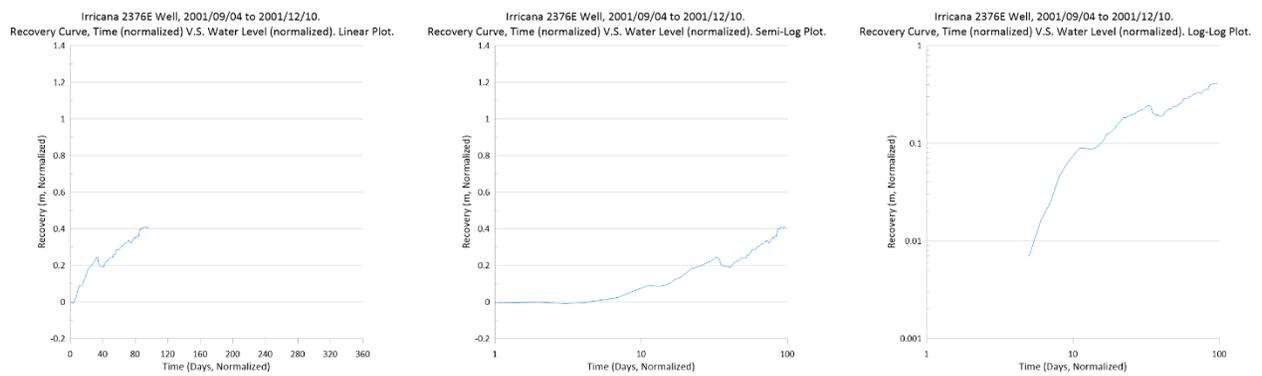


Figure 83: Recovery curve plots for Irricana 2376E_0217 well, 2001/09/04 to 2001/12/10. Paskapoo aquifer.

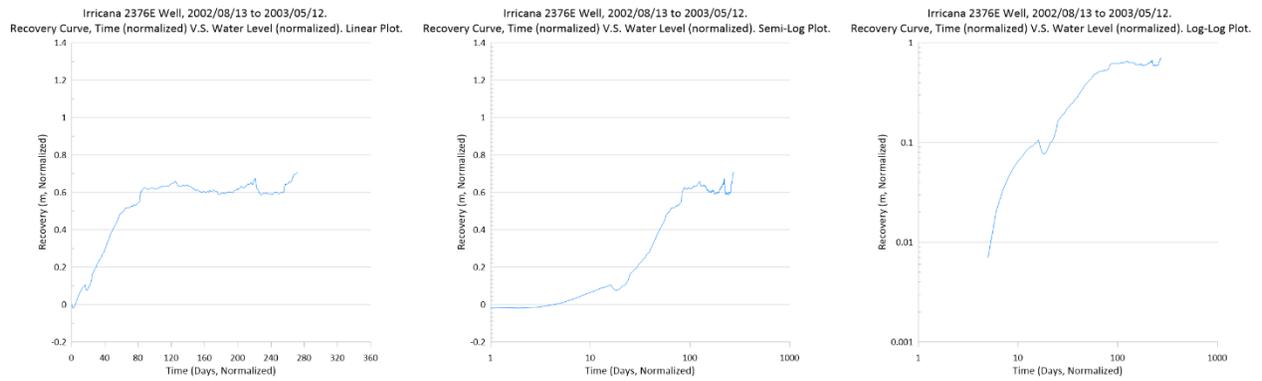


Figure 84: Recovery curve plots for Irricana 2376E_0217 well, 2002/08/13 to 2003/05/12. Paskapoo aquifer.

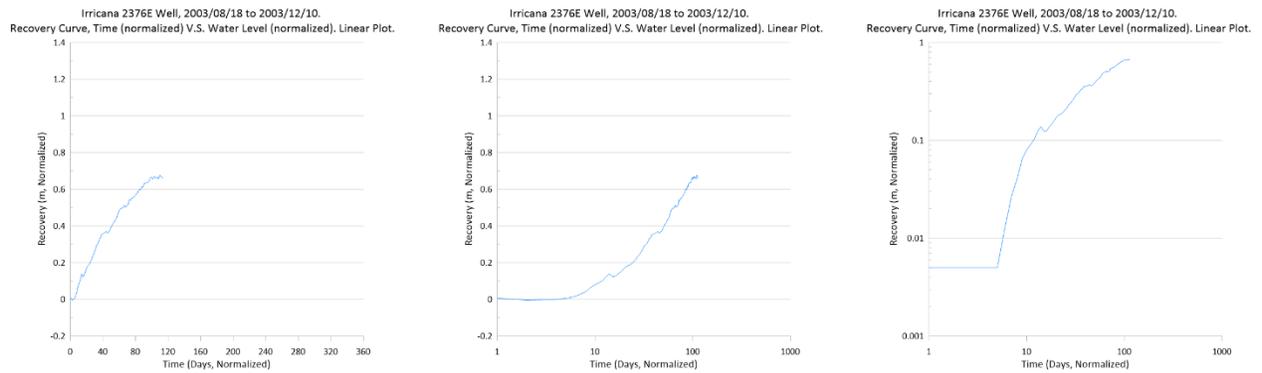


Figure 85: Recovery curve plots for Irricana 2376E_0217 well, 2003/08/18 to 2003/12/10. Paskapoo aquifer.

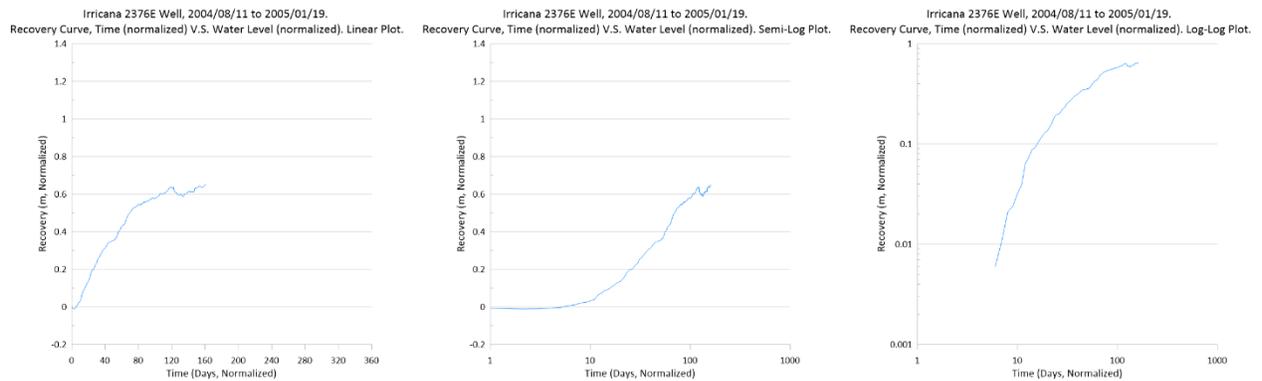


Figure 86: Recovery curve plots for Irricana 2376E_0217 well, 2004/08/11 to 2005/01/19. Paskapoo aquifer.

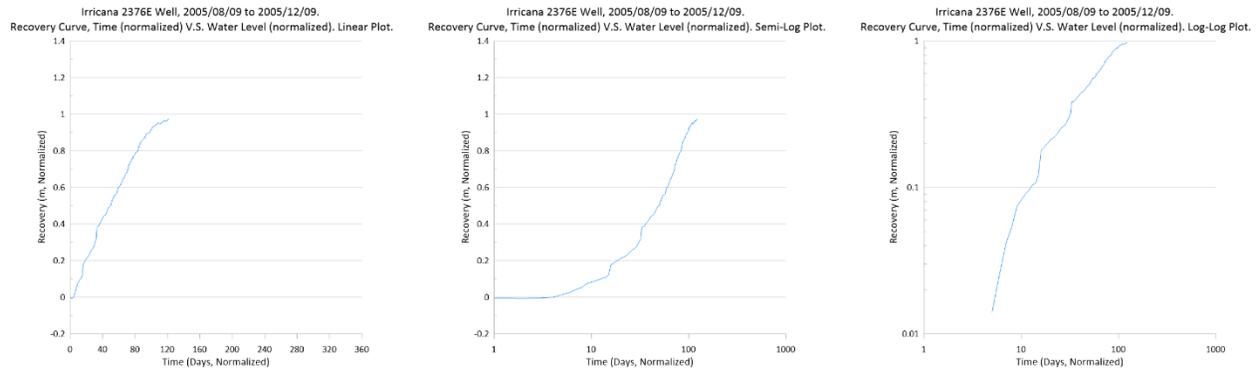


Figure 87: Recovery curve plots for Irricana 2376E_0217 well, 2005/08/09 to 2005/12/09. Paskapoo aquifer.

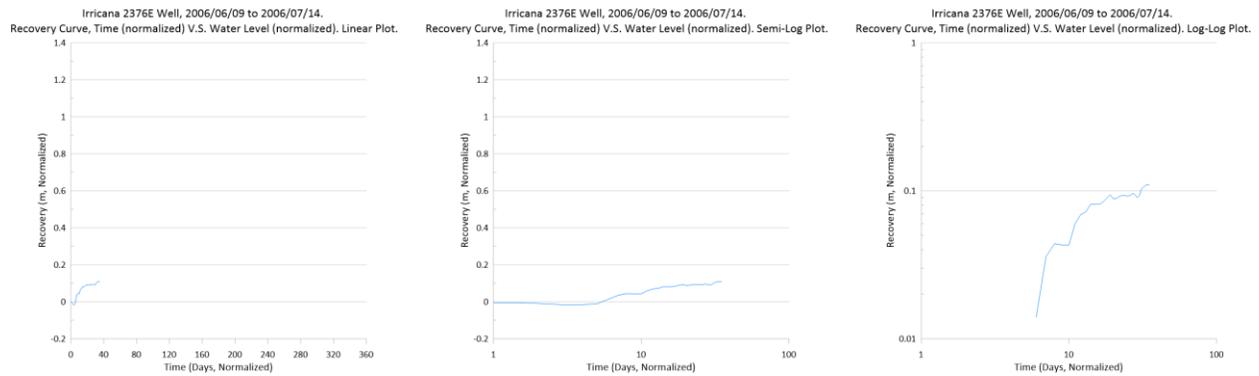


Figure 88: Recovery curve plots for Irricana 2376E_0217 well, 2006/06/09 to 2006/07/14. Paskapoo aquifer.

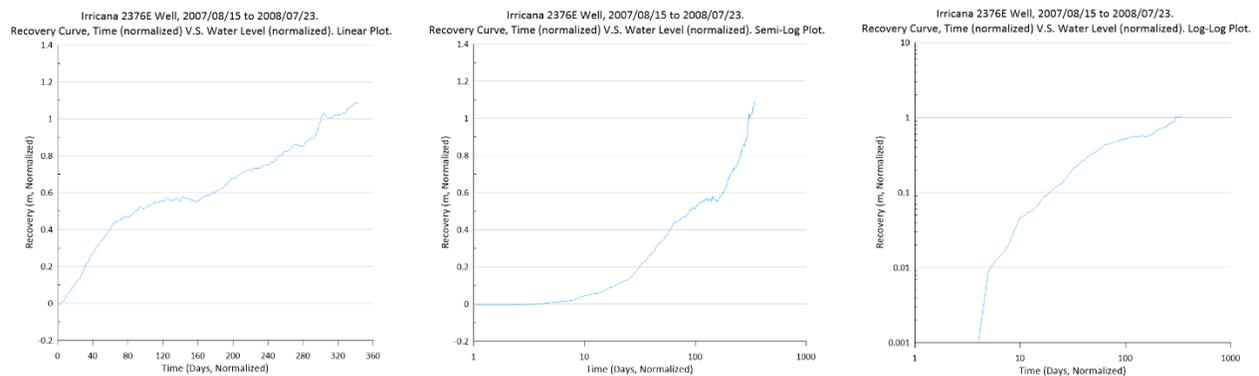


Figure 89: Recovery curve plots for Irricana 2376E_0217 well, 2007/08/15 to 2008/07/23. Paskapoo aquifer.

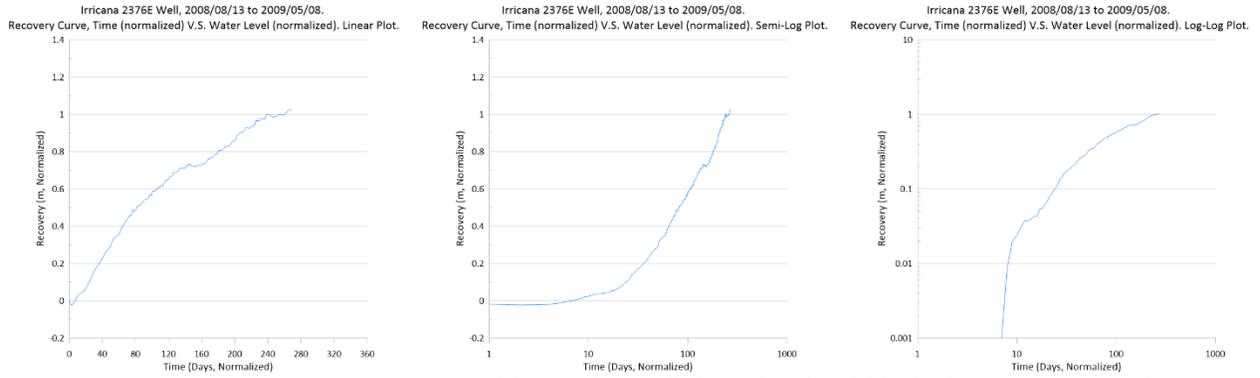


Figure 90: Recovery curve plots for Irricana 2376E_0217 well, 2008/08/13 to 2009/05/08. Paskapoo aquifer.

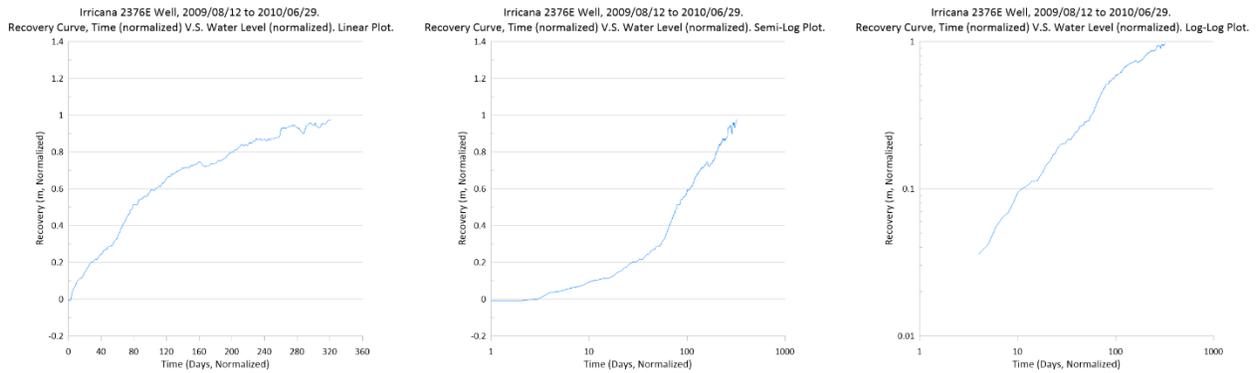


Figure 91: Recovery curve plots for Irricana 2376E_0217 well, 2009/08/12 to 2010/06/29. Paskapoo aquifer.

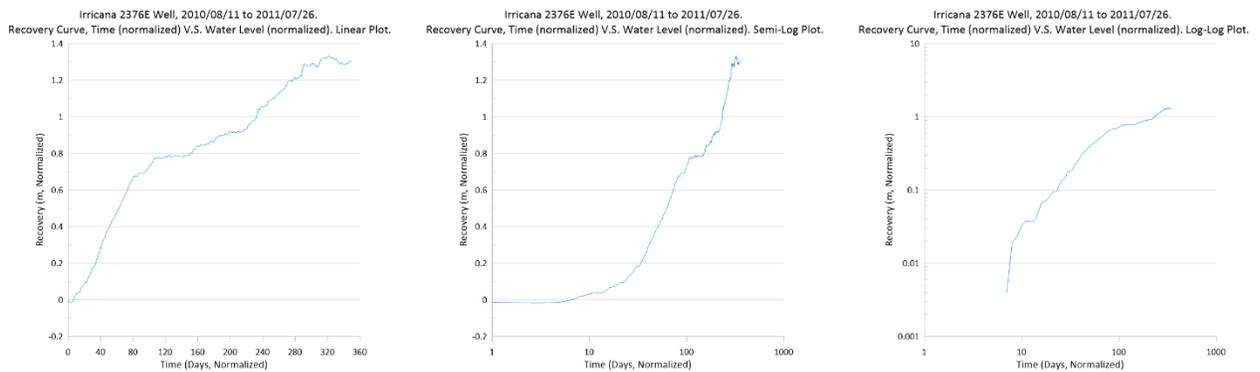


Figure 92: Recovery curve plots for Irricana 2376E_0217 well, 2010/08/11 to 2011/07/26. Paskapoo aquifer.

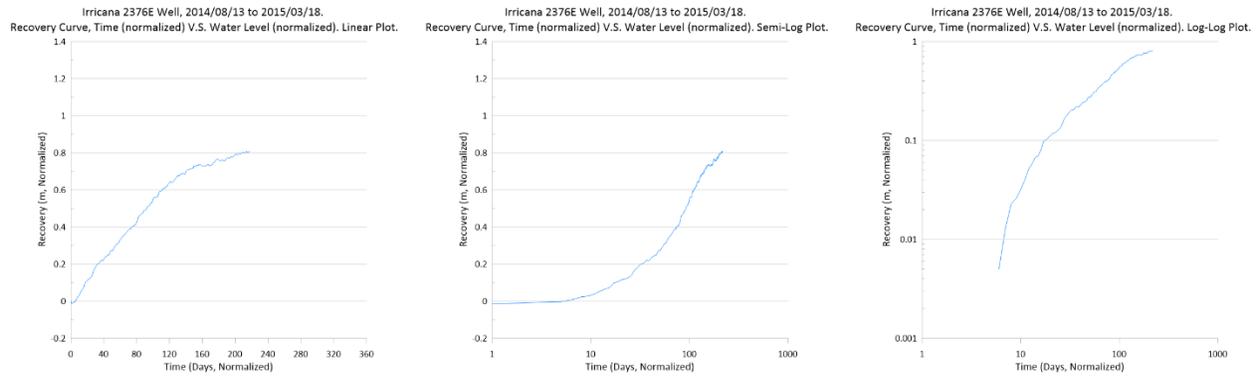


Figure 93: Recovery curve plots for Irricana 2376E_0217 well, 2014/08/13 to 2015/03/18. Paskapoo aquifer.

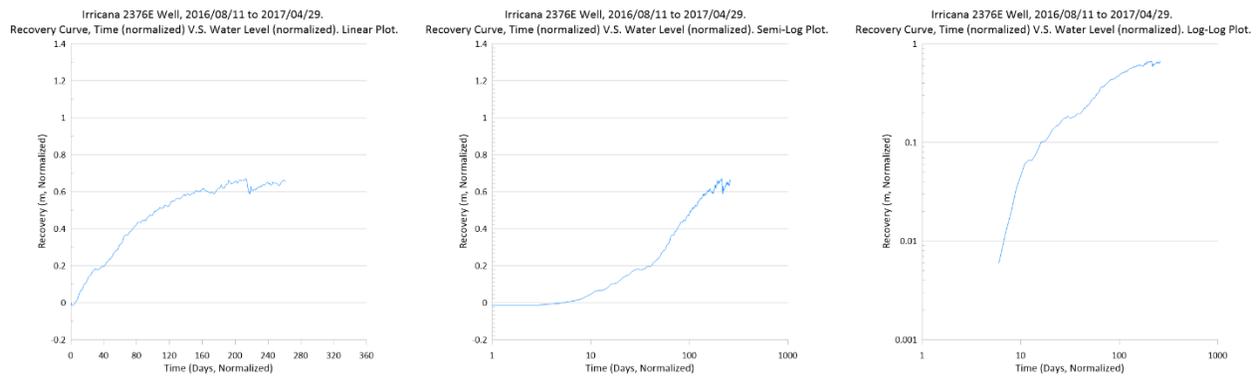


Figure 94: Recovery curve plots for Irricana 2376E_0217 well, 2016/08/11 to 2017/04/29. Paskapoo aquifer.

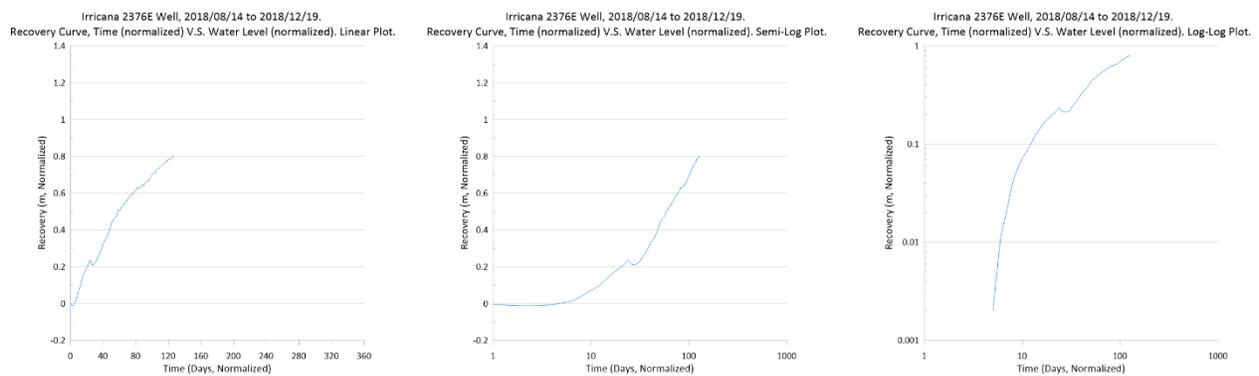


Figure 95: Recovery curve plots for Irricana 2376E_0217 well, 2018/08/14 to 2018/12/19. Paskapoo aquifer.

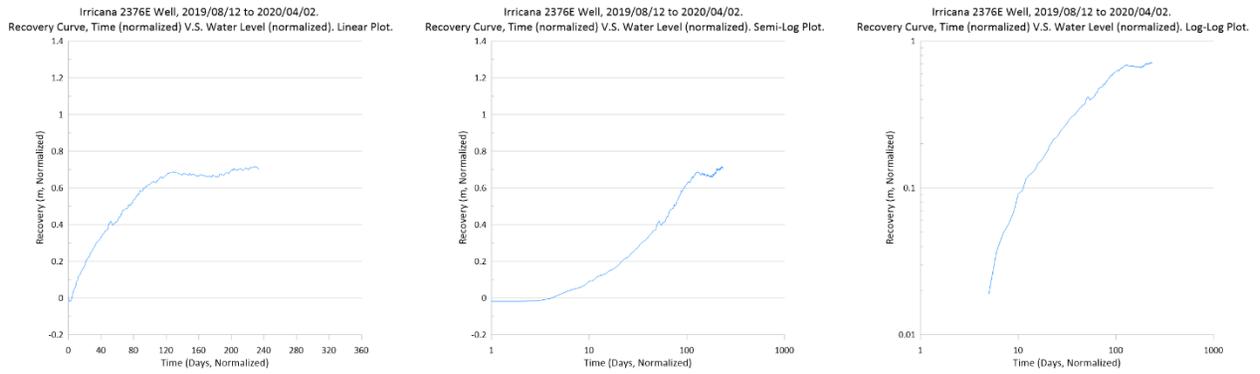


Figure 96: Recovery curve plots for Irricana 2376E_0217 well, 2019/08/12 to 2020/04/02. Paskapoo aquifer.

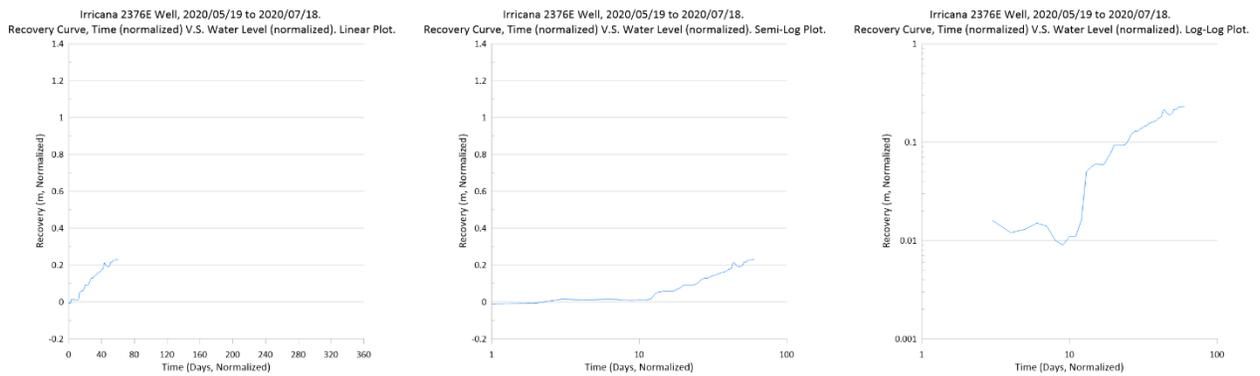


Figure 97: Recovery curve plots for Irricana 2376E_0217 well, 2020/05/19 to 2020/07/18. Paskapoo aquifer.

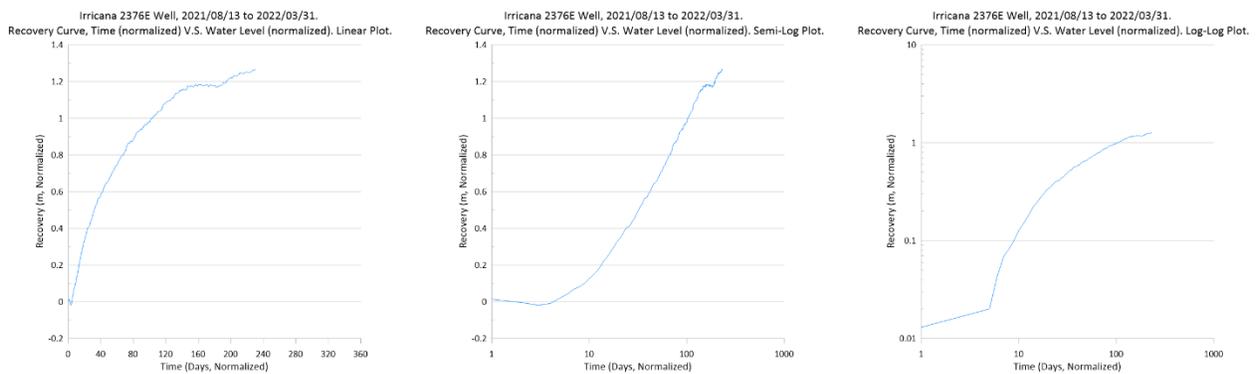


Figure 98: Recovery curve plots for Irricana 2376E_0217 well, 2021/08/13 to 2022/03/31. Paskapoo aquifer.

Appendix D7: GOWN Monitoring Well Recovery Curve Plots for Okotoks Land Fill 2378E_0217 Well

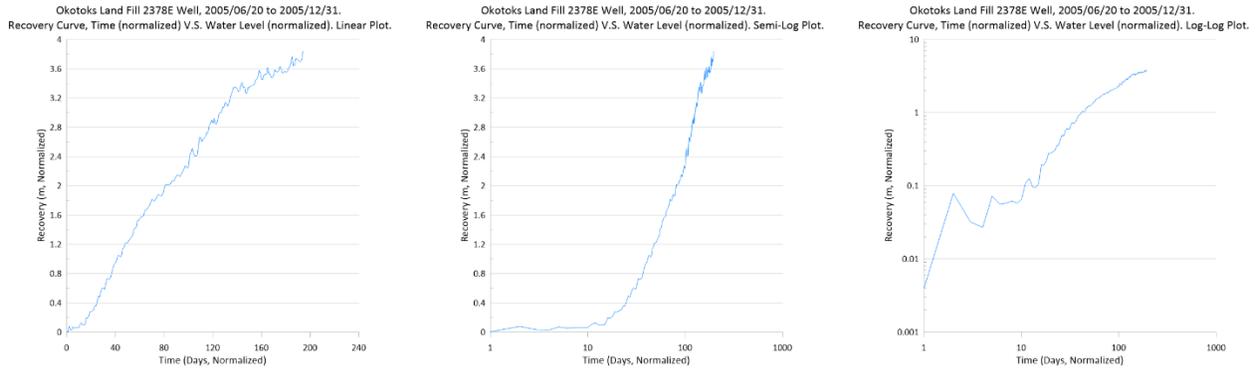


Figure 99: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2005/06/20 to 2005/12/31. Paskapoo aquifer.

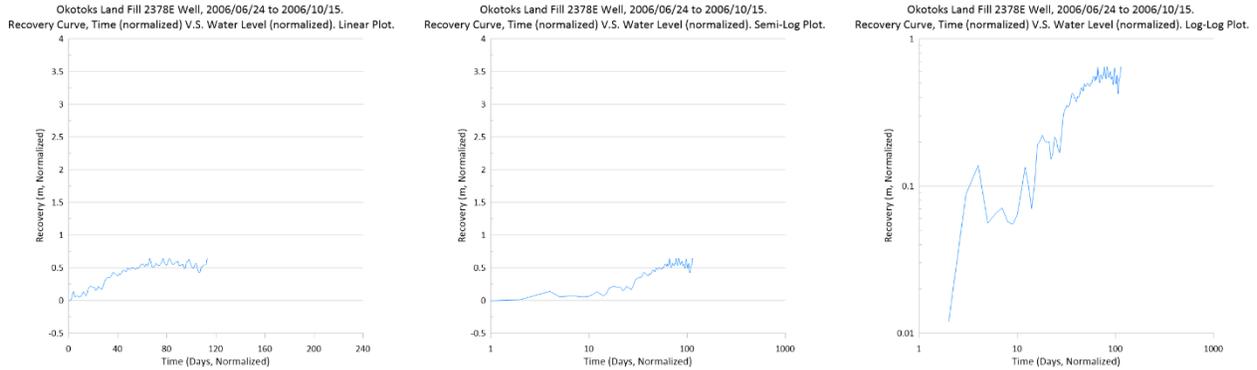


Figure 100: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2006/06/24 to 2006/10/15. Paskapoo aquifer.

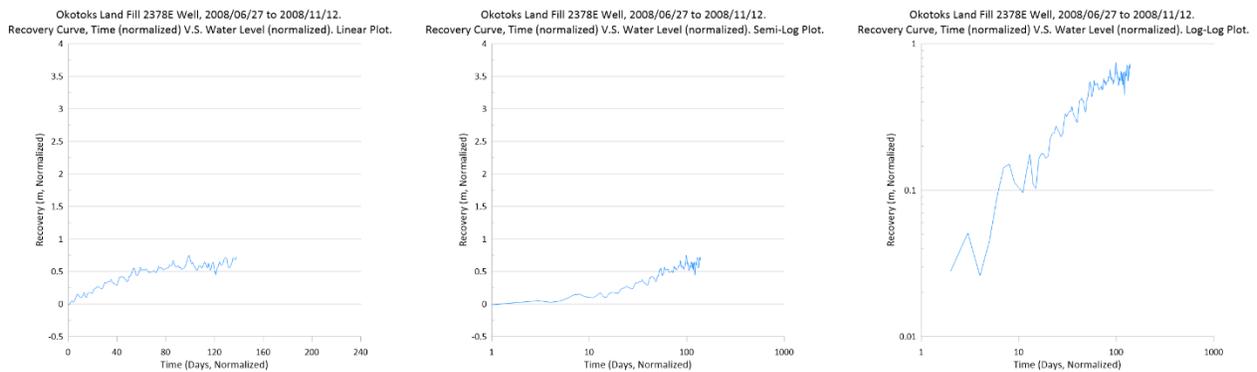


Figure 101: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2008/06/27 to 2008/11/12. Paskapoo aquifer.

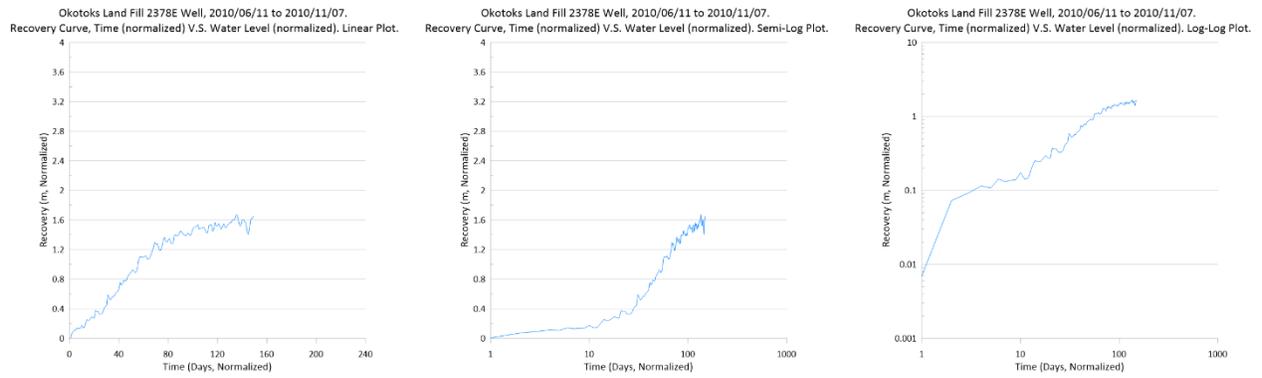


Figure 102: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2010/06/11 to 2010/11/07. Paskapoo aquifer.

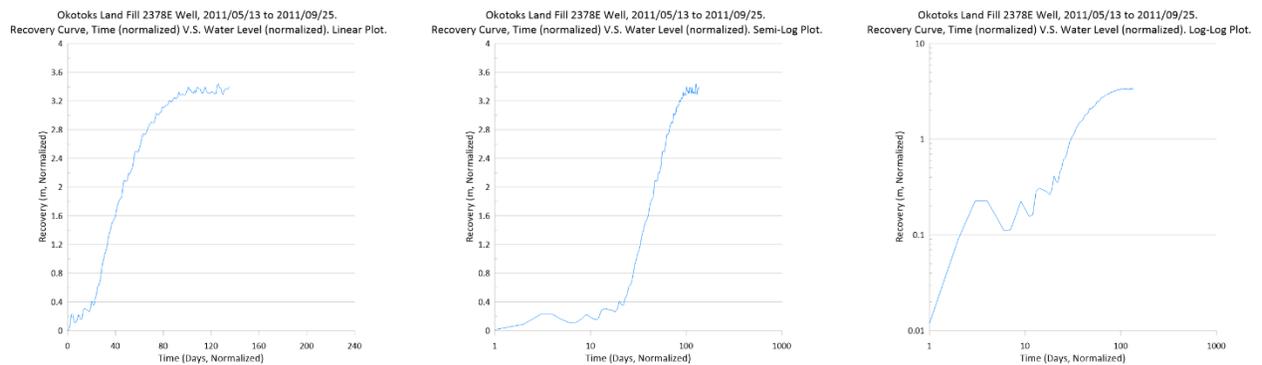


Figure 103: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2011/05/13 to 2011/09/25. Paskapoo aquifer.

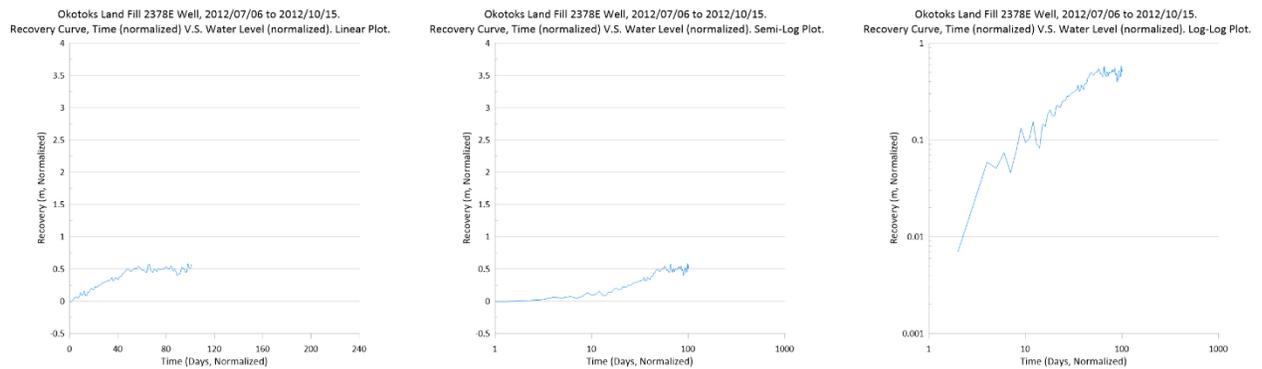


Figure 104: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2012/07/15 to 2012/10/15. Paskapoo aquifer.

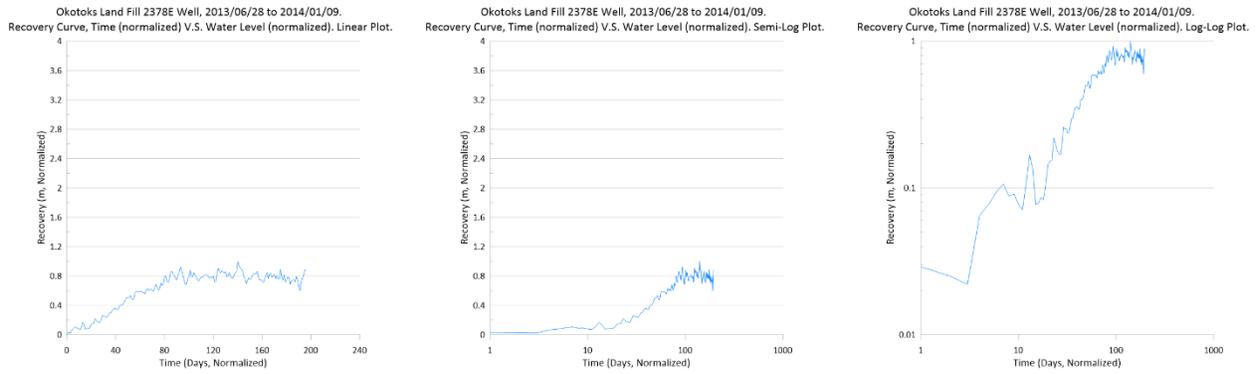


Figure 105: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2013/06/28 to 2014/01/09. Paskapoo aquifer.

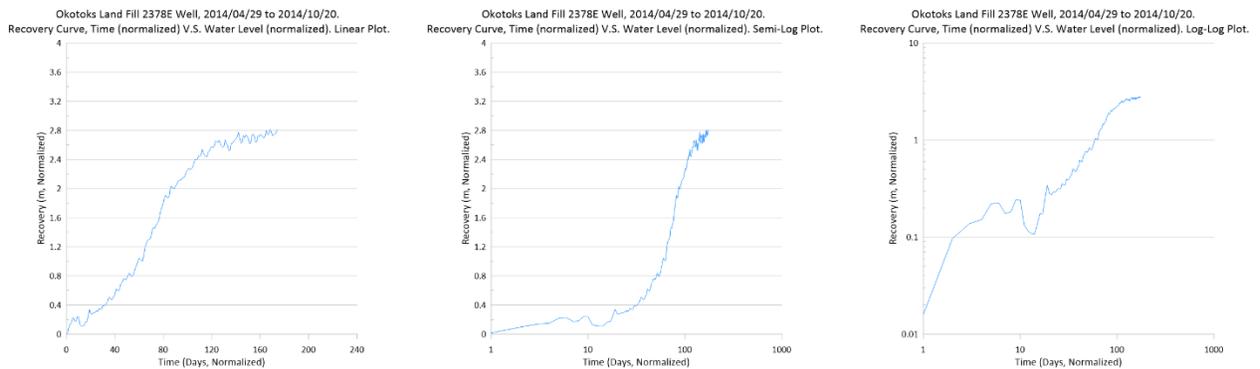


Figure 106: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2014/04/29 to 2014/10/20. Paskapoo aquifer.

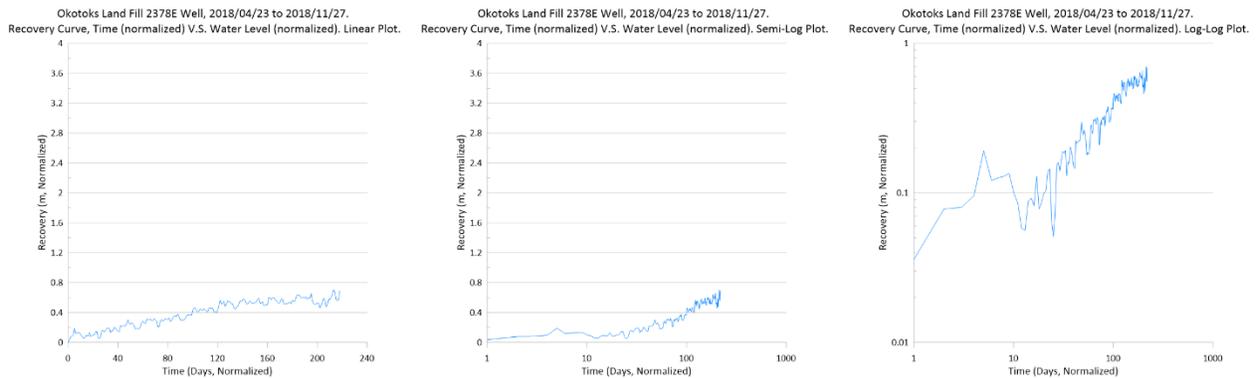


Figure 107: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2018/04/23 to 2018/11/27. Paskapoo aquifer.

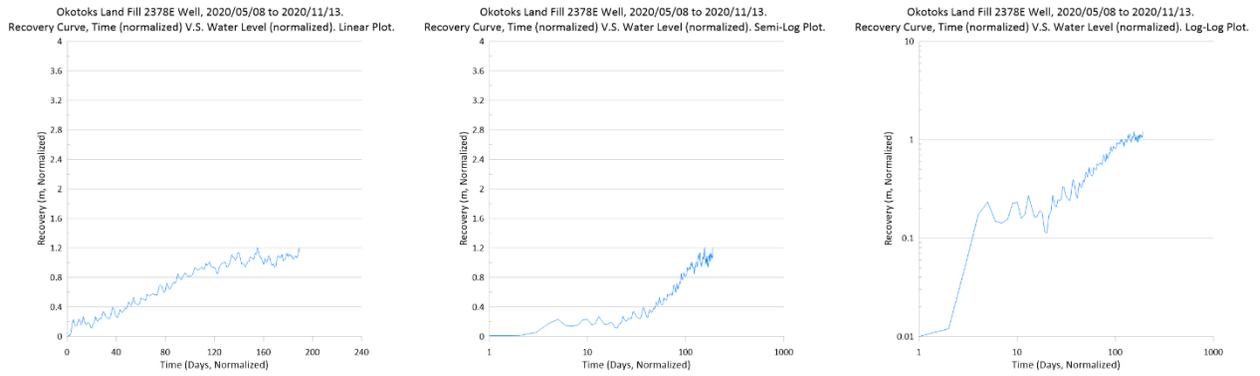


Figure 108: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2020/05/08 to 2020/11/13. Paskapoo aquifer.

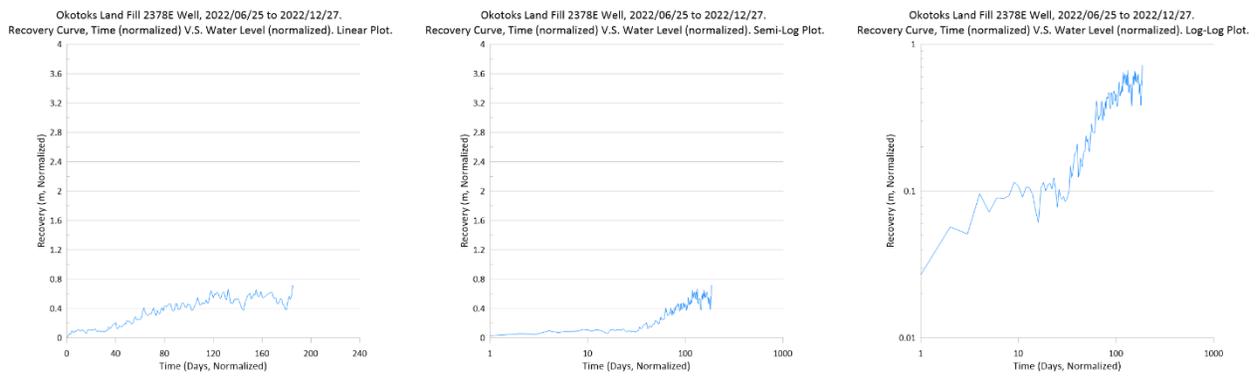


Figure 109: Recovery curve plots for Okotoks Land Fill 2378E_0217 well, 2022/06/25 to 2022/12/27. Paskapoo aquifer.

Appendix D8: GOWN Monitoring Well Recovery Curve Plots for Paddle River 81-1-A_0345 Well

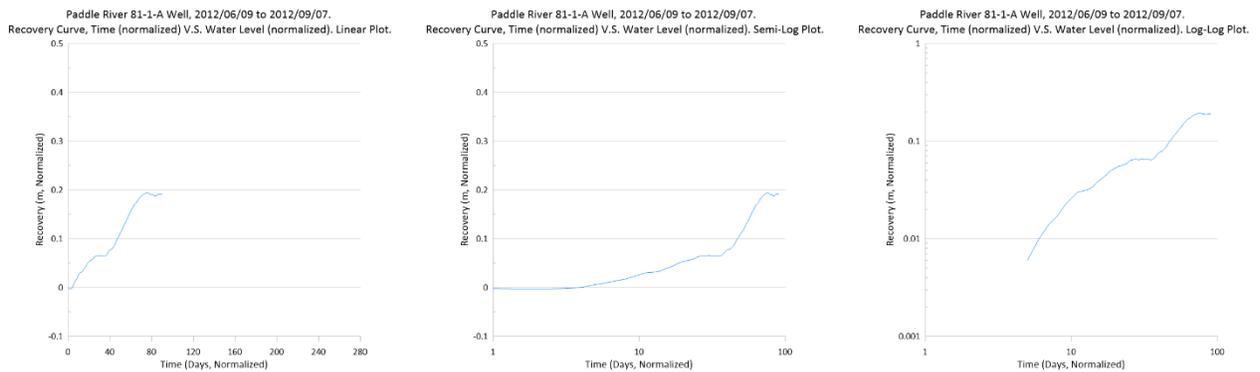


Figure 110: Recovery curve plots for Paddle River 81-1-A_0345 well, 2012/06/09 to 2012/09/07. Paskapoo aquifer.

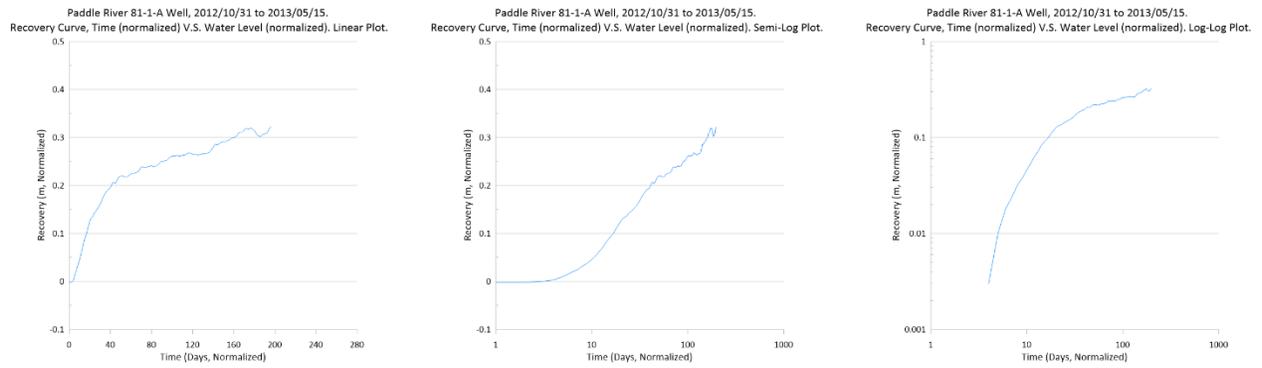


Figure 111: Recovery curve plots for Paddle River 81-1-A_0345 well, 2012/10/31 to 2013/05/15. Paskapoo aquifer.

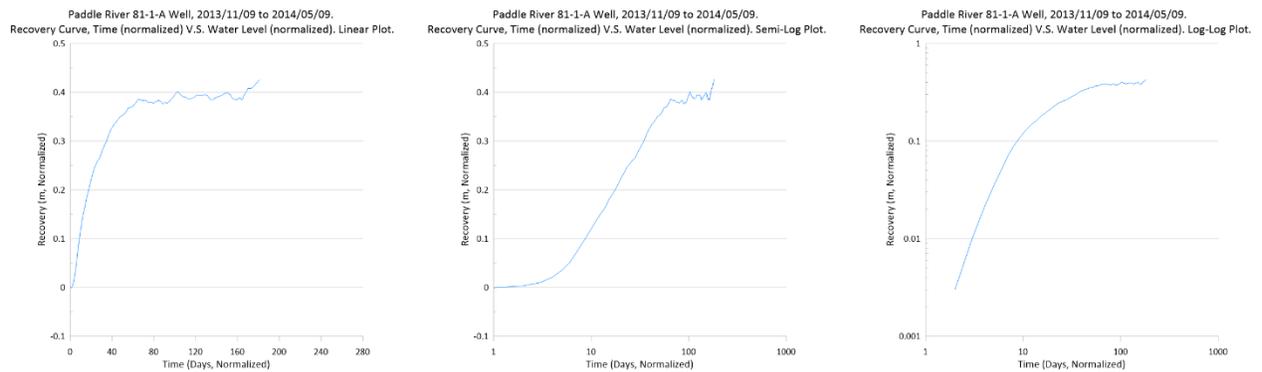


Figure 112: Recovery curve plots for Paddle River 81-1-A_0345 well, 2013/11/09 to 2014/05/09. Paskapoo aquifer.

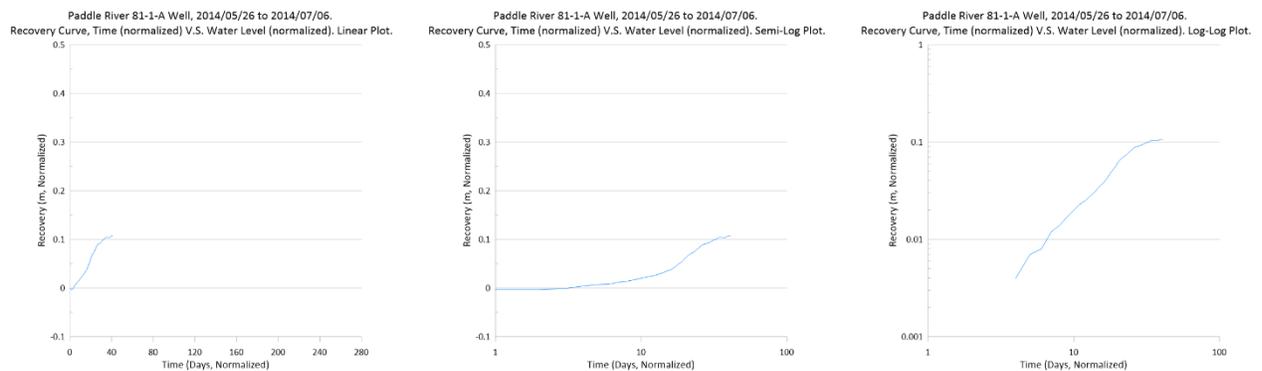


Figure 113: Recovery curve plots for Paddle River 81-1-A_0345 well, 2014/05/26 to 2014/07/06. Paskapoo aquifer.

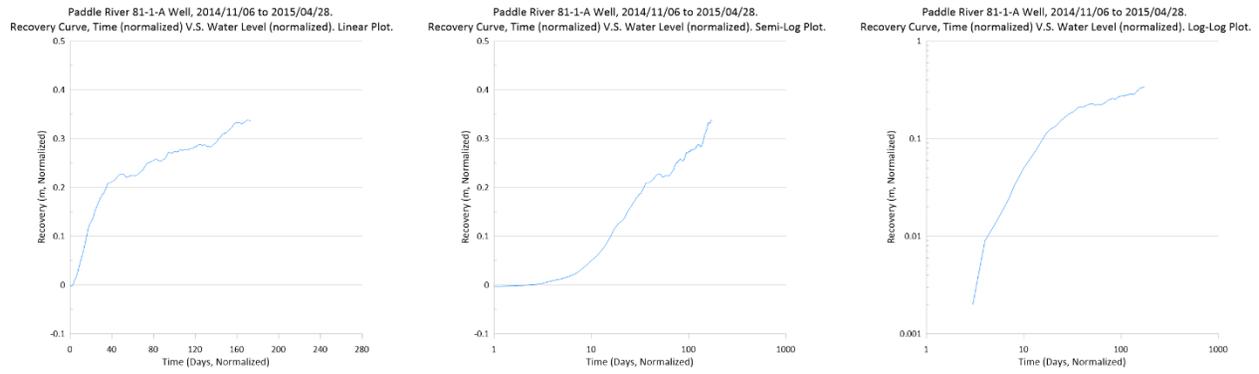


Figure 114: Recovery curve plots for Paddle River 81-1-A_0345 well, 2014/11/06 to 2015/04/28. Paskapoo aquifer.

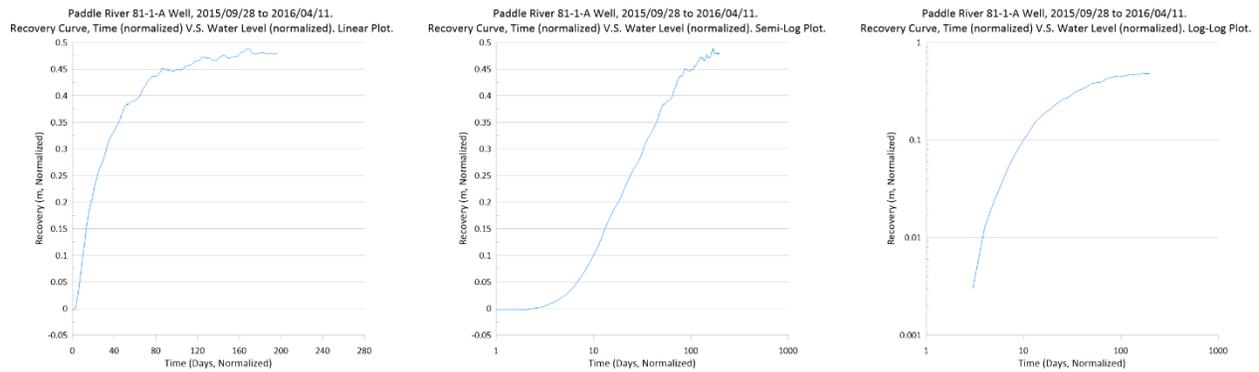


Figure 115: Recovery curve plots for Paddle River 81-1-A_0345 well, 2015/09/28 to 2016/04/11. Paskapoo aquifer.

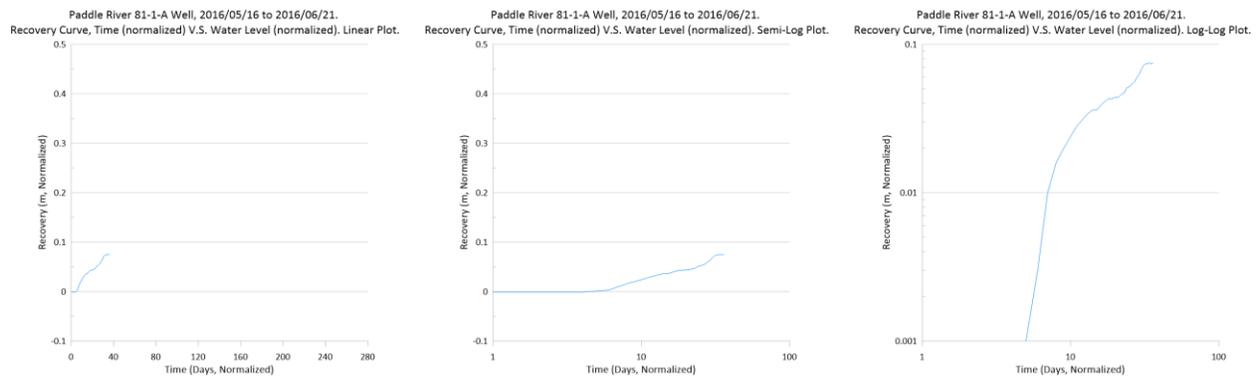


Figure 116: Recovery curve plots for Paddle River 81-1-A_0345 well, 2016/05/16 to 2016/06/21. Paskapoo aquifer.

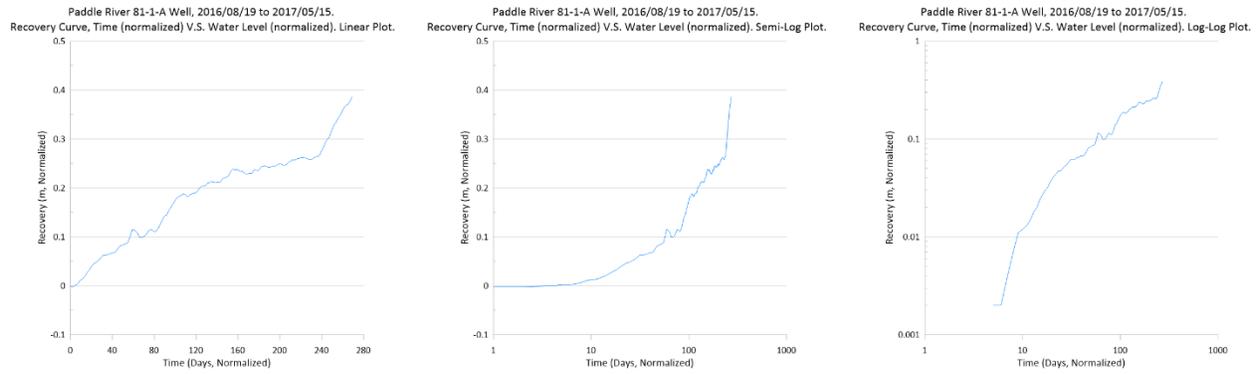


Figure 117: Recovery curve plots for Paddle River 81-1-A_0345 well, 2016/08/19 to 2017/05/15. Paskapoo aquifer.

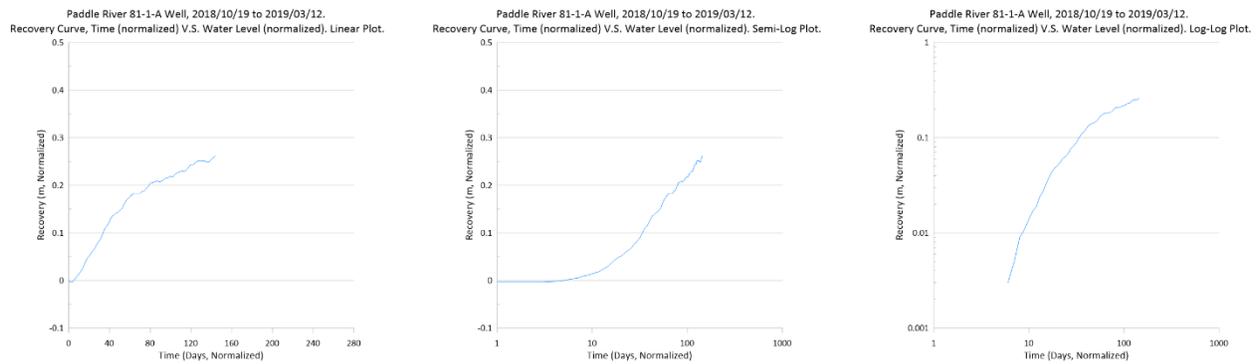


Figure 118: Recovery curve plots for Paddle River 81-1-A_0345 well, 2018/10/19 to 2019/03/12. Paskapoo aquifer.

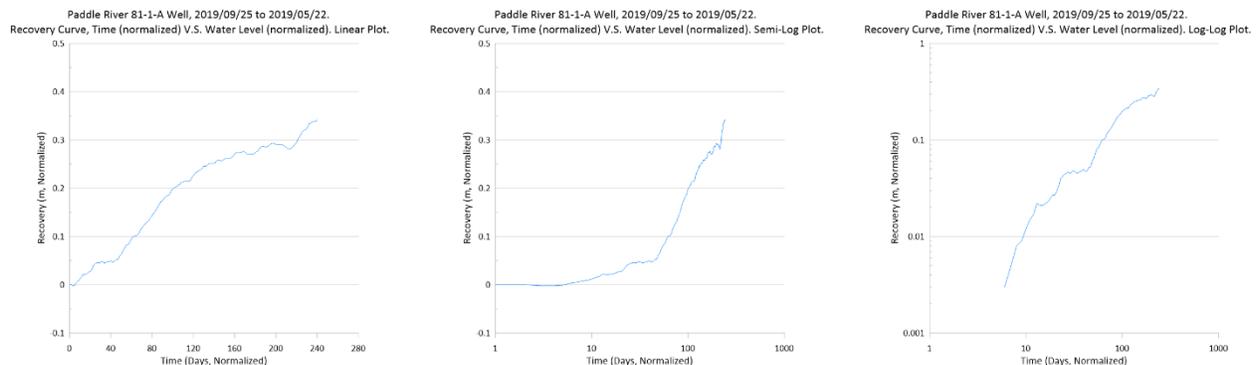


Figure 119: Recovery curve plots for Paddle River 81-1-A_0345 well, 2019/09/25 to 2020/05/22. Paskapoo aquifer.

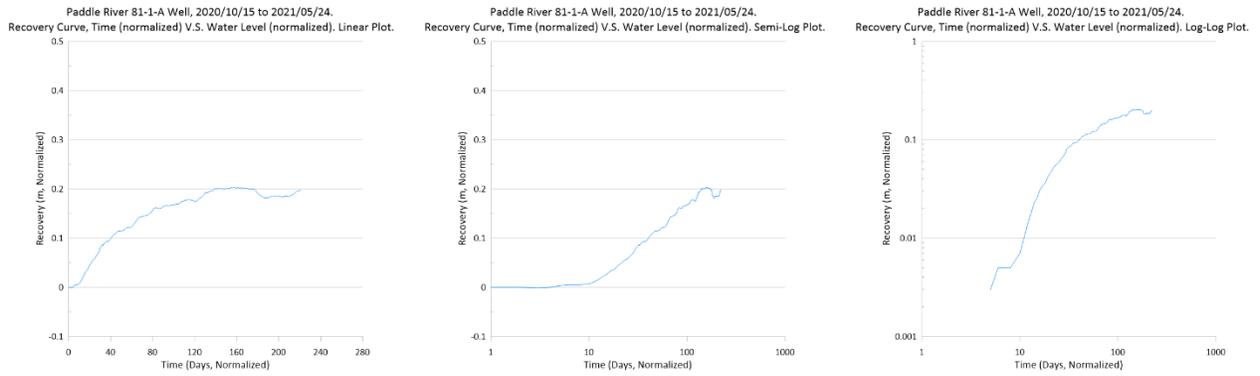


Figure 120: Recovery curve plots for Paddle River 81-1-A_0345 well, 2020/10/15 to 2021/05/24. Paskapoo aquifer.

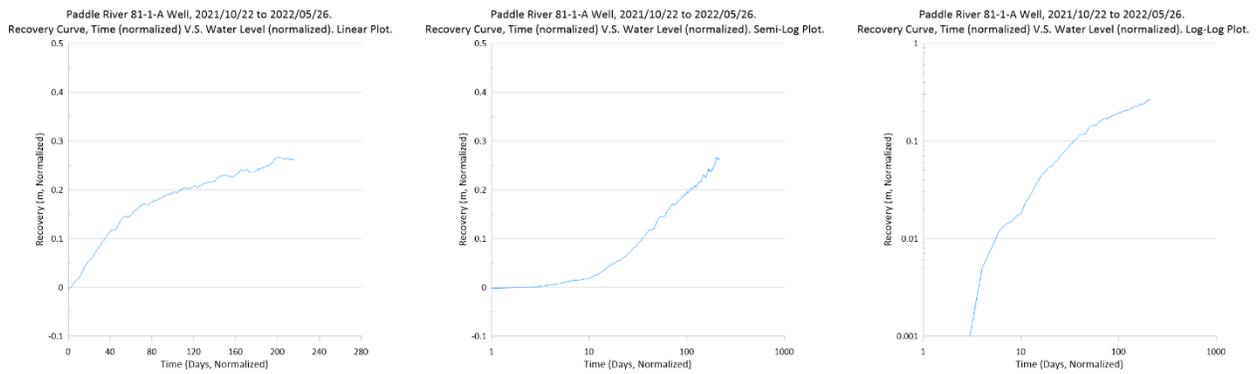


Figure 121: Recovery curve plots for Paddle River 81-1-A_0345 well, 2021/10/22 to 2022/05/26. Paskapoo aquifer.

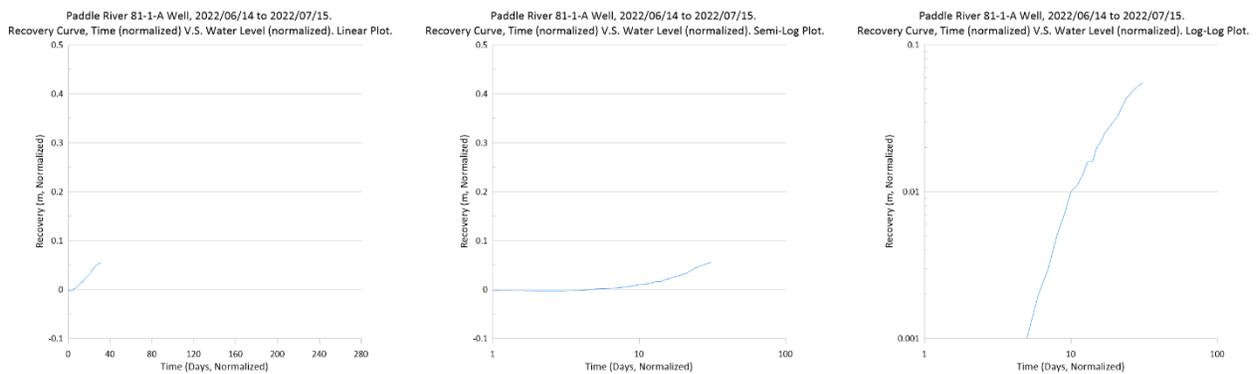


Figure 122: Recovery curve plots for Paddle River 81-1-A_0345 well, 2022/06/14 to 2022/07/15. Paskapoo aquifer.

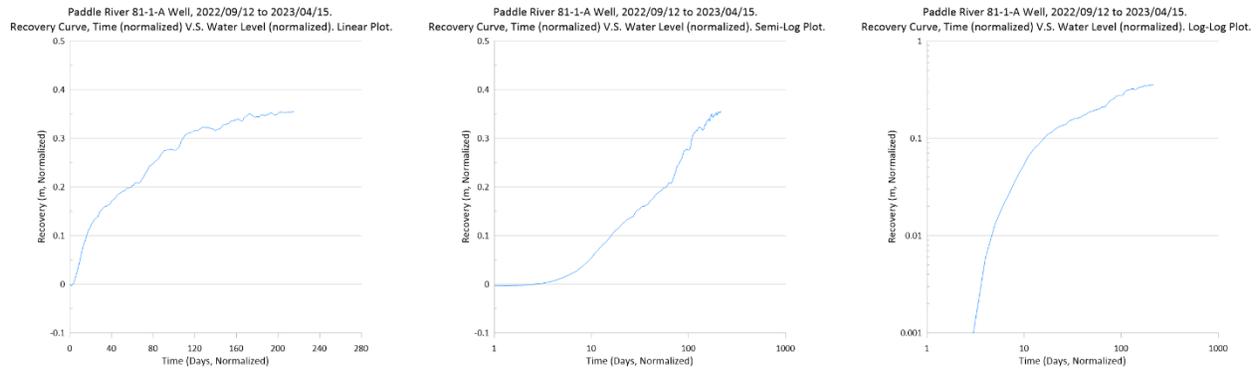


Figure 123: Recovery curve plots for Paddle River 81-1-A_0345 well, 2022/09/12 to 2023/04/15. Paskapoo aquifer.

Appendix D9: GOWN Monitoring Well Recovery Curve Plots for Raven 87-1_0384 Well

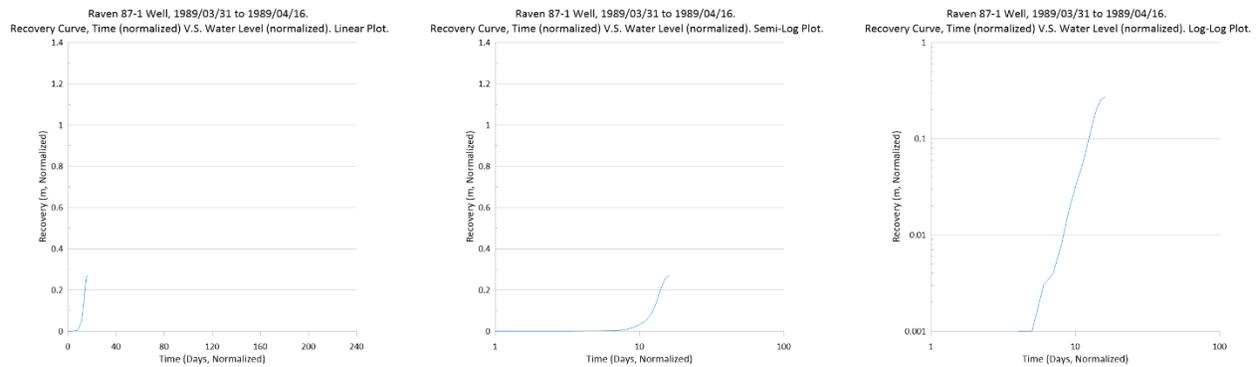


Figure 124: Recovery curve plots for Raven 87-1_0384 well, 1989/03/31 to 1989/04/16. Paskapoo aquifer.

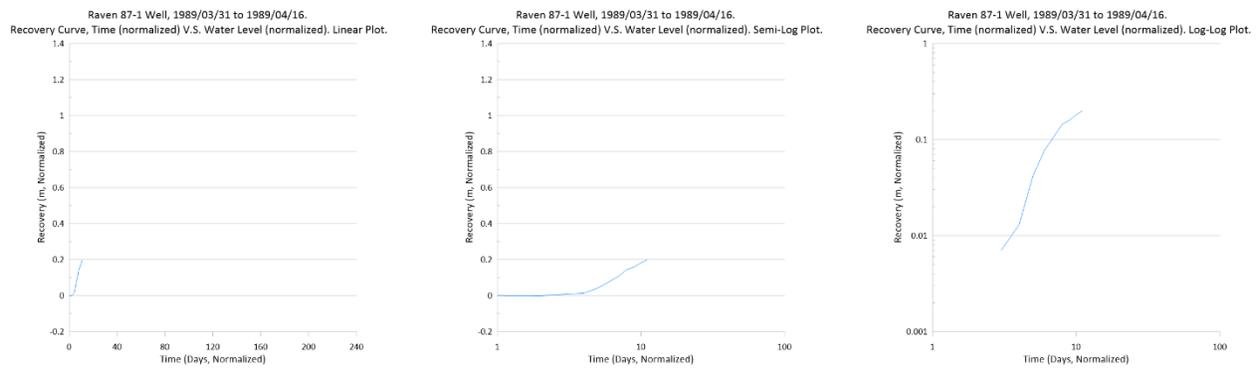


Figure 125: Recovery curve plots for Raven 87-1_0384 well, 1992/02/23 to 1992/03/05. Paskapoo aquifer.

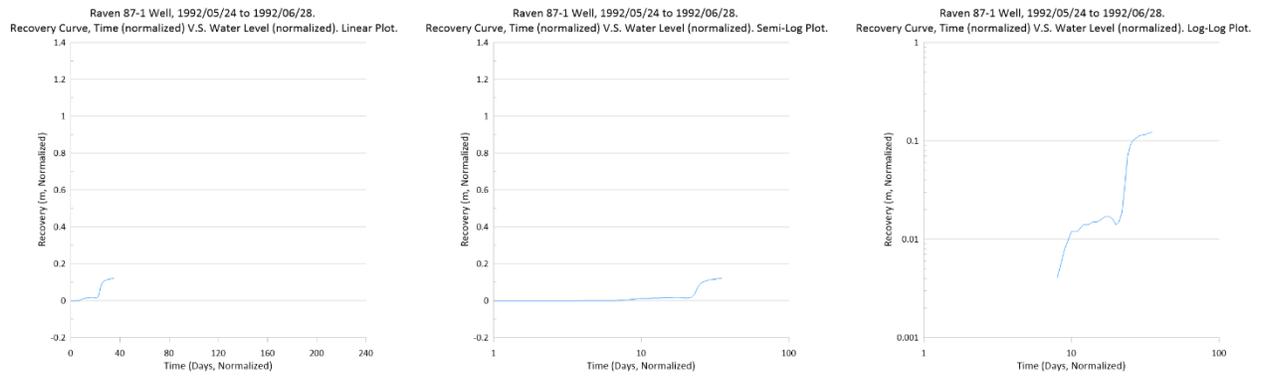


Figure 126: Recovery curve plots for Raven 87-1_0384 well, 1992/05/24 to 1992/06/28. Paskapoo aquifer.

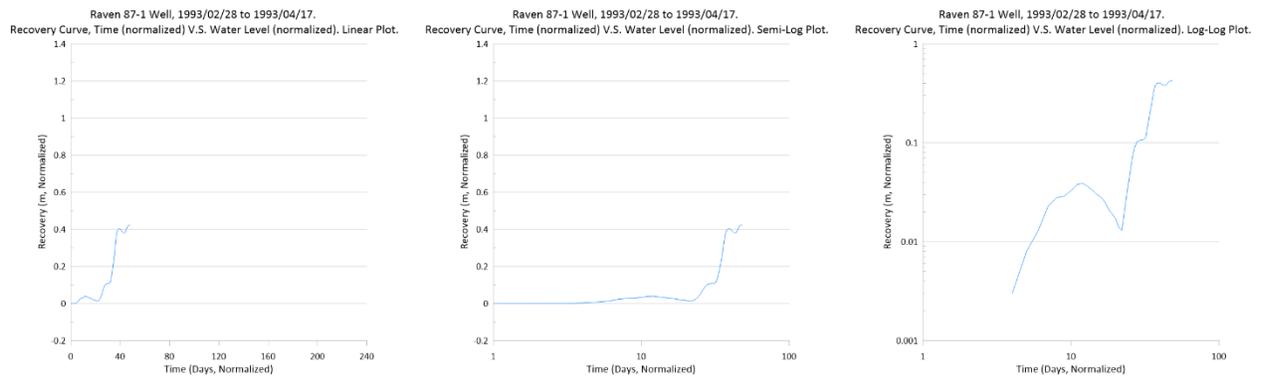


Figure 127: Recovery curve plots for Raven 87-1_0384 well, 1993/02/28 to 1993/04/17. Paskapoo aquifer.

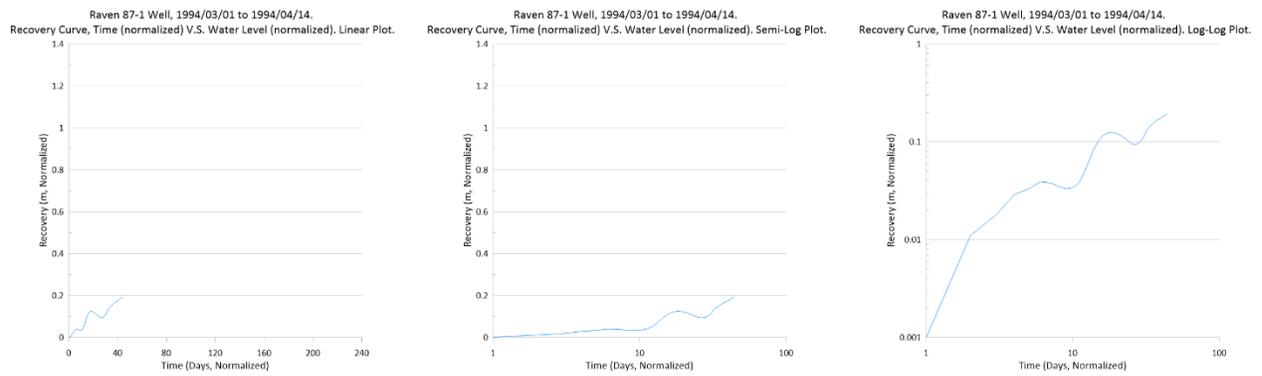


Figure 128: Recovery curve plots for Raven 87-1_0384 well, 1994/01/01 to 1994/04/14. Paskapoo aquifer.

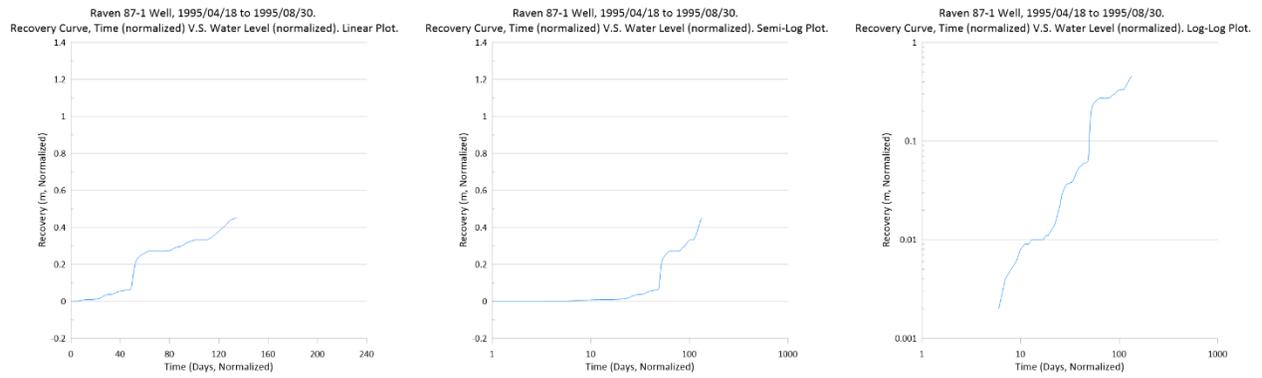


Figure 129: Recovery curve plots for Raven 87-1_0384 well, 1995/04/18 to 1995/08/30. Paskapoo aquifer.

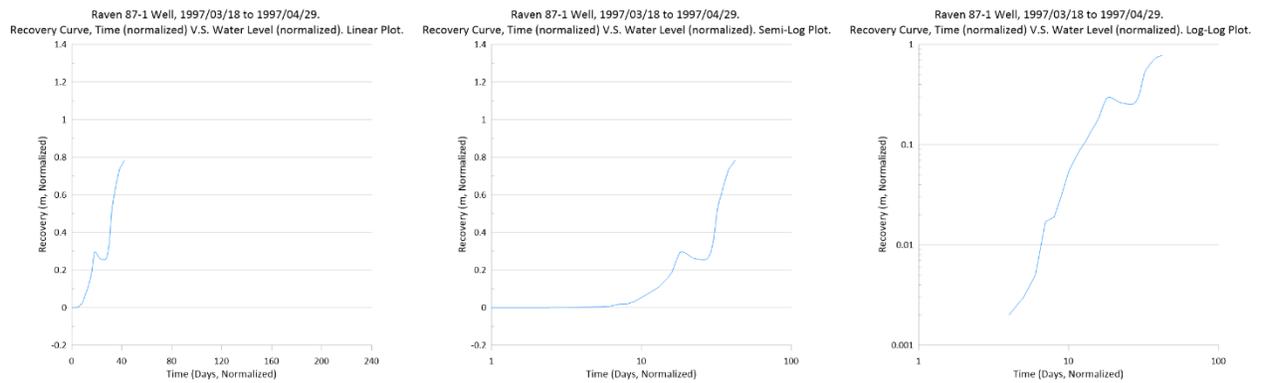


Figure 130: Recovery curve plots for Raven 87-1_0384 well, 1997/03/18 to 1997/04/29. Paskapoo aquifer.

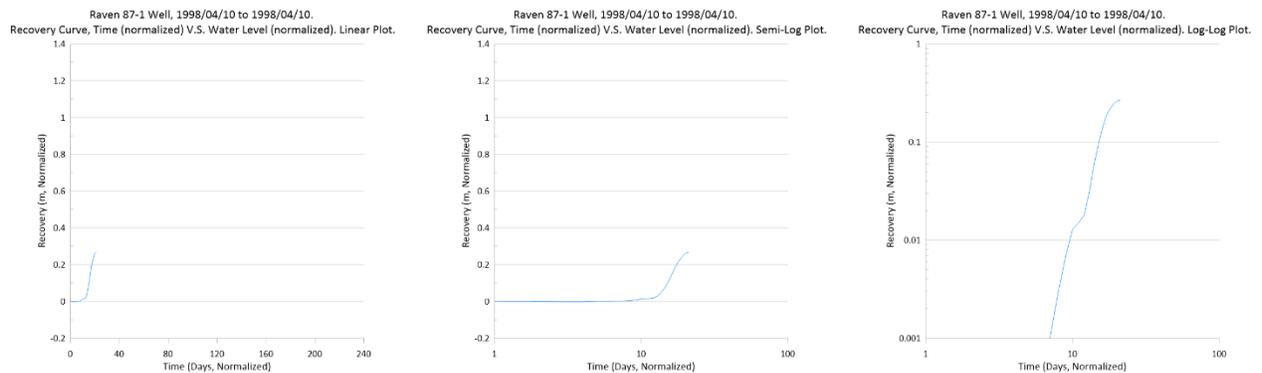


Figure 131: Recovery curve plots for Raven 87-1_0384 well, 1998/03/20 to 1989/04/10. Paskapoo aquifer.

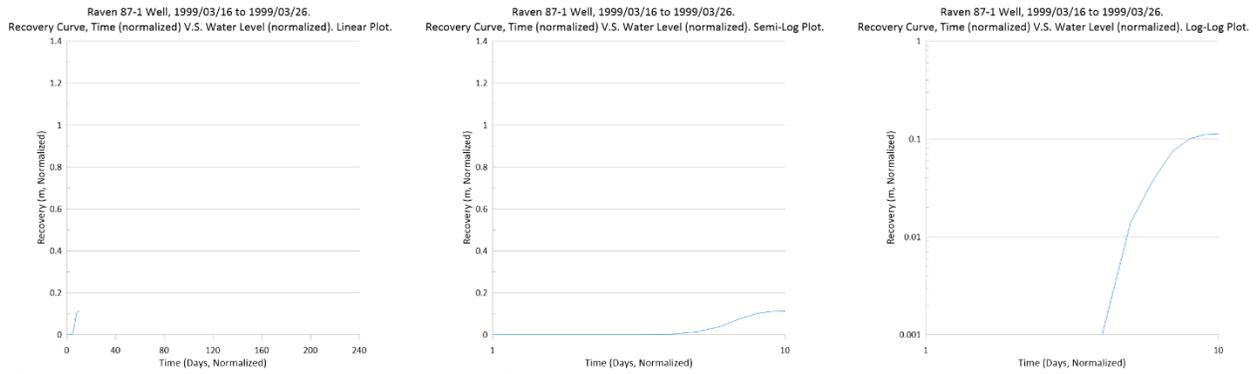


Figure 132: Recovery curve plots for Raven 87-1_0384 well, 1999/03/16 to 1999/03/26. Paskapoo aquifer.

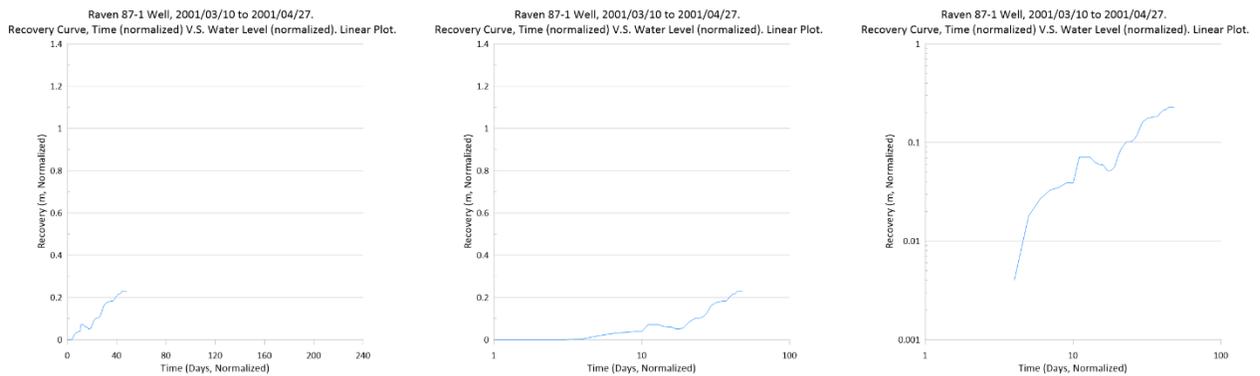


Figure 133: Recovery curve plots for Raven 87-1_0384 well, 2001/03/10 to 2001/04/27. Paskapoo aquifer.

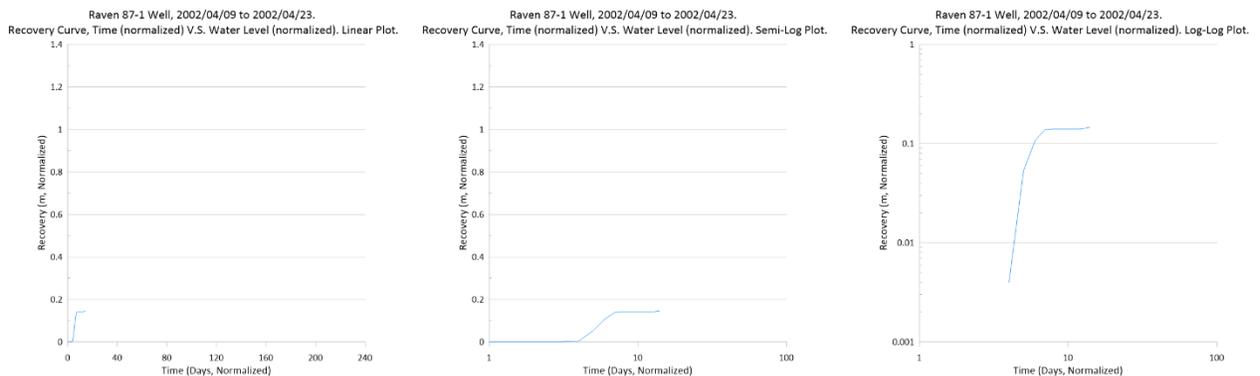


Figure 134: Recovery curve plots for Raven 87-1_0384 well, 2002/04/09 to 2002/04/23. Paskapoo aquifer.

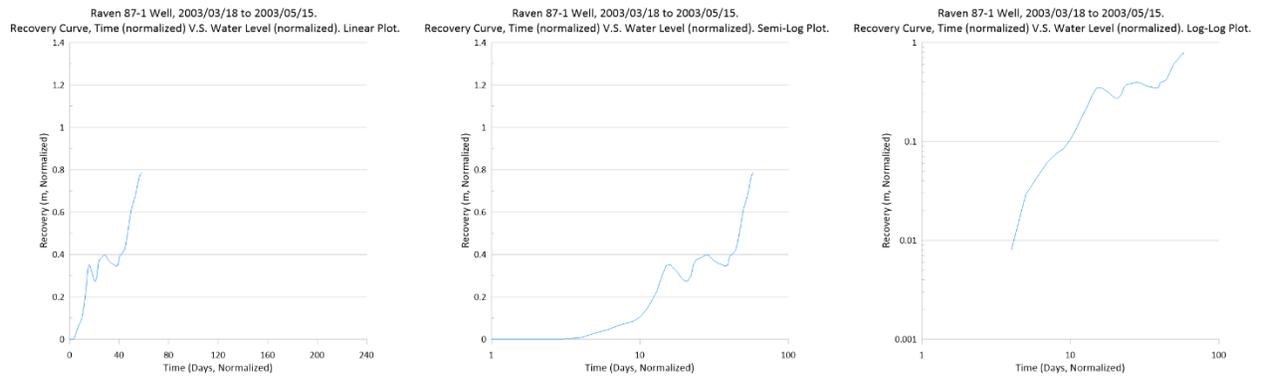


Figure 135: Recovery curve plots for Raven 87-1_0384 well, 2003/03/18 to 2003/05/15. Paskapoo aquifer.

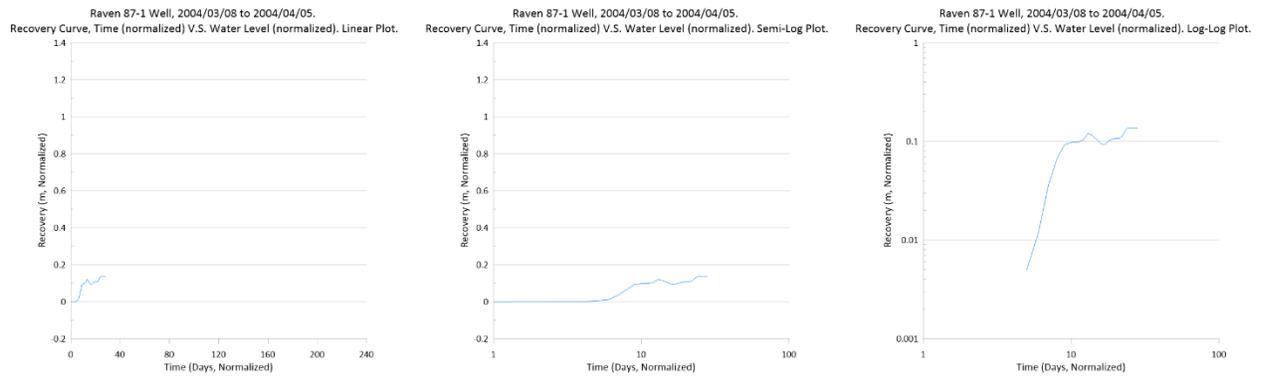


Figure 136: Recovery curve plots for Raven 87-1_0384 well, 2004/03/08 to 2004/04/05. Paskapoo aquifer.

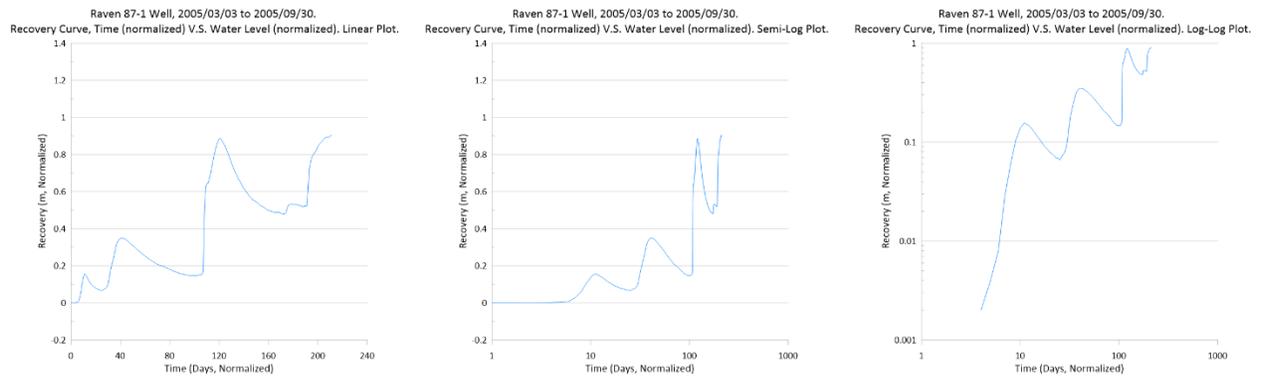


Figure 137: Recovery curve plots for Raven 87-1_0384 well, 2005/03/03 to 2005/09/30. Paskapoo aquifer.

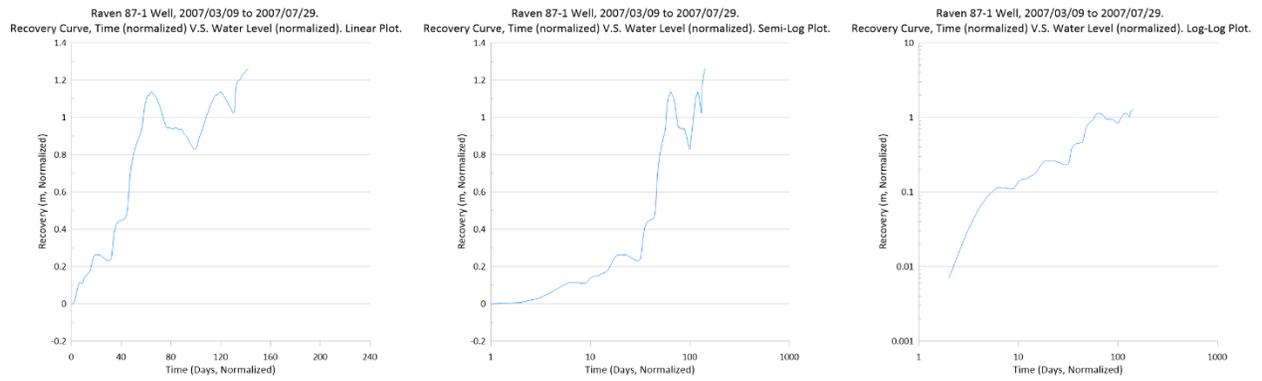


Figure 138: Recovery curve plots for Raven 87-1_0384 well, 2007/03/09 to 2007/07/29. Paskapoo aquifer.

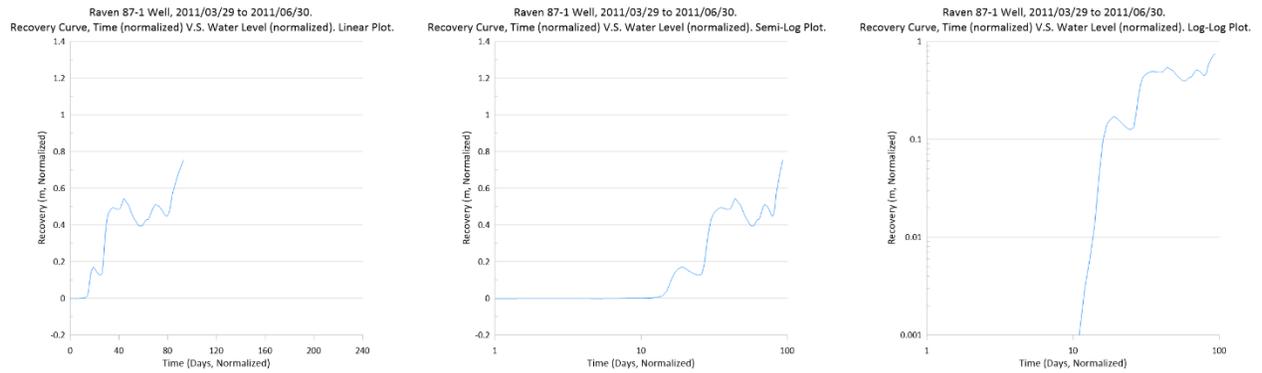


Figure 139: Recovery curve plots for Raven 87-1_0384 well, 2011/03/29 to 2011/06/30. Paskapoo aquifer.

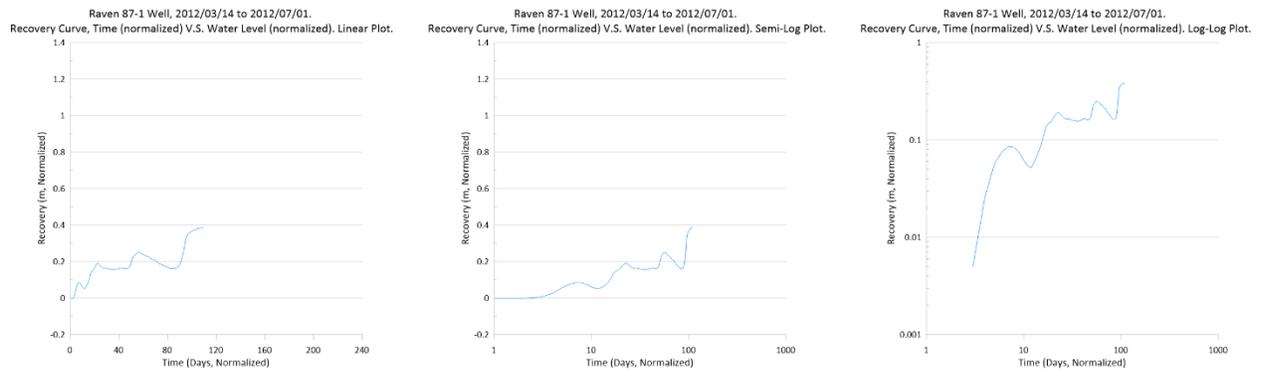


Figure 140: Recovery curve plots for Raven 87-1_0384 well, 2012/03/14 to 2012/07/01. Paskapoo aquifer.

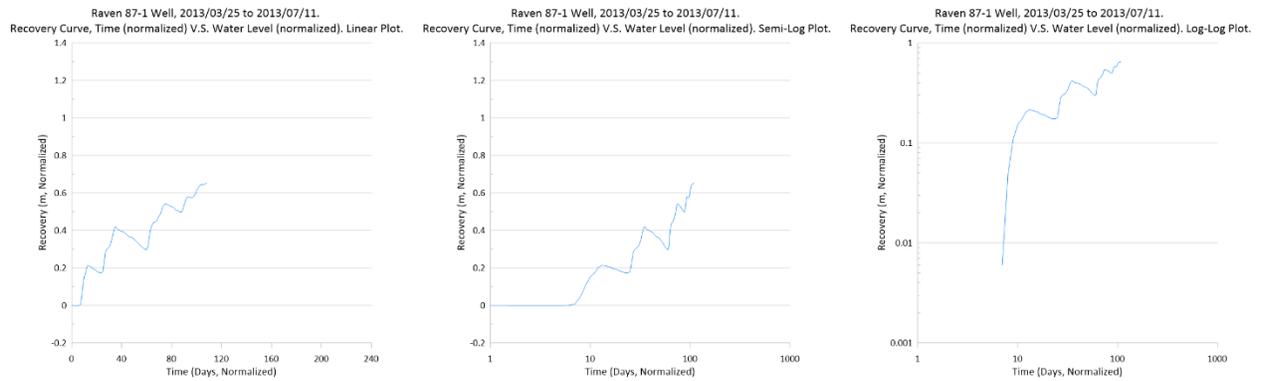


Figure 141: Recovery curve plots for Raven 87-1_0384 well, 2013/03/25 to 2013/07/11. Paskapoo aquifer.

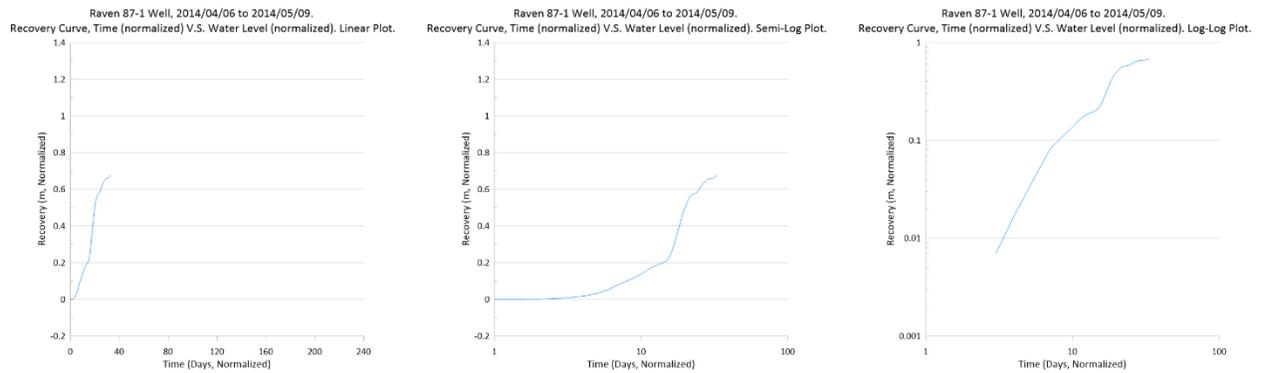


Figure 142: Recovery curve plots for Raven 87-1_0384 well, 2014/04/06 to 2014/05/09. Paskapoo aquifer.

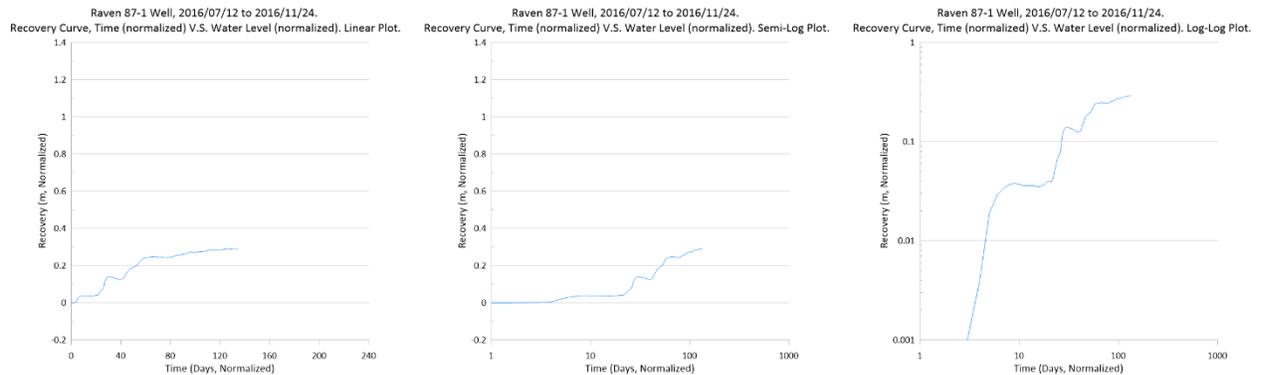


Figure 143: Recovery curve plots for Raven 87-1_0384 well, 2016/07/12 to 2016/11/24. Paskapoo aquifer.

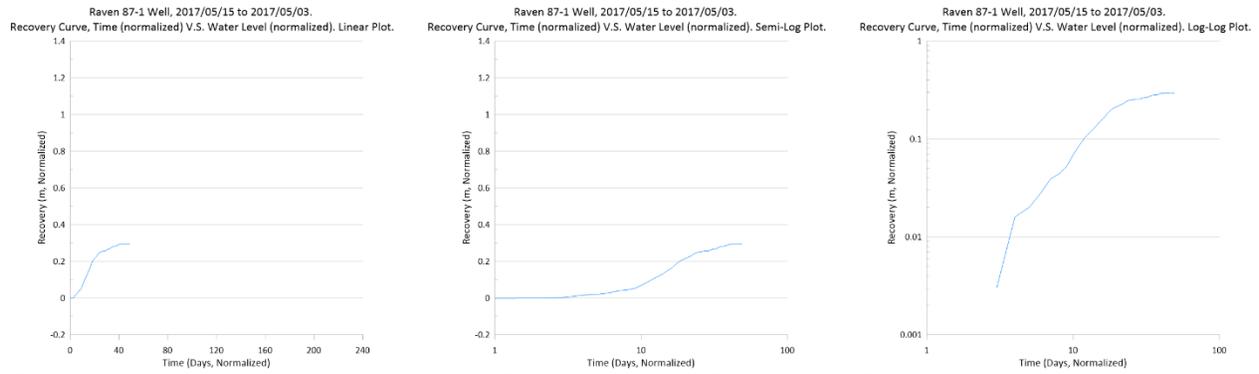


Figure 144: Recovery curve plots for Raven 87-1_0384 well, 2017/05/15 to 2017/05/03. Paskapoo aquifer.

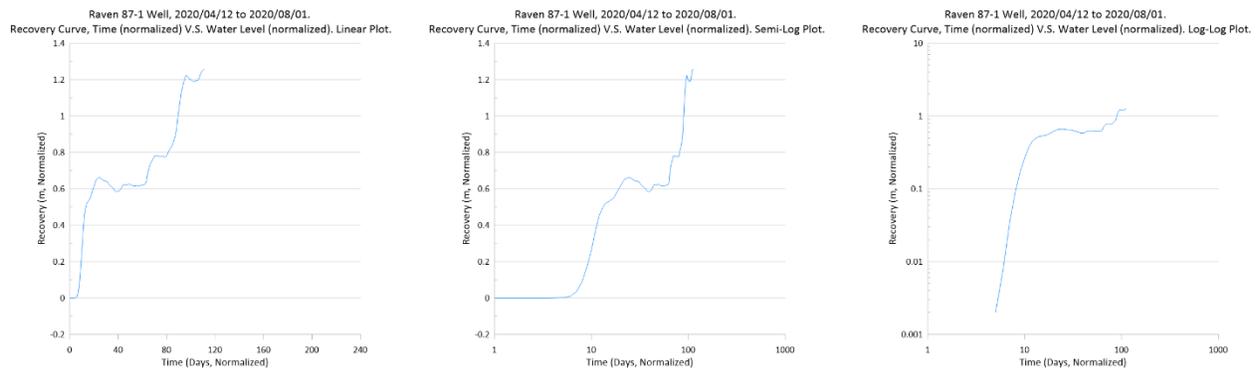


Figure 145: Recovery curve plots for Raven 87-1_0384 well, 2020/04/12 to 2020/08/01. Paskapoo aquifer.

Appendix D10: GOWN Monitoring Well Recovery Curve Plots for Warburg 2185E_0315 Well

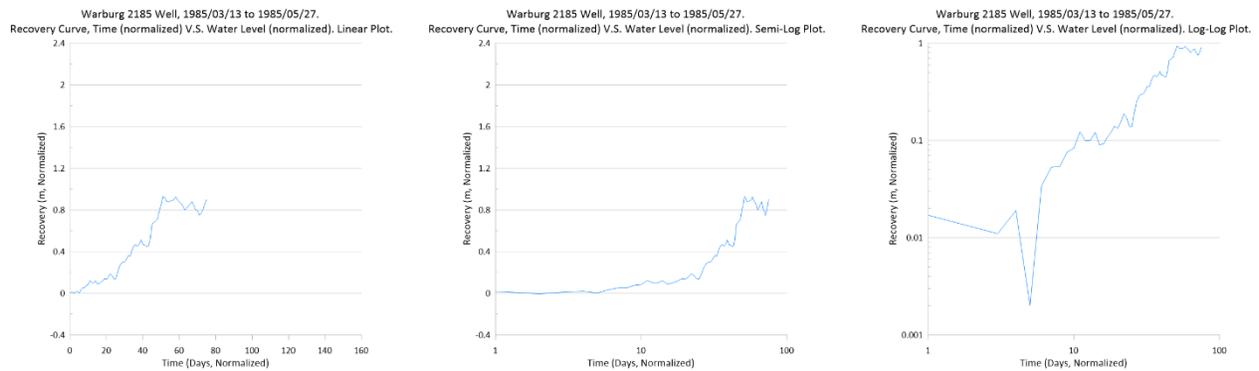


Figure 146: Recovery curve plots for Warburg 2185E_0315 well, 1985/03/13 to 1985/03/13. Paskapoo aquifer.

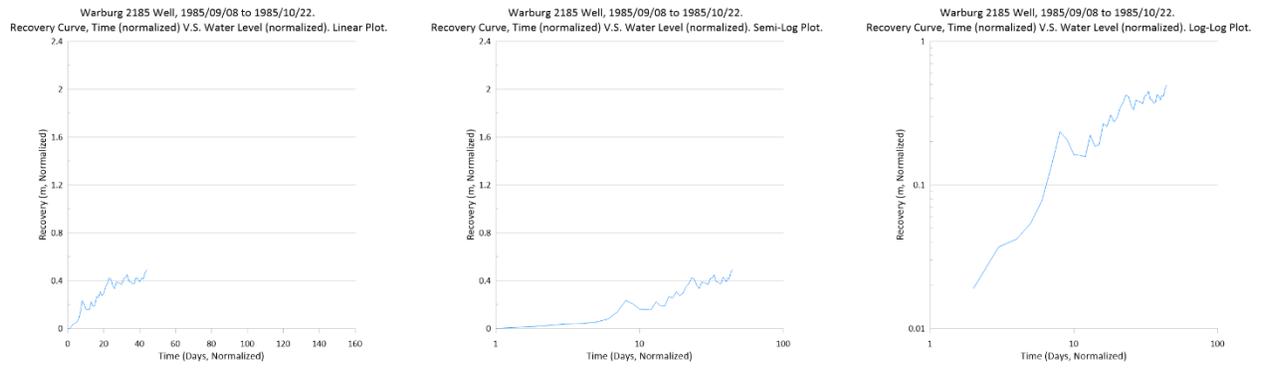


Figure 147: Recovery curve plots for Warburg 2185E_0315 well, 1985/09/08 to 1985/10/22. Paskapoo aquifer.

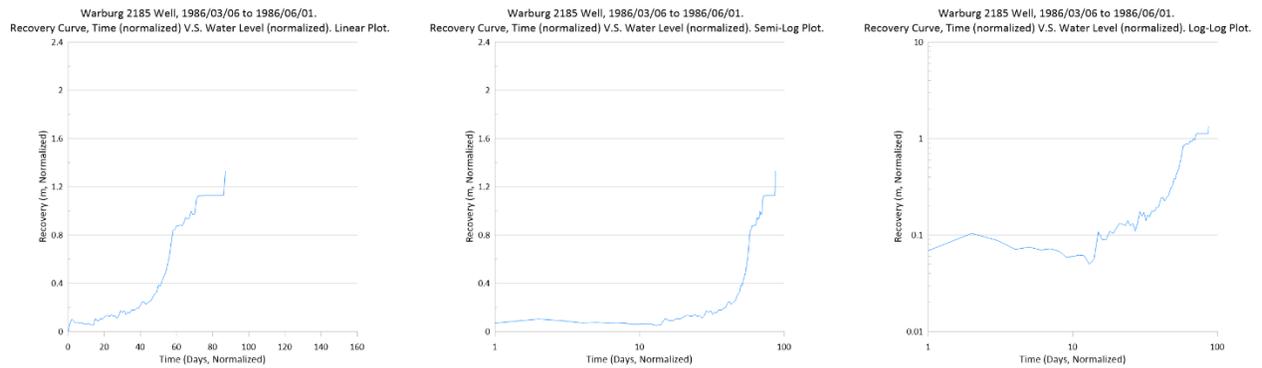


Figure 148: Recovery curve plots for Warburg 2185E_0315 well, 1986/03/06 to 1986/06/01. Paskapoo aquifer.

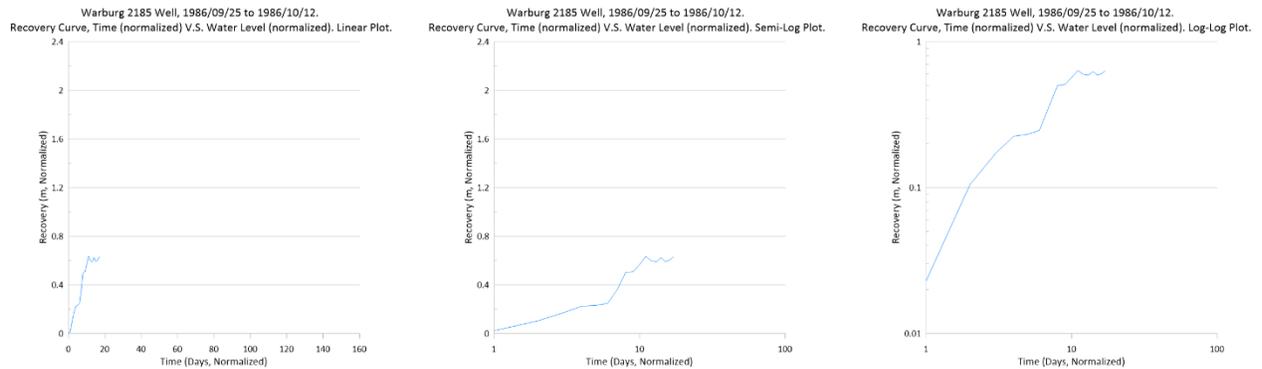


Figure 149: Recovery curve plots for Warburg 2185E_0315 well, 1986/09/25 to 1986/10/12. Paskapoo aquifer.

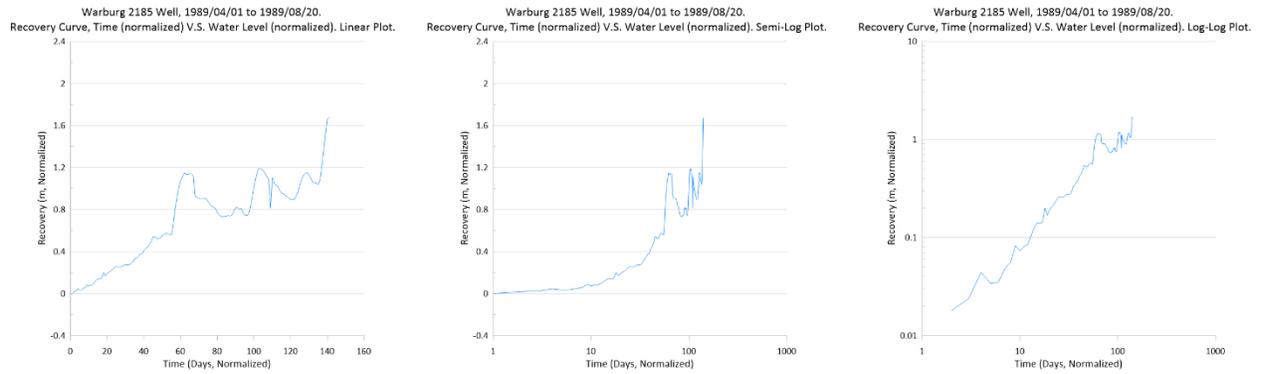


Figure 150: Recovery curve plots for Warburg 2185E_0315 well, 1989/08/20 to 1989/08/20. Paskapoo aquifer.

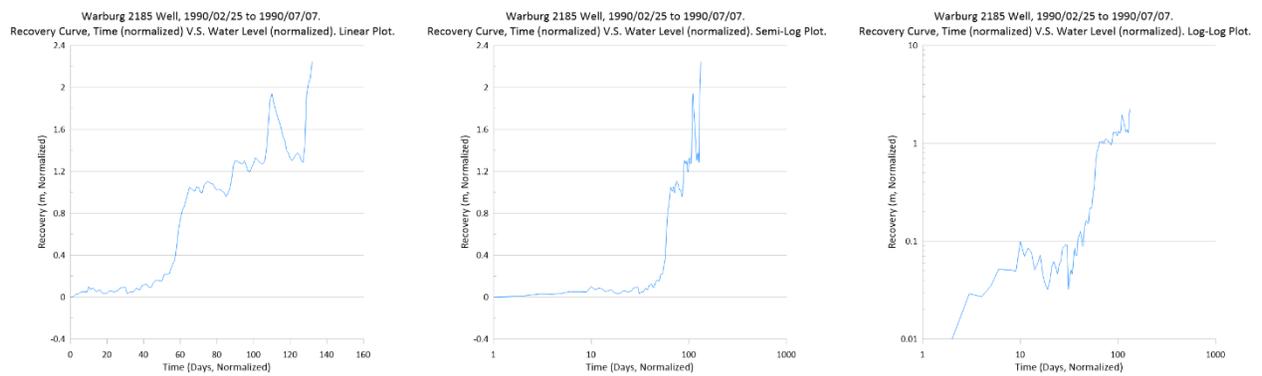


Figure 151: Recovery curve plots for Warburg 2185E_0315 well, 1990/02/25 to 1990/07/07. Paskapoo aquifer.

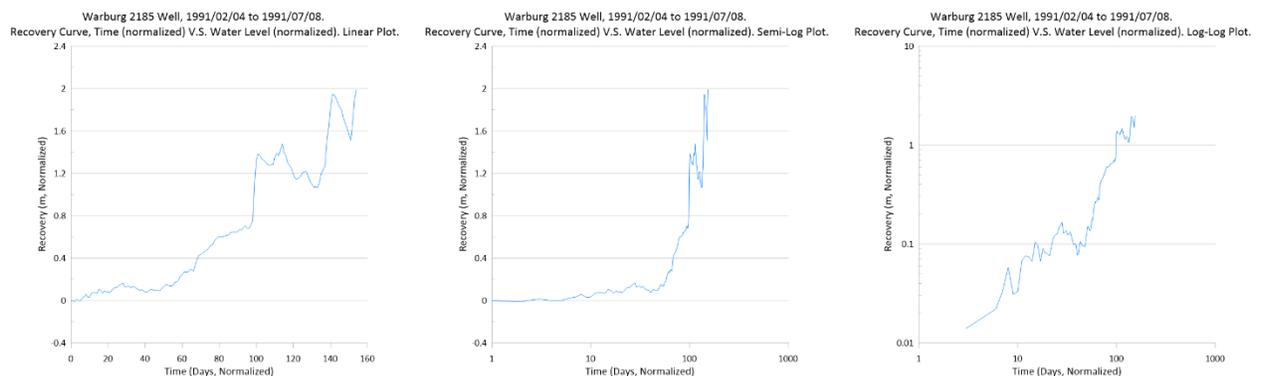


Figure 152: Recovery curve plots for Warburg 2185E_0315 well, 1991/02/04 to 1991/07/08. Paskapoo aquifer.

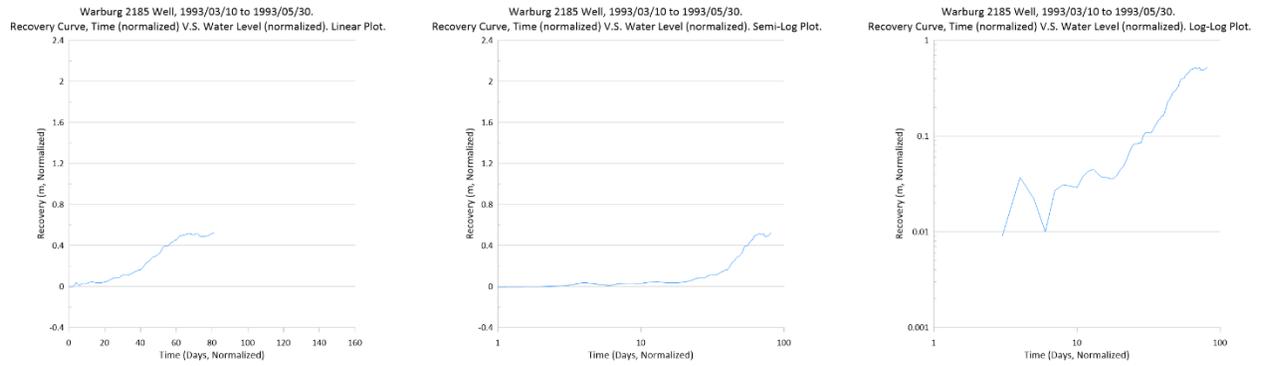


Figure 153: Recovery curve plots for Warburg 2185E_0315 well, 1993/03/10 to 1993/05/30. Paskapoo aquifer.

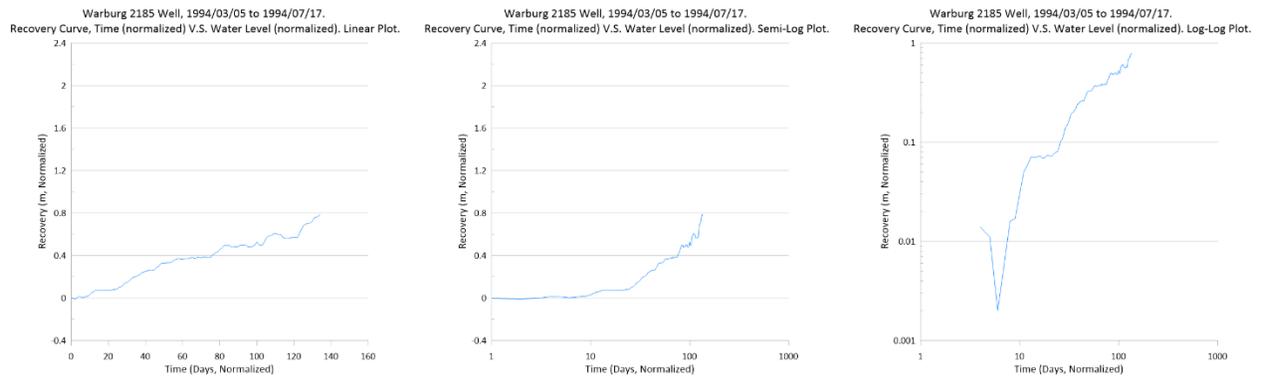


Figure 154: Recovery curve plots for Warburg 2185E_0315 well, 1994/03/05 to 1994/07/17. Paskapoo aquifer.

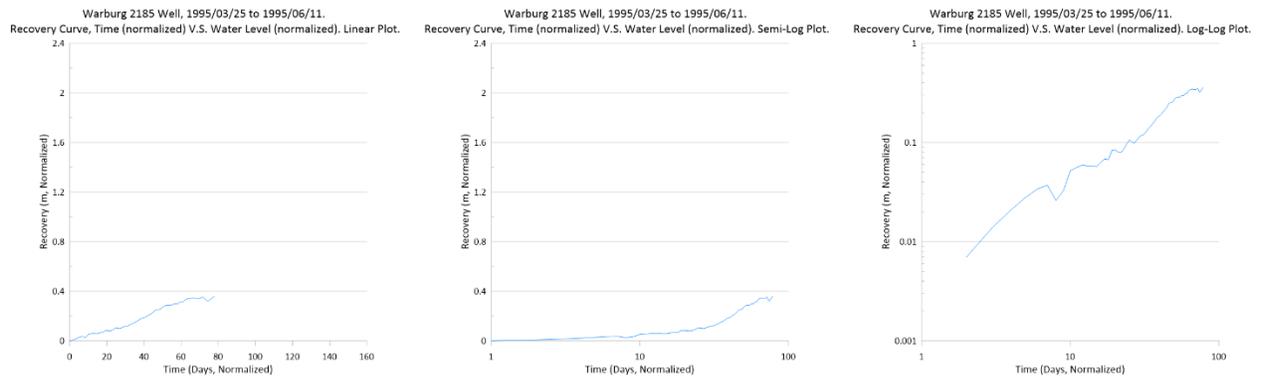
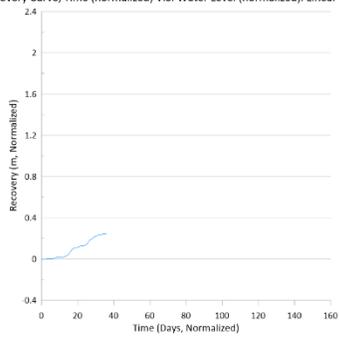
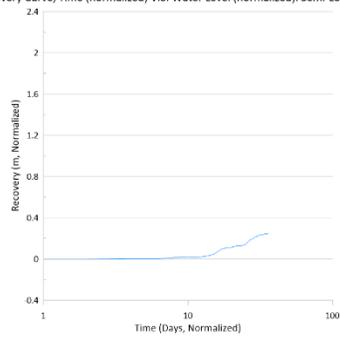


Figure 155: Recovery curve plots for Warburg 2185E_0315 well, 1995/03/25 to 1995/06/11. Paskapoo aquifer.

Warburg 2185 Well, 1995/07/28 to 1995/09/02.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Linear Plot.



Warburg 2185 Well, 1995/07/28 to 1995/09/02.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Semi-Log Plot.



Warburg 2185 Well, 1995/07/28 to 1995/09/02.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Log-Log Plot.

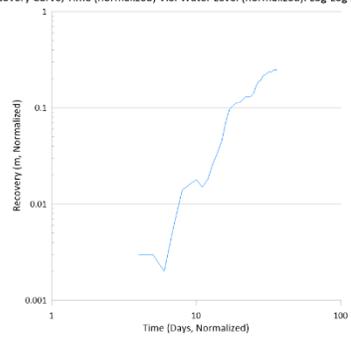


Figure 156: Recovery curve plots for Warburg 2185E_0315 well, 1995/07/28 to 1995/09/02. Paskapoo aquifer.

Appendix E: GOWN Monitoring Well Recovery Curve Plots for Horseshoe Canyon Aquifer Wells

Appendix E1: GOWN Monitoring Well Recovery Curve Plots for Barons 615E_0117 Well

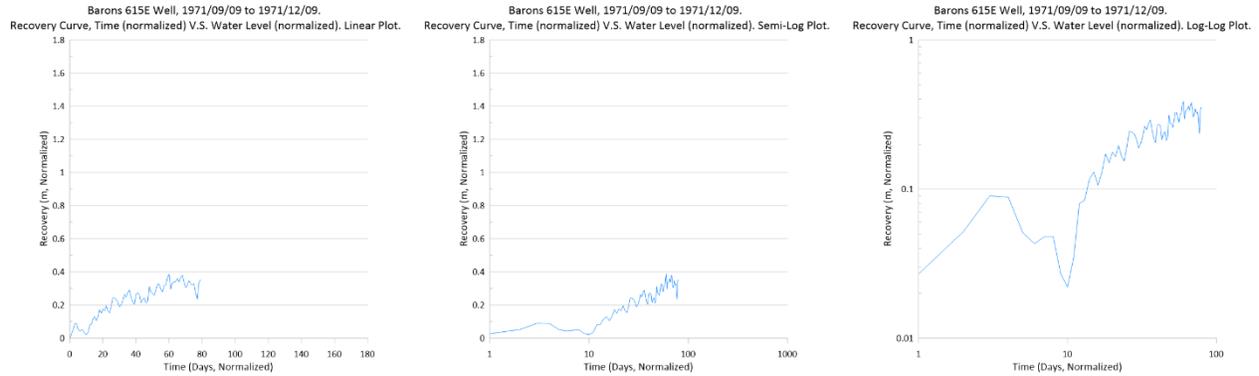


Figure 157: Recovery curve plots for Barons 615E_0117 well, 1971/09/09 to 1971/12/09. Horseshoe Canyon aquifer.

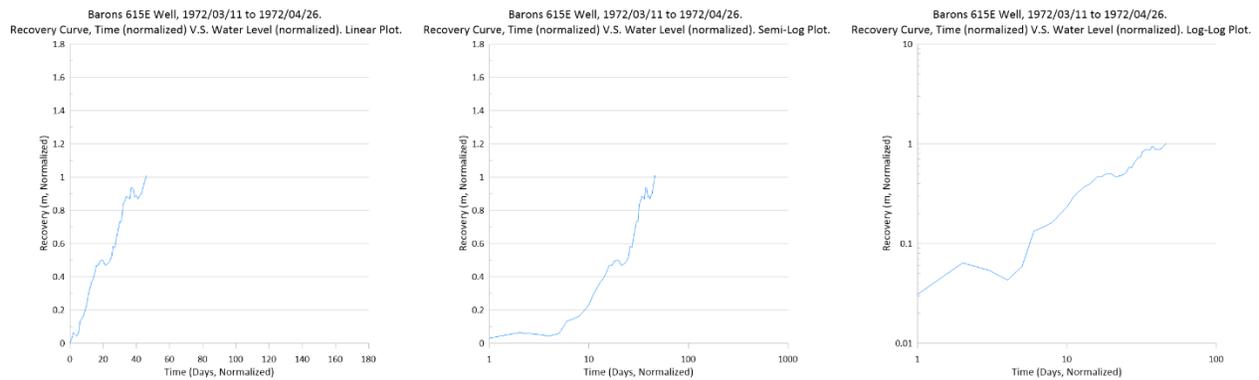


Figure 158: Recovery curve plots for Barons 615E_0117 well, 1972/03/12 to 1972/04/26. Horseshoe Canyon aquifer.

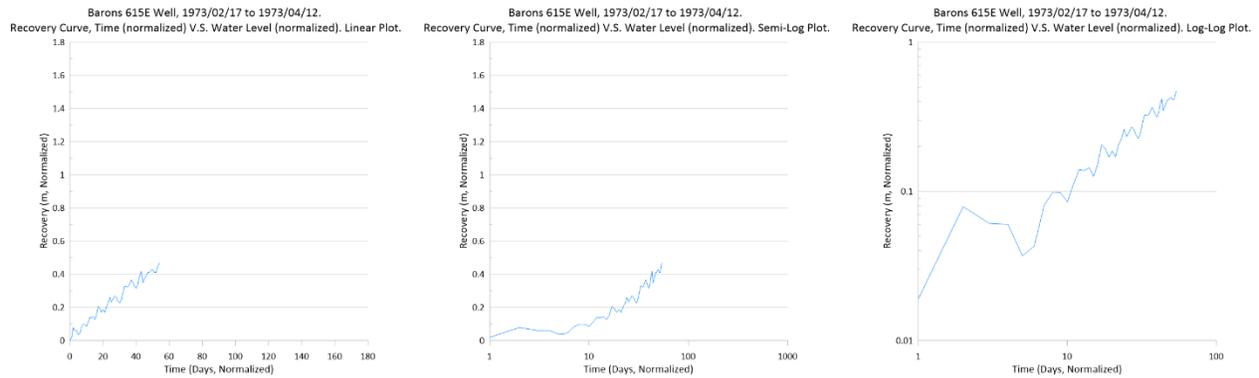


Figure 159: Recovery curve plots for Barons 615E_0117 well, 1973/02/17 to 1973/04/12. Horseshoe Canyon aquifer.

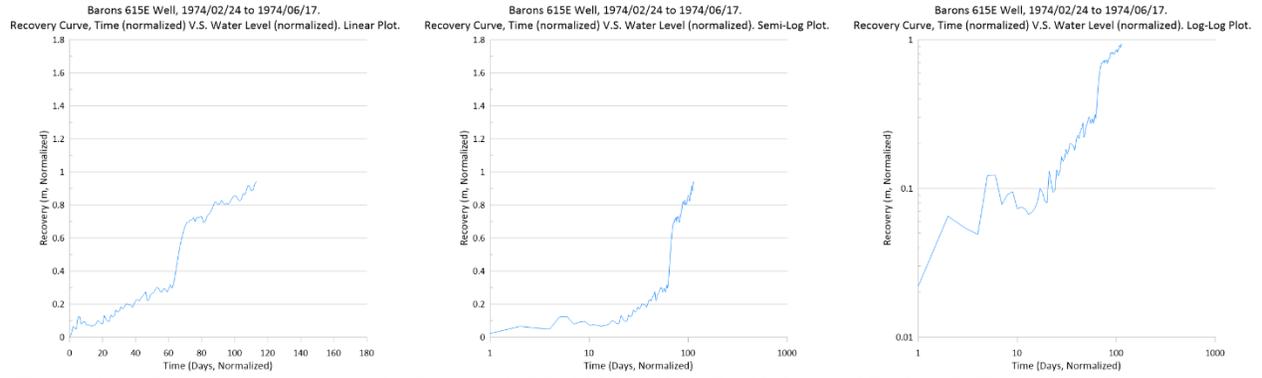


Figure 160: Recovery curve plots for Barons 615E_0117 well, 1974/02/24 to 1974/06/17. Horseshoe Canyon aquifer.

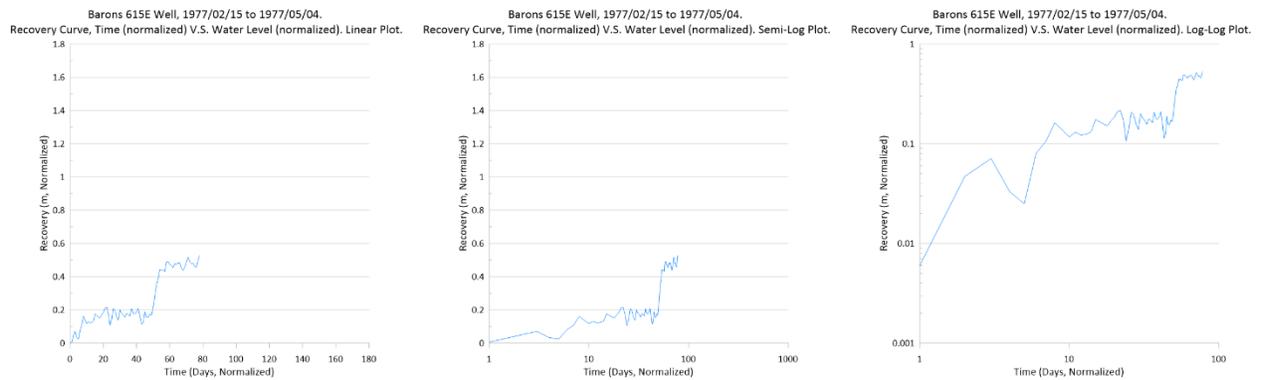


Figure 161: Recovery curve plots for Barons 615E_0117 well, 1977/02/15 to 1977/05/04. Horseshoe Canyon aquifer.

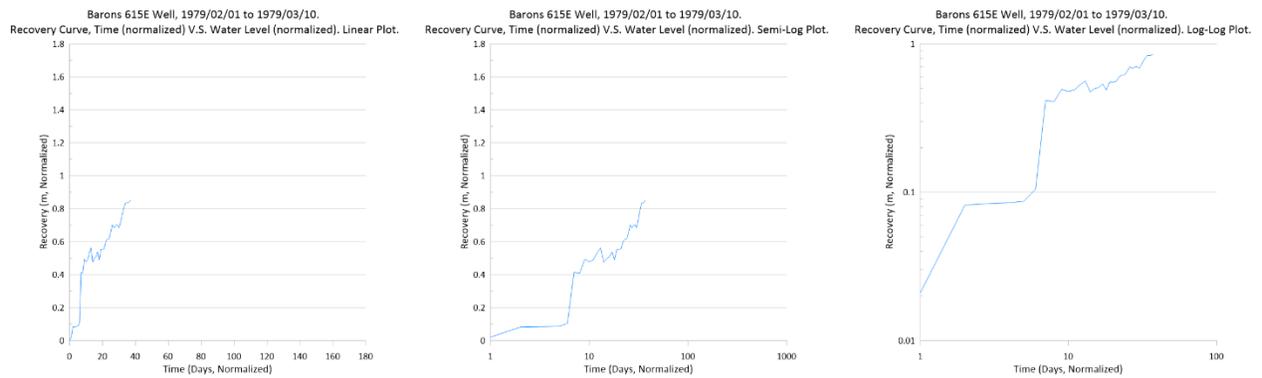


Figure 162: Recovery curve plots for Barons 615E_0117 well, 1979/02/01 to 1979/03/10. Horseshoe Canyon aquifer.

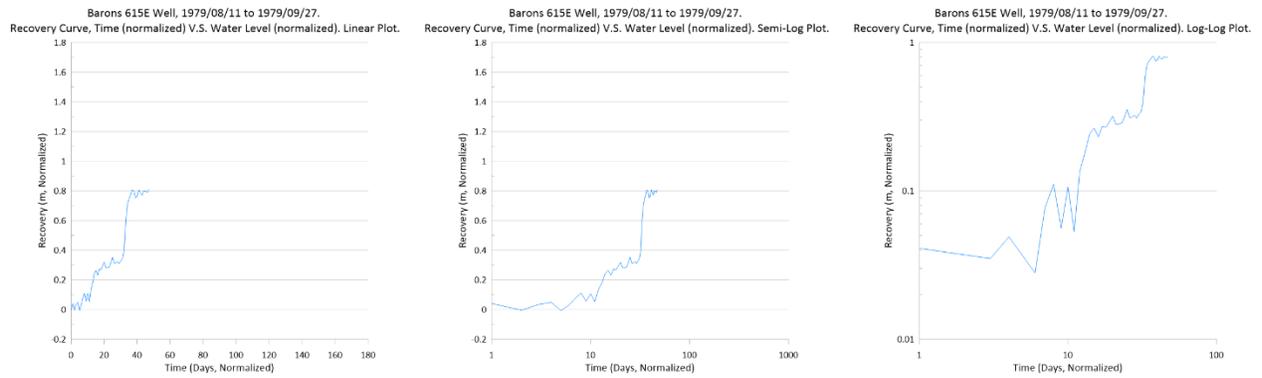


Figure 163: Recovery curve plots for Barons 615E_0117 well, 1979/08/11 to 1979/09/27. Horseshoe Canyon aquifer.

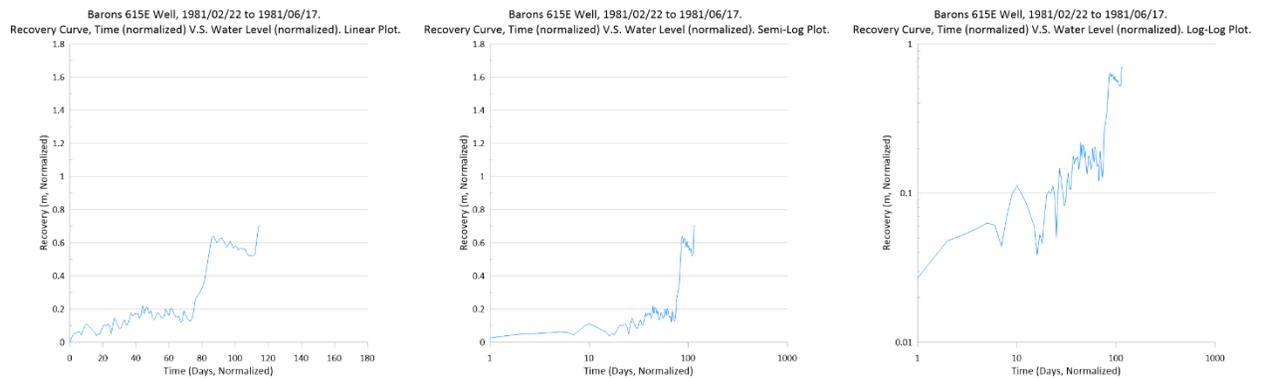


Figure 164: Recovery curve plots for Barons 615E_0117 well, 1981/02/22 to 1981/06/17. Horseshoe Canyon aquifer.

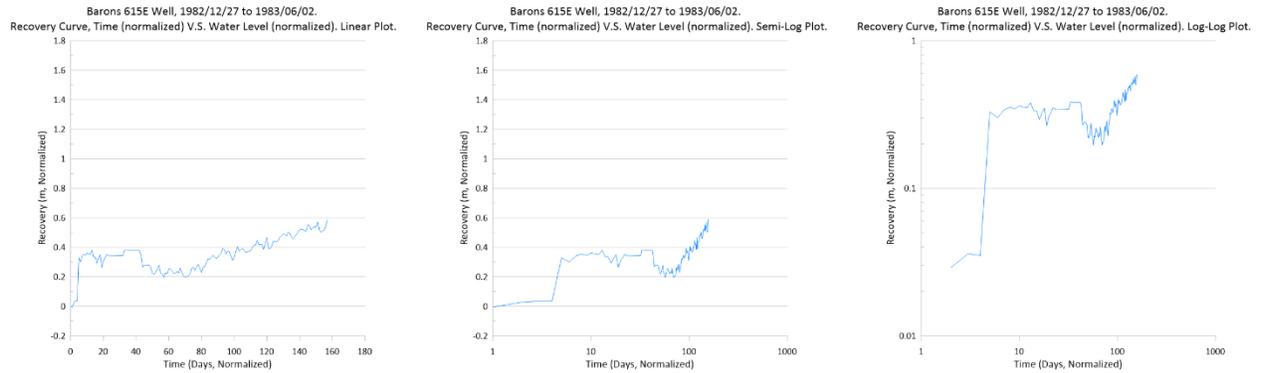


Figure 165: Recovery curve plots for Barons 615E_0117 well, 1982/12/27 to 1983/06/02. Horseshoe Canyon aquifer.

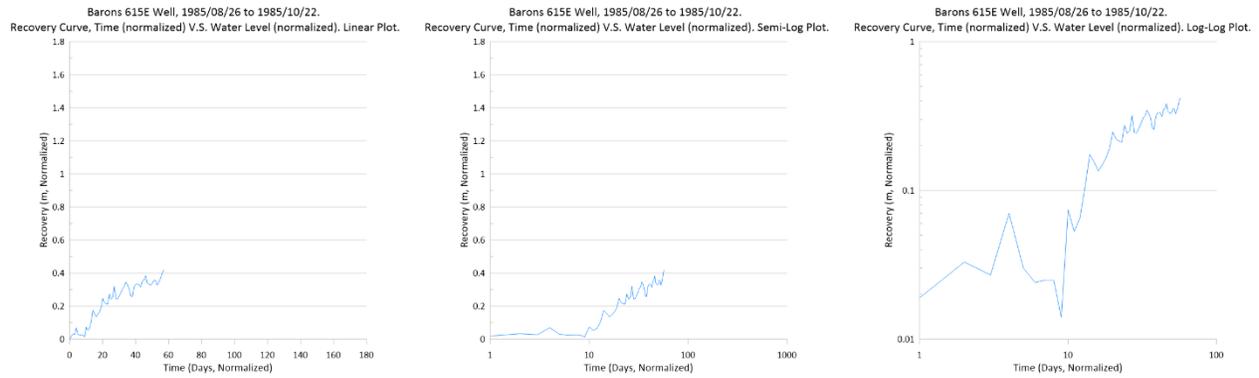


Figure 166: Recovery curve plots for Barons 615E_0117 well, 1985/08/26 to 1985/10/22. Horseshoe Canyon aquifer.

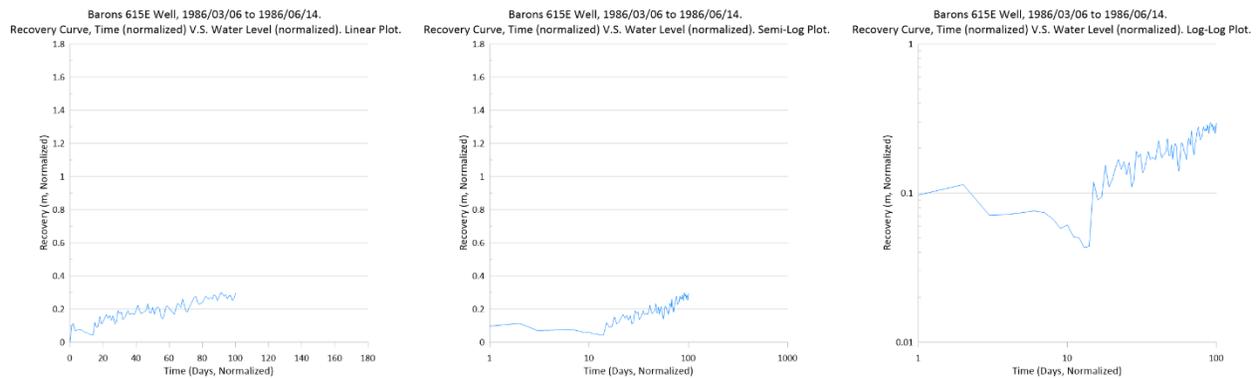


Figure 167: Recovery curve plots for Barons 615E_0117 well, 1986/03/06 to 1986/06/14. Horseshoe Canyon aquifer.

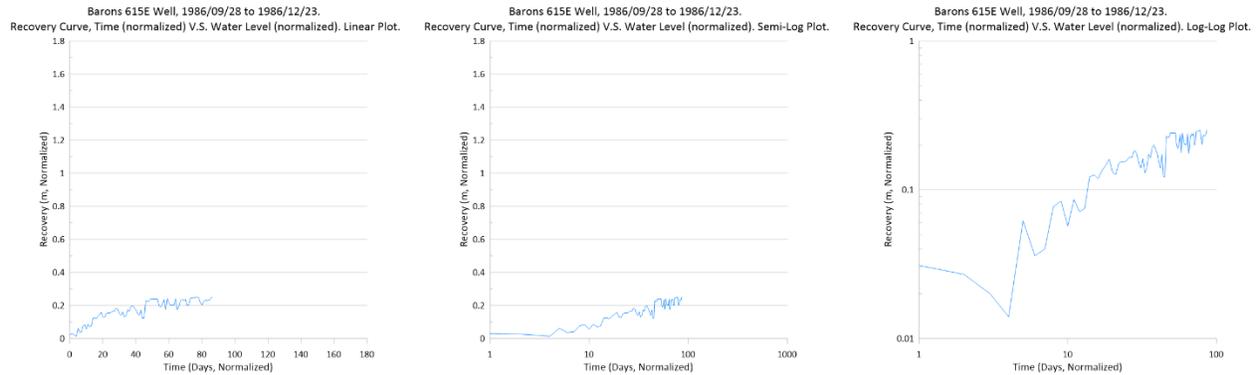


Figure 168: Recovery curve plots for Barons 615E_0117 well, 1986/09/28 to 1986/12/23. Horseshoe Canyon aquifer.

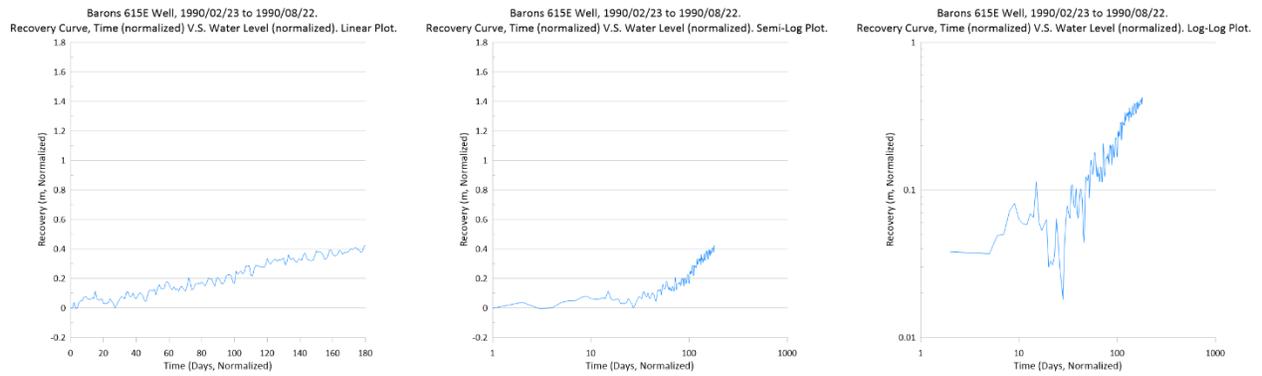


Figure 169: Recovery curve plots for Barons 615E_0117 well, 1990/02/23 to 1990/08/22. Horseshoe Canyon aquifer.

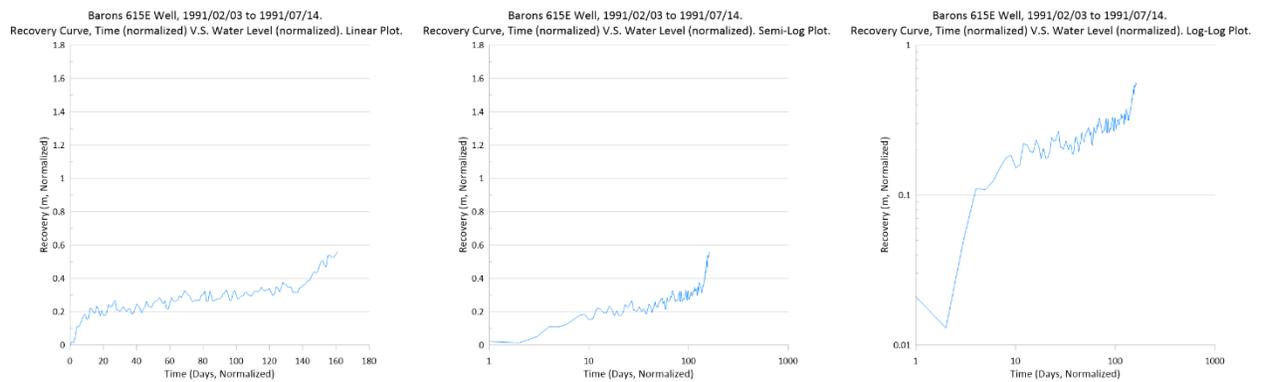


Figure 170: Recovery curve plots for Barons 615E_0117 well, 1991/02/03 to 1991/07/14. Horseshoe Canyon aquifer.

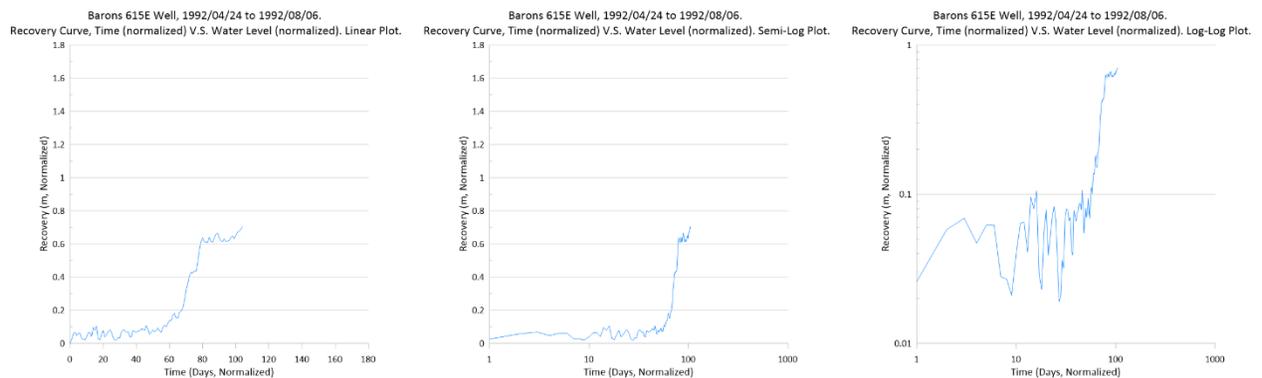


Figure 171: Recovery curve plots for Barons 615E_0117 well, 1992/04/24 to 1992/08/06. Horseshoe Canyon aquifer.

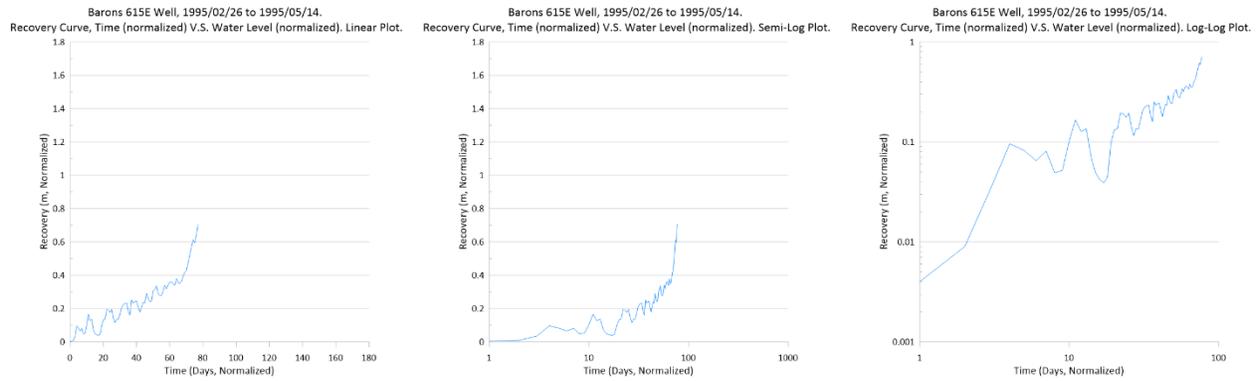


Figure 172: Recovery curve plots for Barons 615E_0117 well, 1995/02/26 to 1995/05/14. Horseshoe Canyon aquifer.

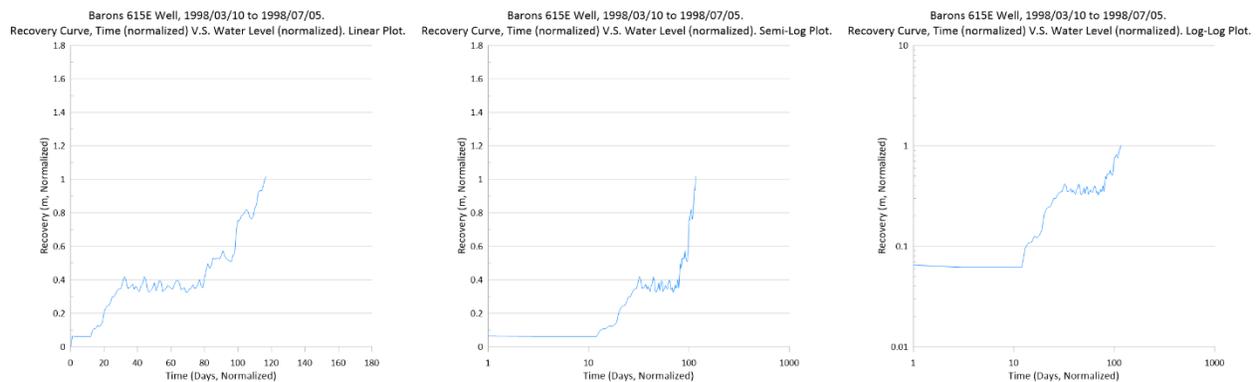


Figure 173: Recovery curve plots for Barons 615E_0117 well, 1998/03/10 to 1998/07/05. Horseshoe Canyon aquifer.

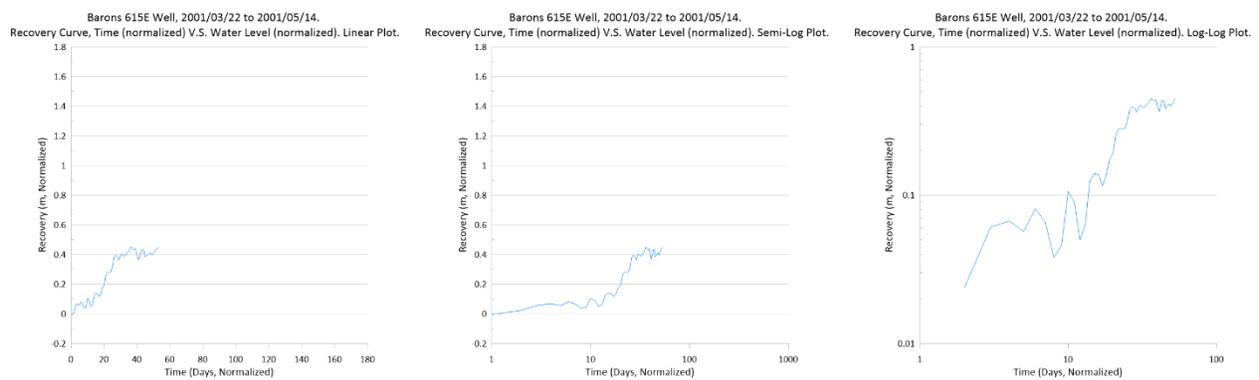


Figure 174: Recovery curve plots for Barons 615E_0117 well, 2001/03/22 to 2001/05/14. Horseshoe Canyon aquifer.

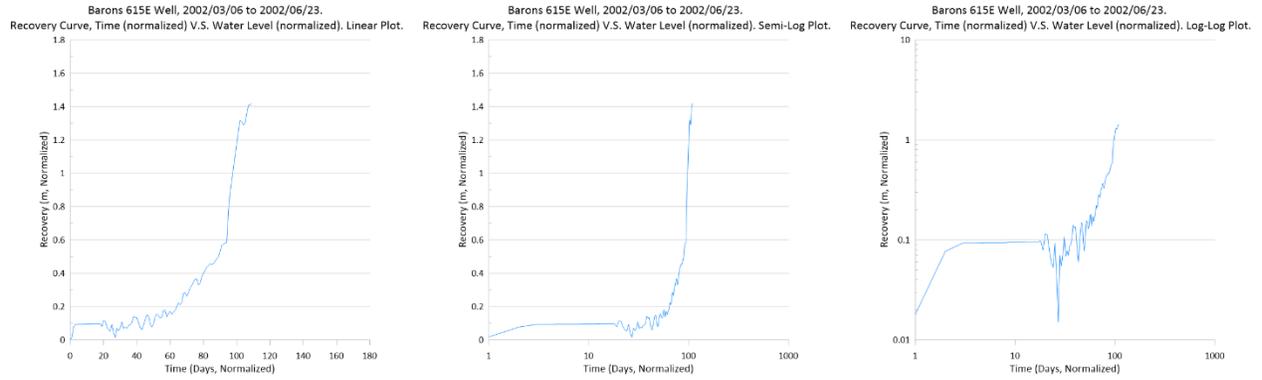


Figure 175: Recovery curve plots for Barons 615E_0117 well, 2002/03/06 to 2002/06/23. Horseshoe Canyon aquifer.

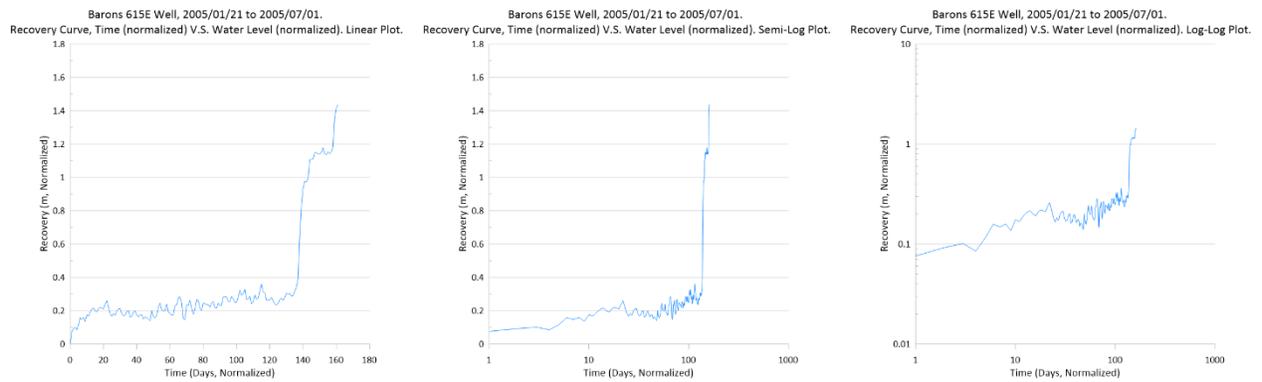


Figure 176: Recovery curve plots for Barons 615E_0117 well, 2005/01/21 to 2005/07/01. Horseshoe Canyon aquifer.

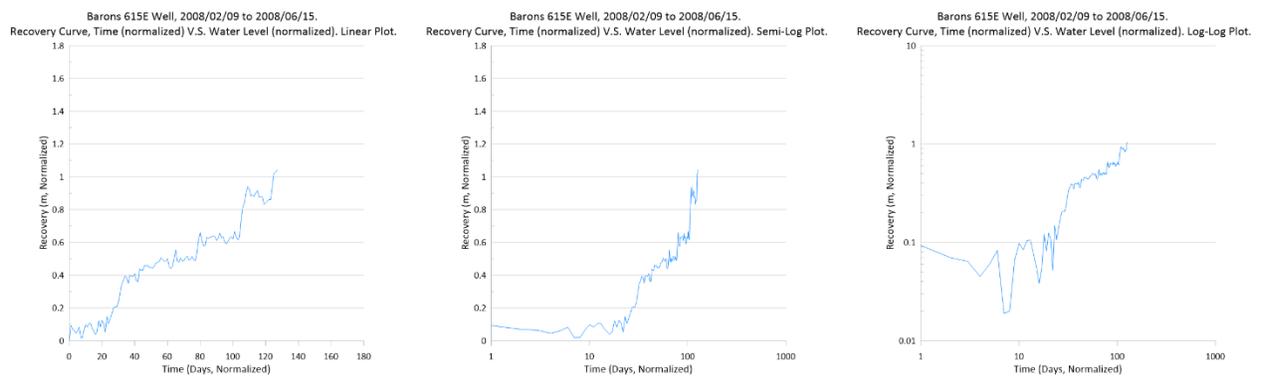


Figure 177: Recovery curve plots for Barons 615E_0117 well, 2008/02/09 to 2008/06/15. Horseshoe Canyon aquifer.

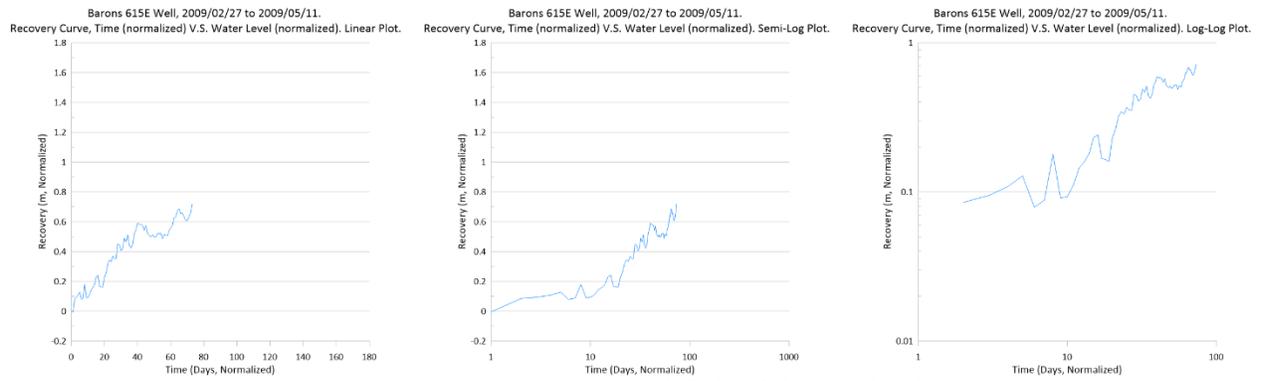


Figure 178: Recovery curve plots for Barons 615E_0117 well, 2009/02/27 to 2009/02/11. Horseshoe Canyon aquifer.

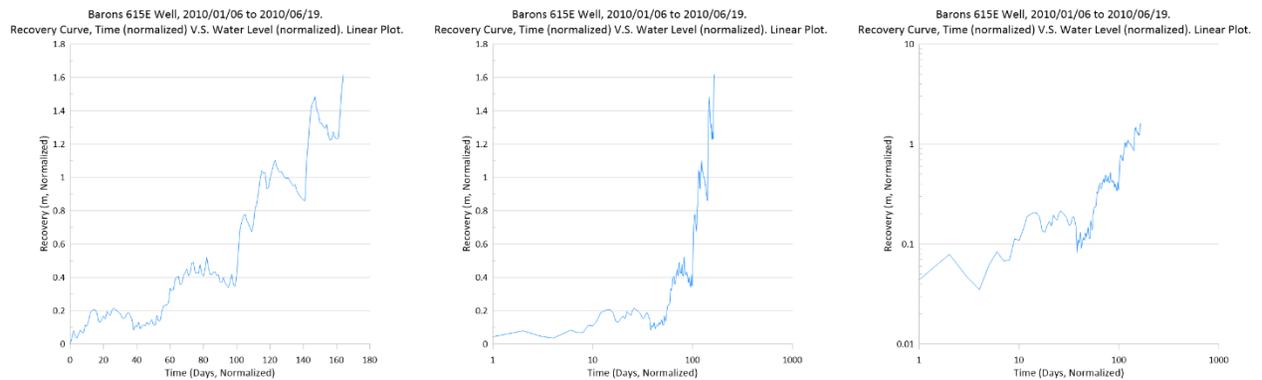


Figure 179: Recovery curve plots for Barons 615E_0117 well, 2010/01/06 to 2010/06/19. Horseshoe Canyon aquifer.

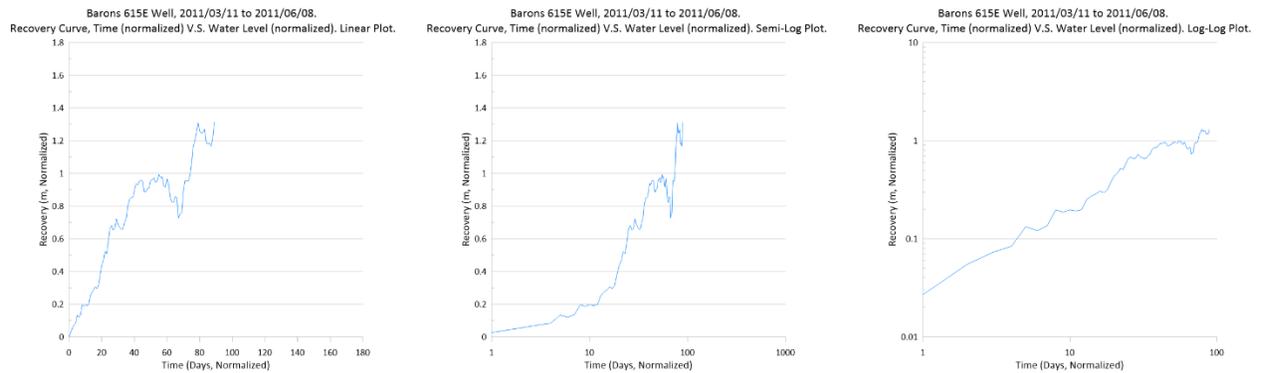


Figure 180: Recovery curve plots for Barons 615E_0117 well, 2011/03/11 to 2011/06/08. Horseshoe Canyon aquifer.

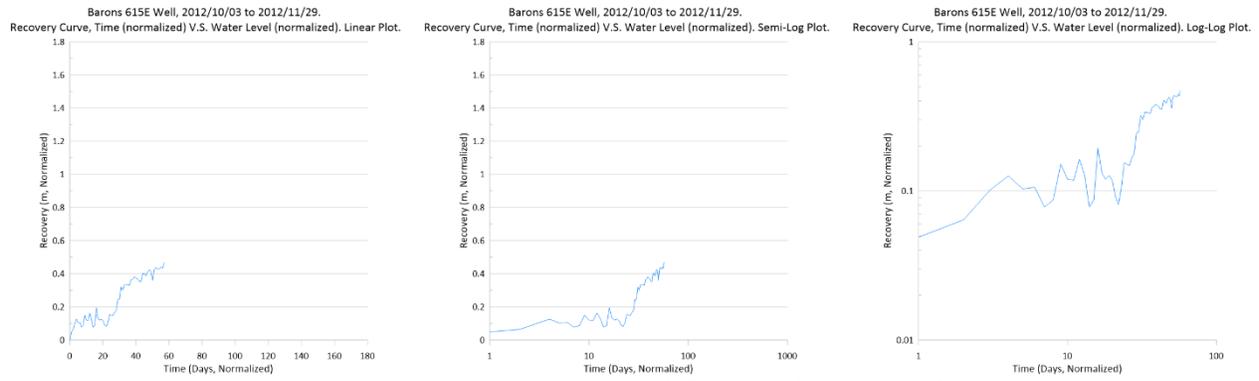


Figure 181: Recovery curve plots for Barons 615E_0117 well, 2012/10/03 to 2012/11/29. Horseshoe Canyon aquifer.

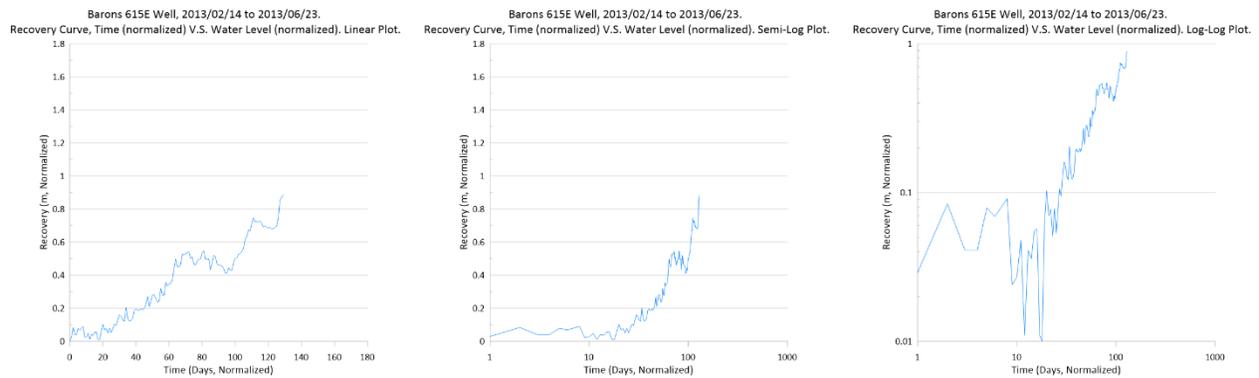


Figure 182: Recovery curve plots for Barons 615E_0117 well, 2013/02/14 to 2013/06/23. Horseshoe Canyon aquifer.

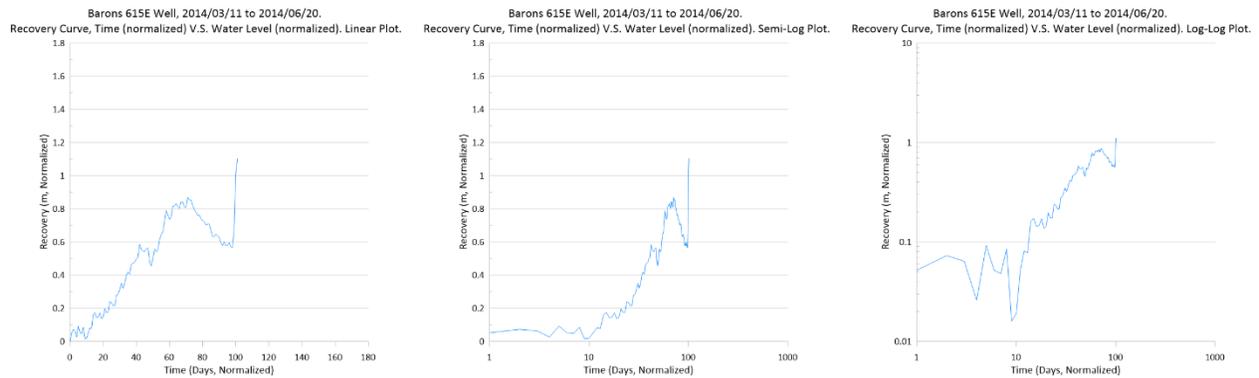


Figure 183: Recovery curve plots for Barons 615E_0117 well, 2014/03/11 to 2014/06/20. Horseshoe Canyon aquifer.

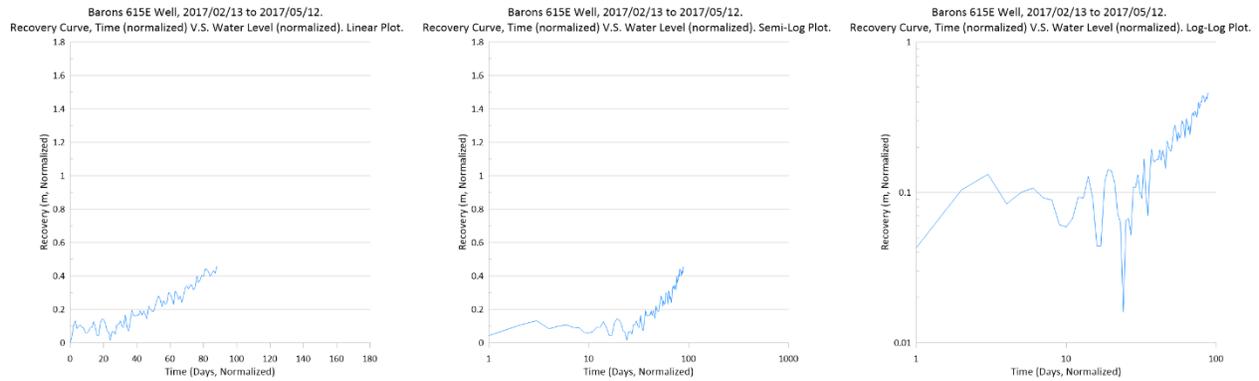


Figure 184: Recovery curve plots for Barons 615E_0117 well, 2017/02/13 to 2017/05/12. Horseshoe Canyon aquifer.

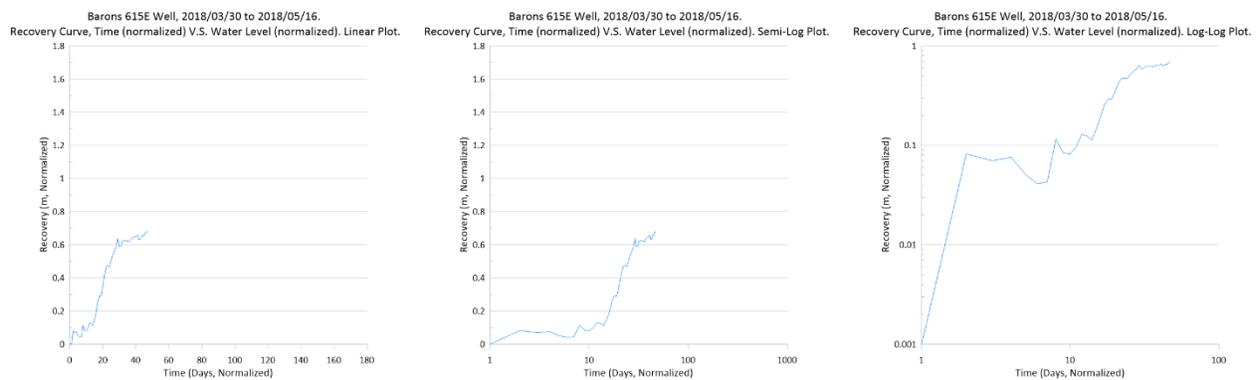


Figure 185: Recovery curve plots for Barons 615E_0117 well, 2018/03/30 to 2018/05/16. Horseshoe Canyon aquifer.

Appendix E2: GOWN Monitoring Well Recovery Curve Plots for Camrose Regional Landfill 85-1_0149 Well

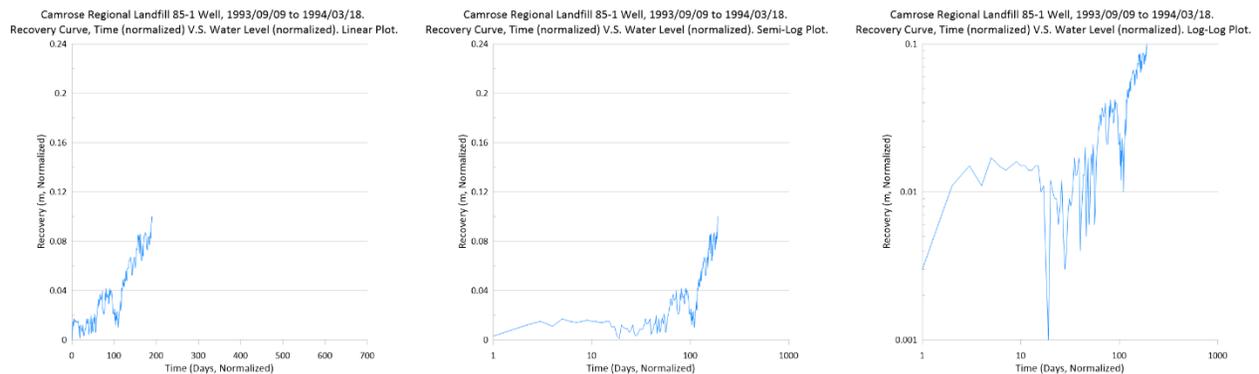


Figure 186: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 1993/09/09 to 1994/03/18. Horseshoe Canyon aquifer.

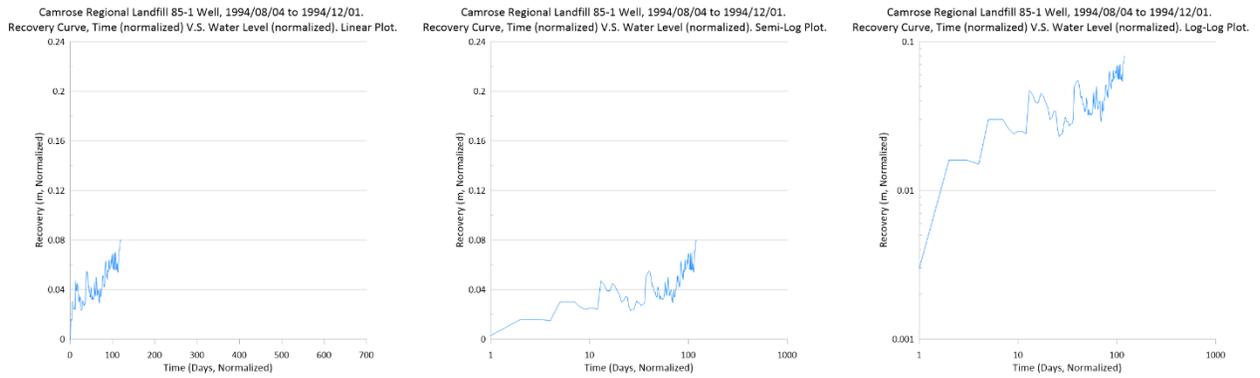


Figure 187: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 1994/08/04 to 1994/12/01. Horseshoe Canyon aquifer.

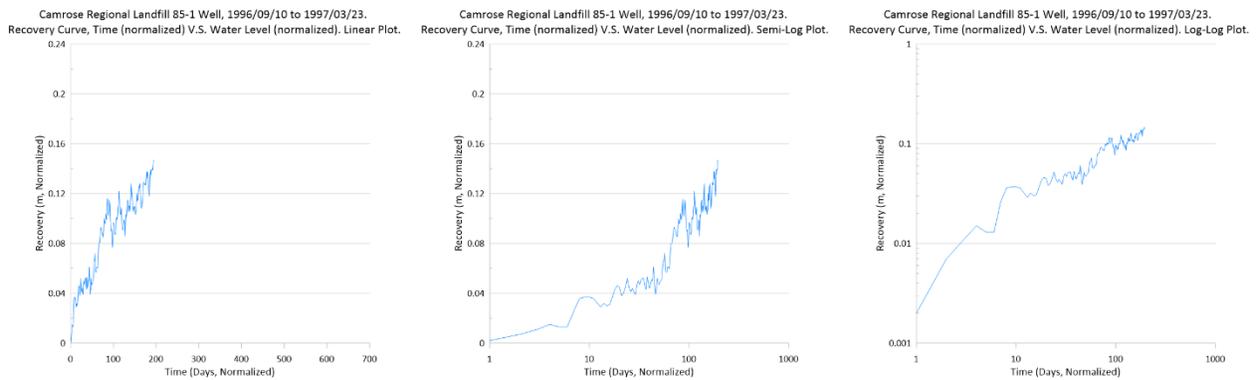


Figure 188: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 1996/09/10 to 1997/03/23. Horseshoe Canyon aquifer.

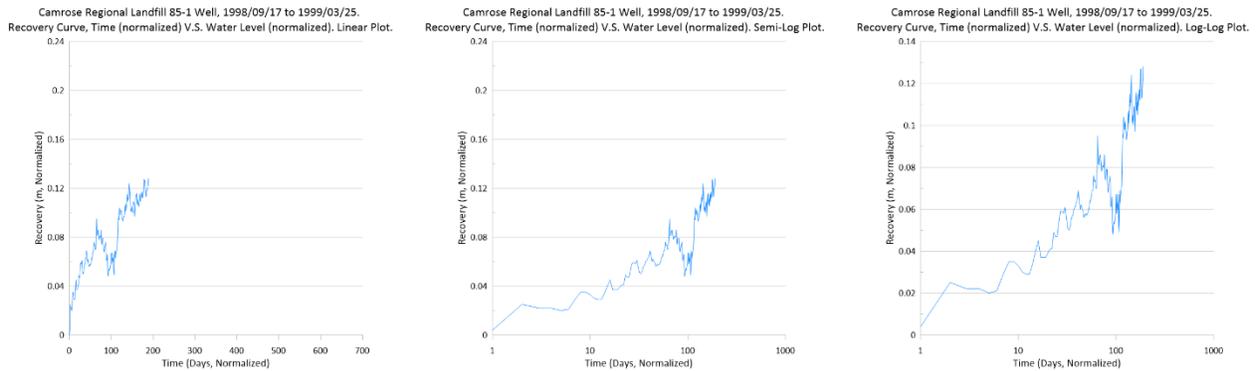


Figure 189: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 1998/09/17 to 1999/03/25. Horseshoe Canyon aquifer.

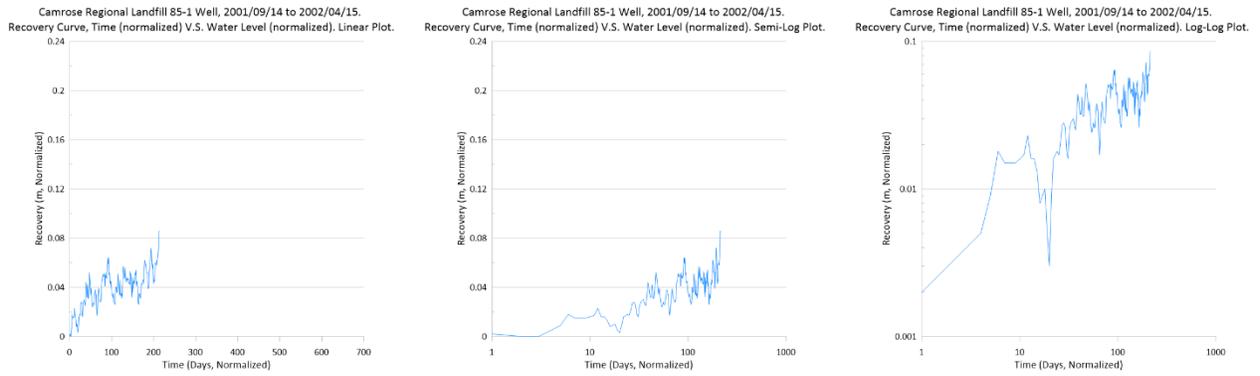


Figure 190: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2001/09/14 to 2002/04/15. Horseshoe Canyon aquifer.

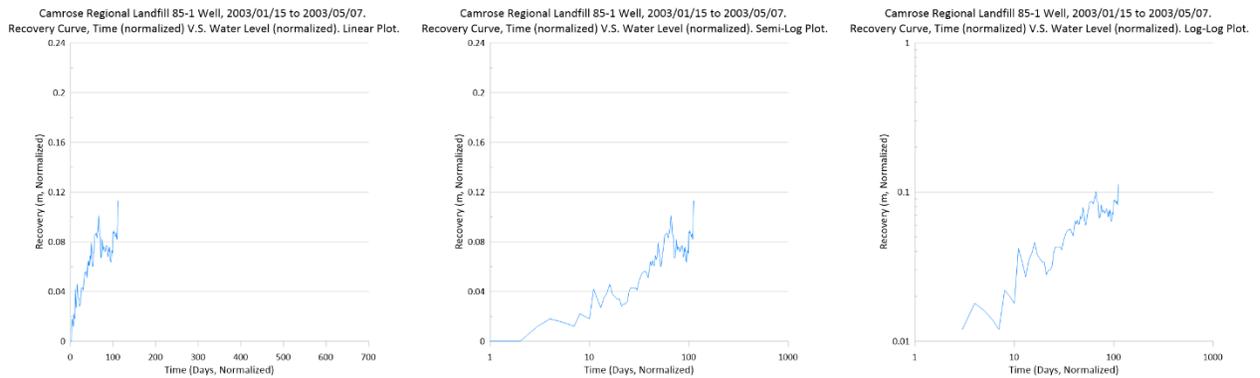


Figure 191: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2003/01/15 to 2003/05/07. Horseshoe Canyon aquifer.

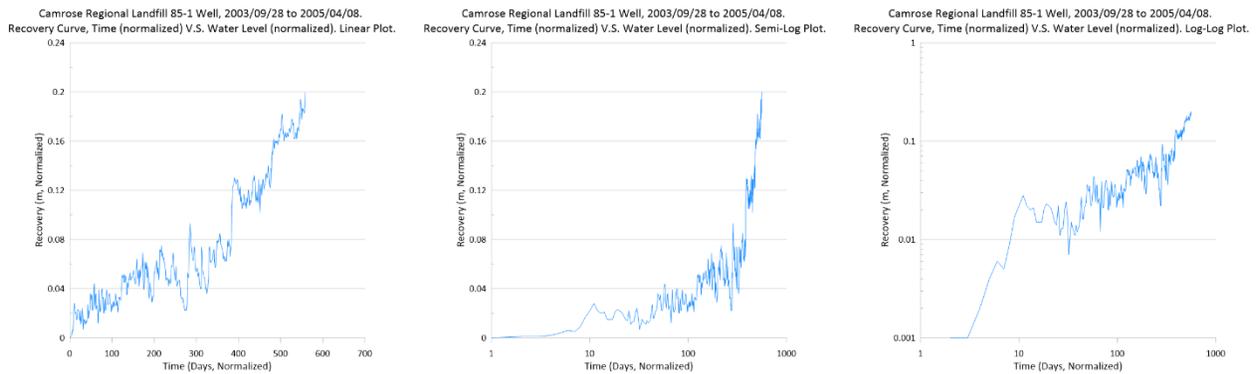


Figure 192: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2003/09/28 to 2005/04/08. Horseshoe Canyon aquifer.

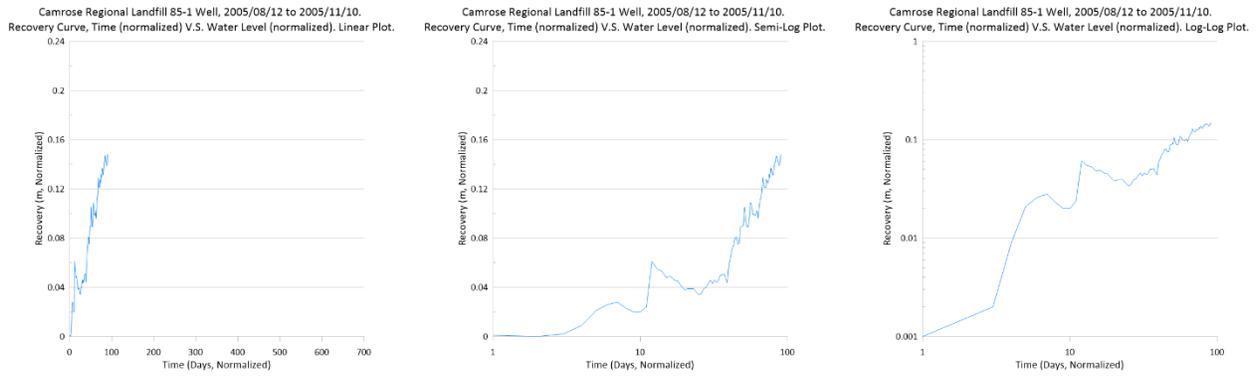


Figure 193: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2005/08/12 to 2005/11/10. Horseshoe Canyon aquifer.

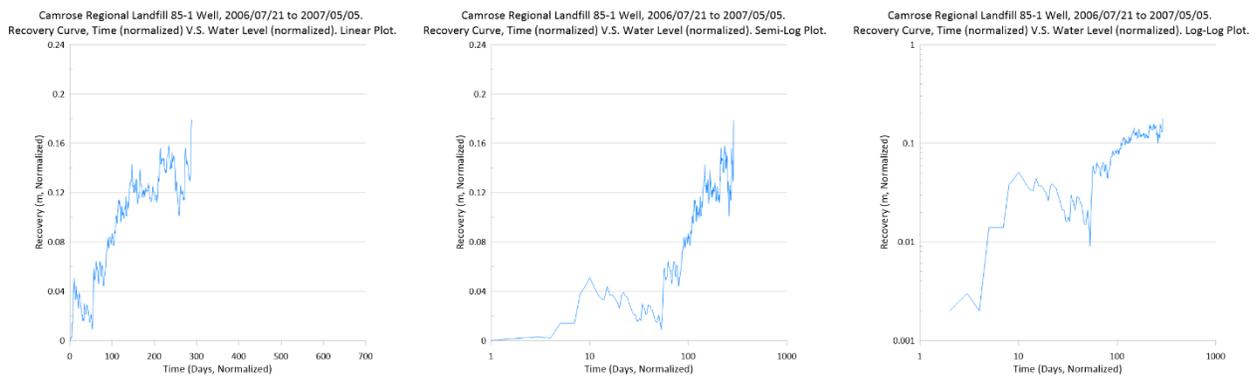


Figure 194: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2006/07/21 to 2007/05/05. Horseshoe Canyon aquifer.

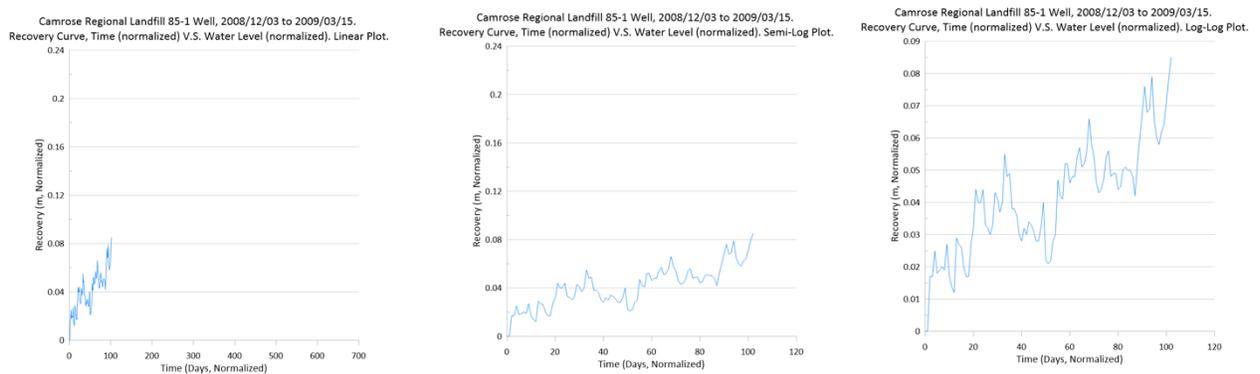


Figure 195: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2008/12/03 to 2009/03/15. Horseshoe Canyon aquifer.

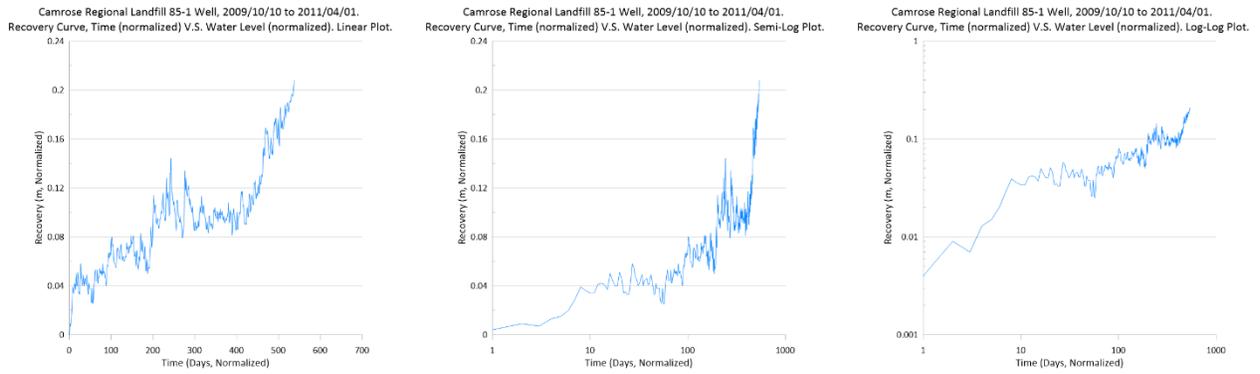


Figure 196: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2009/10/10 to 2011/04/01. Horseshoe Canyon aquifer.

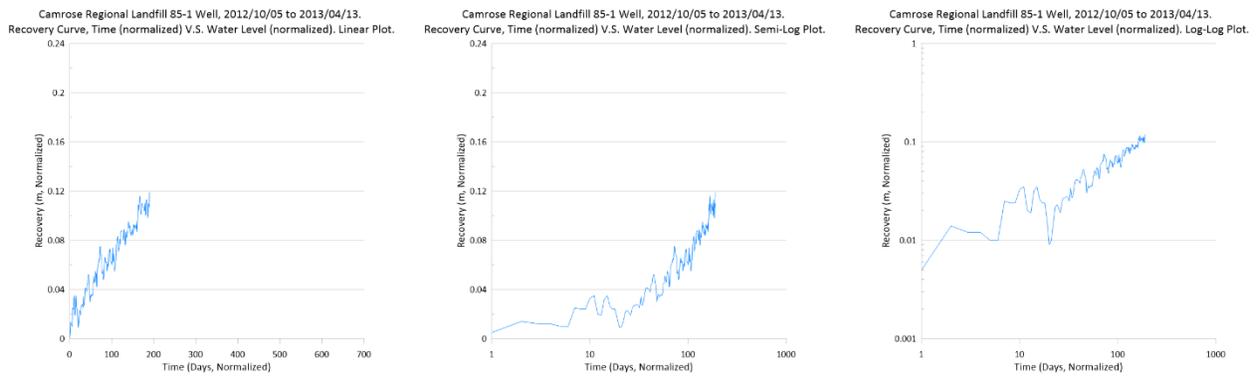


Figure 197: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2012/10/05 to 2013/04/13. Horseshoe Canyon aquifer.

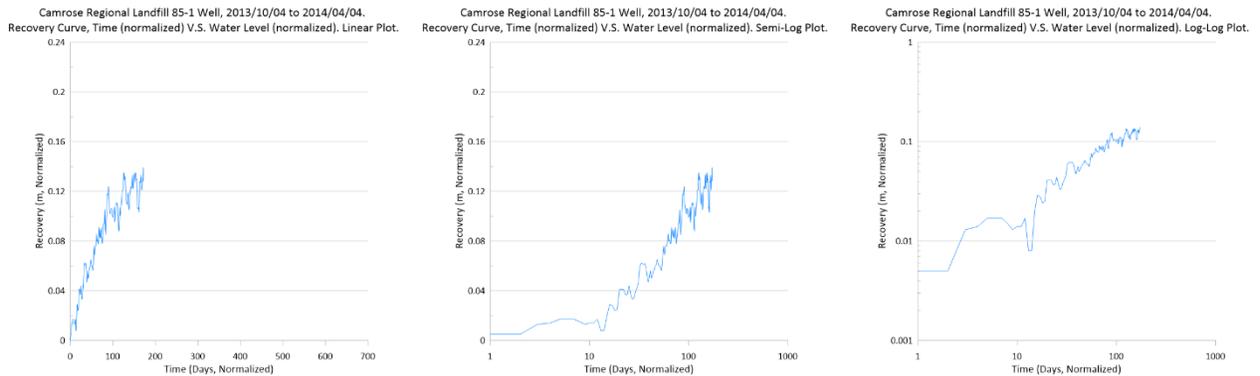


Figure 198: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2013/10/04 to 2014/04/04. Horseshoe Canyon aquifer.

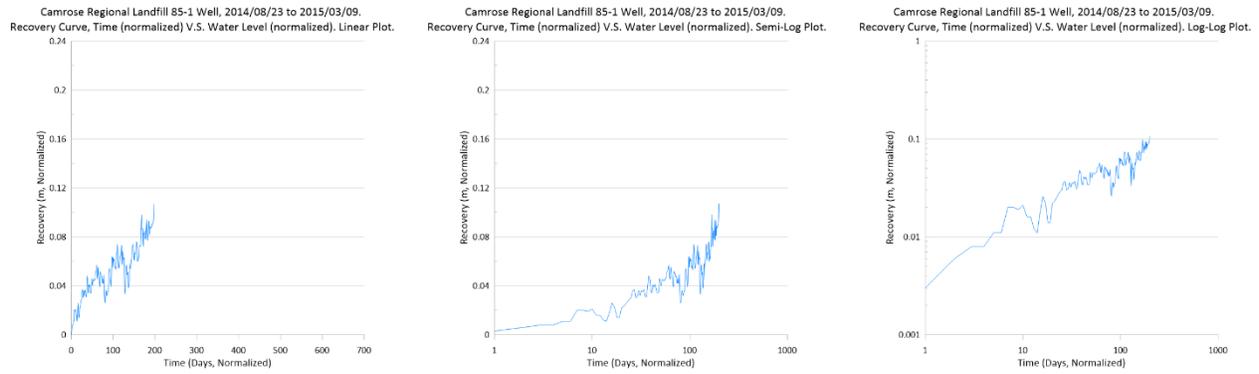


Figure 199: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2014/08/23 to 2015/03/09. Horseshoe Canyon aquifer.

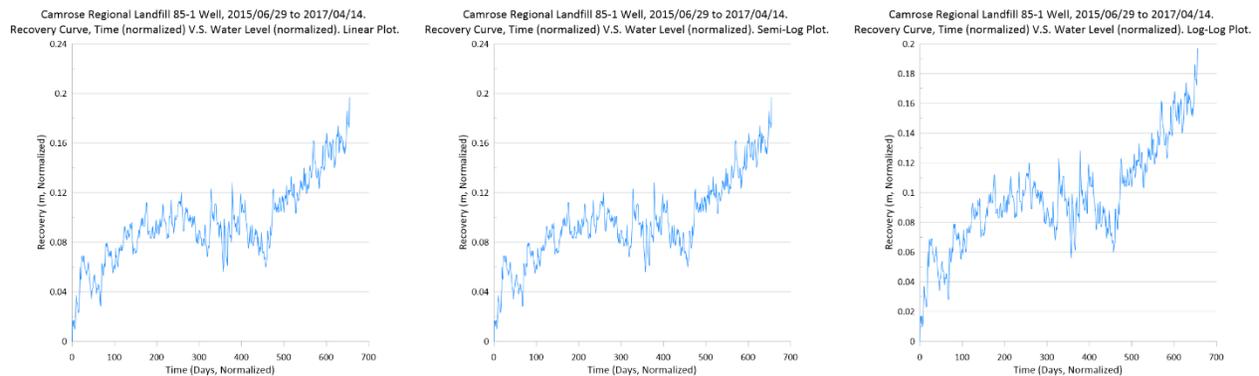


Figure 200: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2015/06/29 to 2017/04/14. Horseshoe Canyon aquifer.

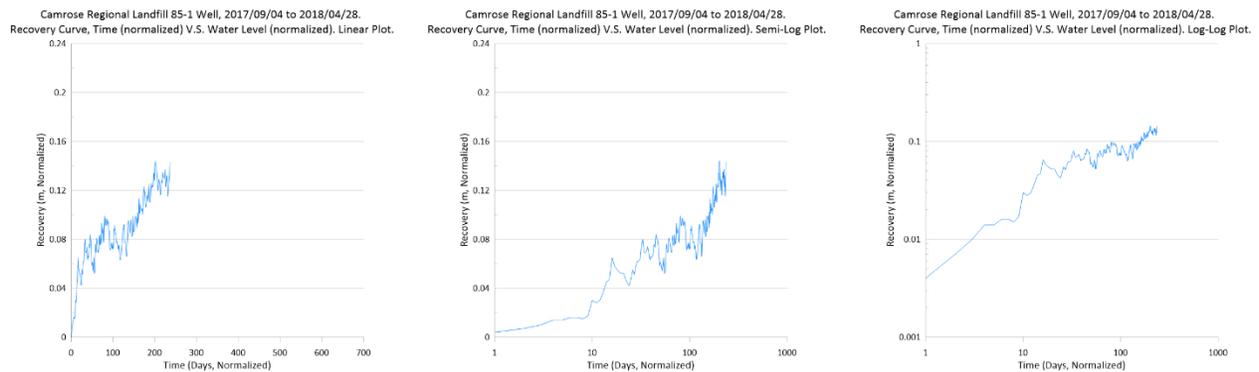


Figure 201: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2017/09/04 to 2018/04/28. Horseshoe Canyon aquifer.

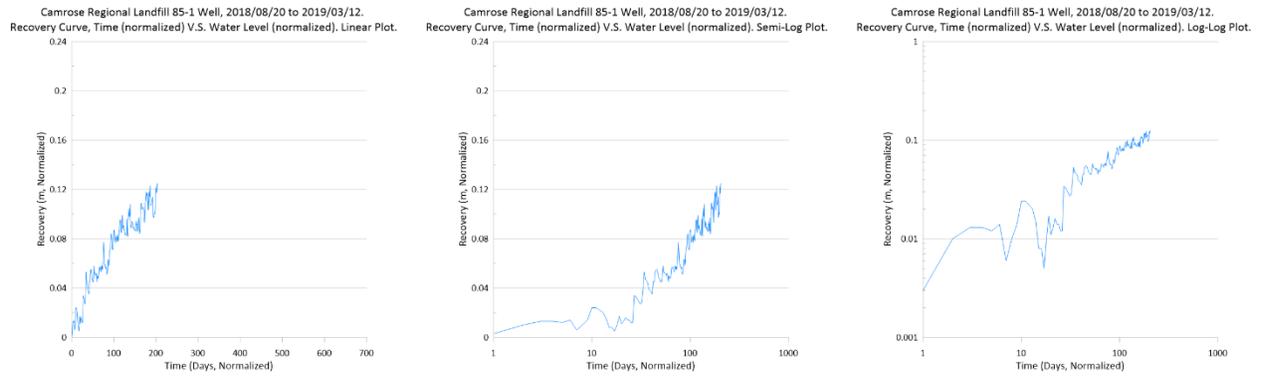


Figure 202: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2018/08/20 to 2019/03/12. Horseshoe Canyon aquifer.

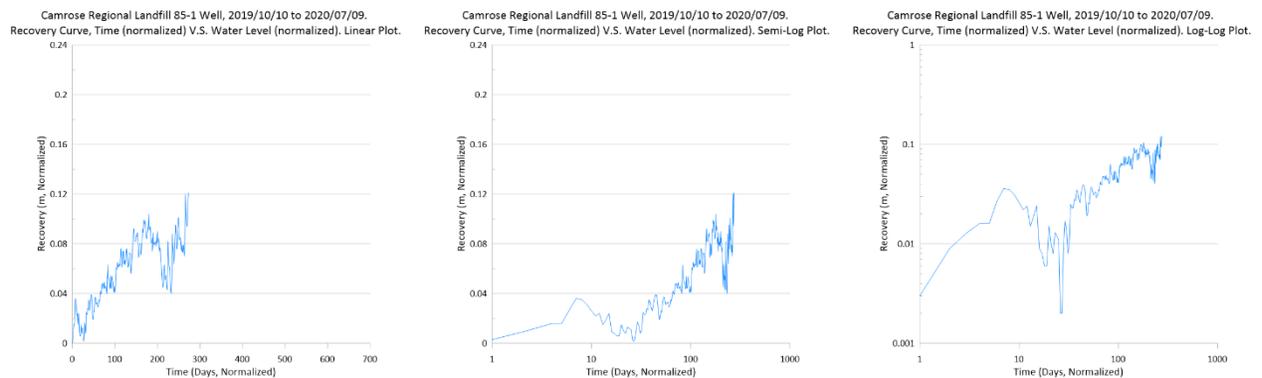


Figure 203: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2019/10/10 to 2020/07/09. Horseshoe Canyon aquifer.

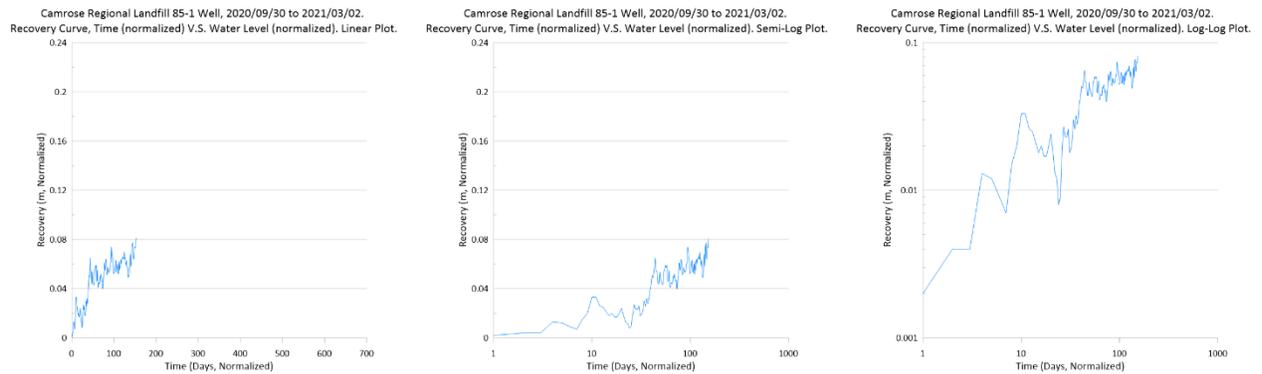


Figure 204: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2020/09/30 to 2021/03/02. Horseshoe Canyon aquifer.

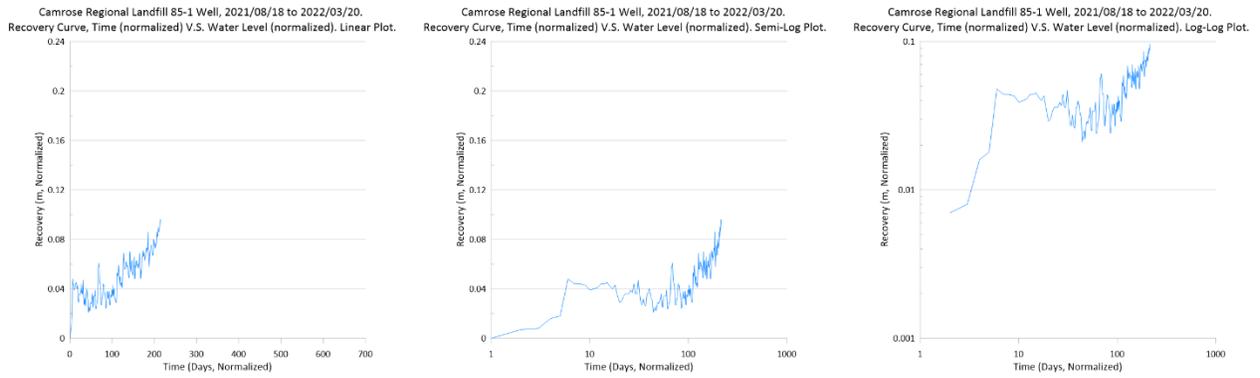


Figure 205: Recovery curve plots for Camrose Regional Landfill 85-1_0149 well, 2021/08/18 to 2022/03/20. Horseshoe Canyon aquifer.

Appendix E3: GOWN Monitoring Well Recovery Curve Plots for Leduc_0153 Well

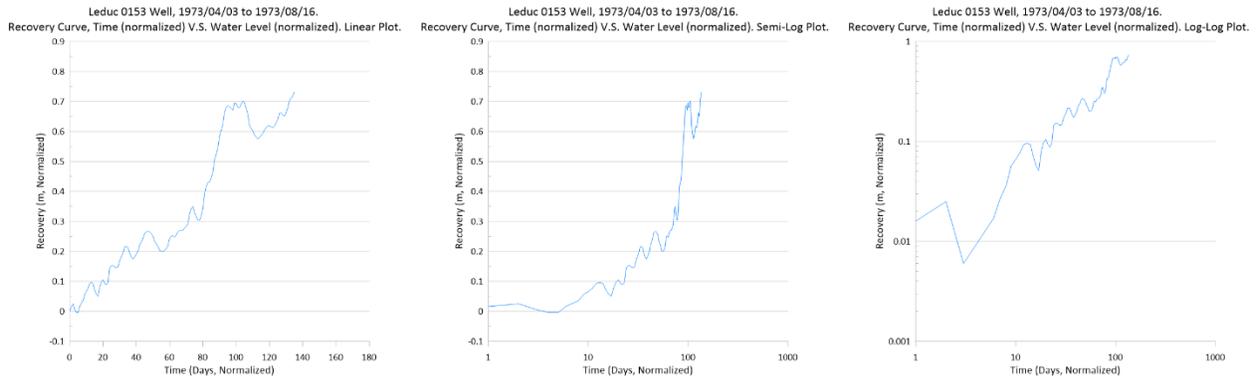


Figure 206: Recovery curve plots for Leduc_0153 well, 1973/04/03 to 1973/08/16. Horseshoe Canyon aquifer.

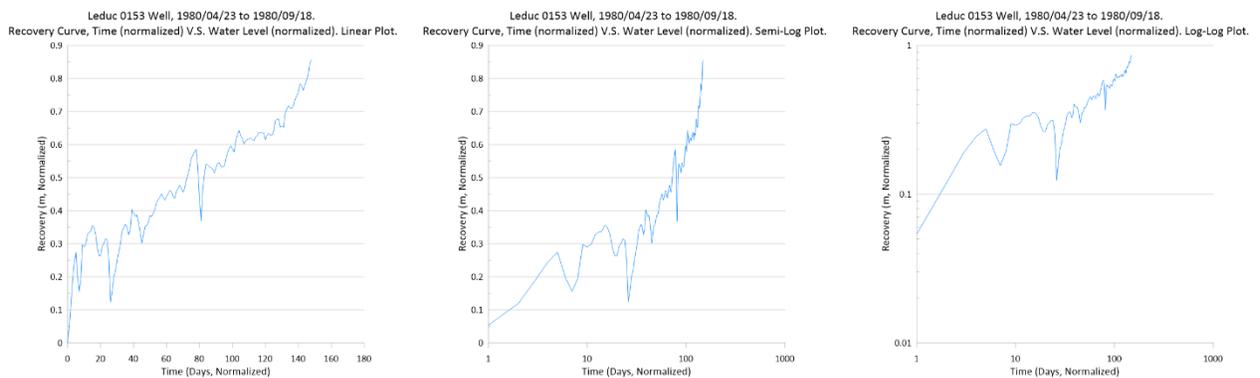


Figure 207: Recovery curve plots for Leduc_0153 well, 1980/04/23 to 1980/09/18. Horseshoe Canyon aquifer.

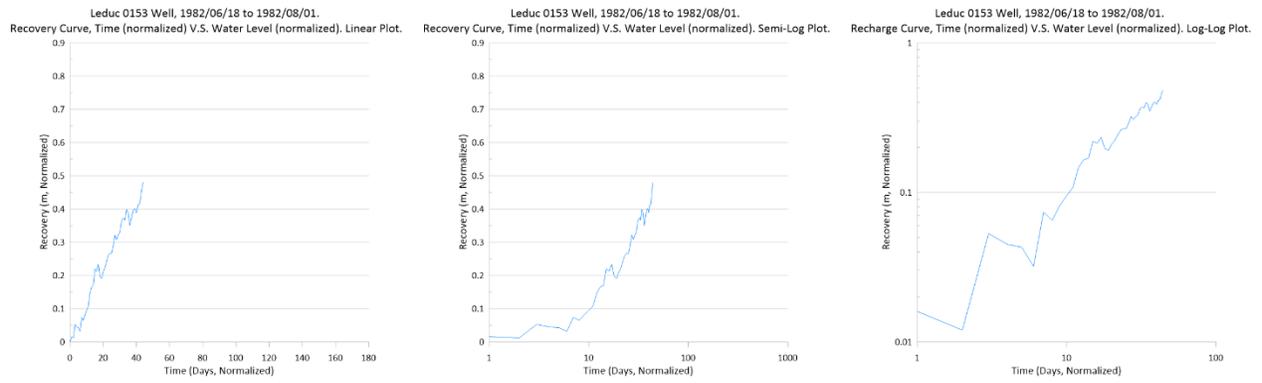


Figure 208: Recovery curve plots for Leduc_0153 well, 1982/06/18 to 1982/08/01. Horseshoe Canyon aquifer.

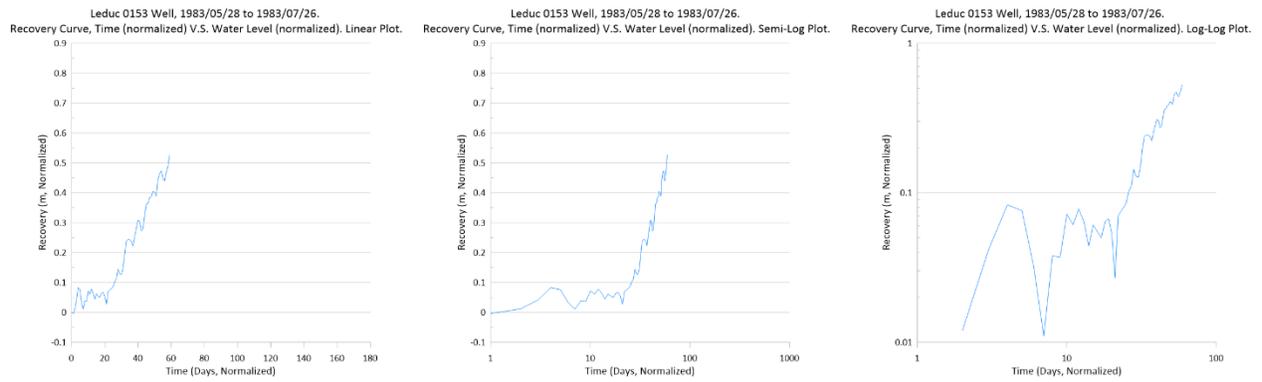


Figure 209: Recovery curve plots for Leduc_0153 well, 1983/05/28 to 1983/07/26. Horseshoe Canyon aquifer.

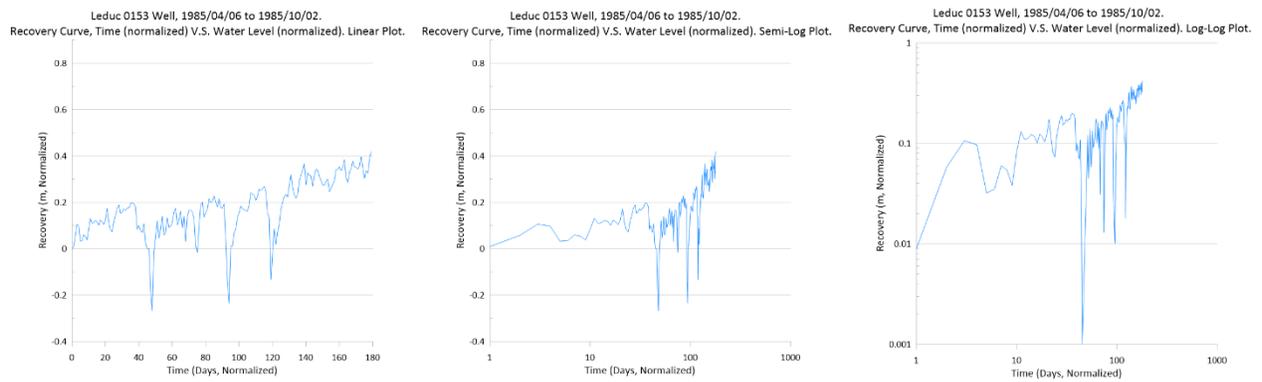


Figure 210: Recovery curve plots for Leduc_0153 well, 1985/04/06 to 1985/10/02. Horseshoe Canyon aquifer.

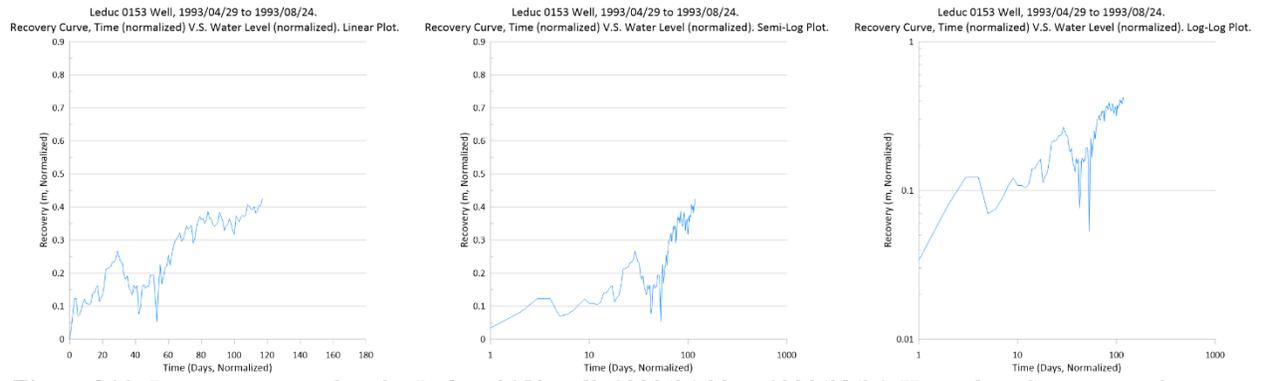


Figure 211: Recovery curve plots for Leduc_0153 well, 1993/04/29 to 1993/08/24. Horseshoe Canyon aquifer.

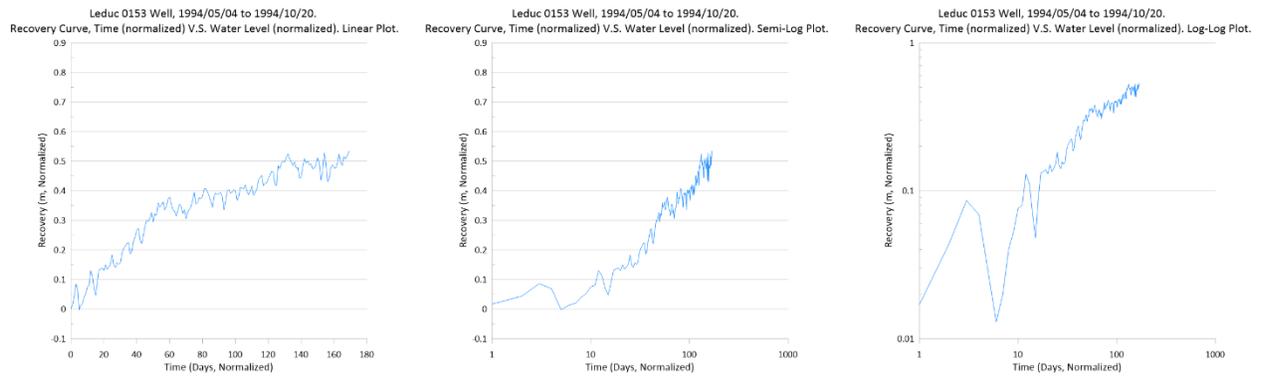


Figure 212: Recovery curve plots for Leduc_0153 well, 1994/05/04 to 1994/10/20. Horseshoe Canyon aquifer.

Appendix F: GOWN Monitoring Well Recovery Curve Plots for Southern Alberta Aquifers Wells

Appendix F1: GOWN Monitoring Well Recovery Curve Plots for Foremost Town_0221 Well

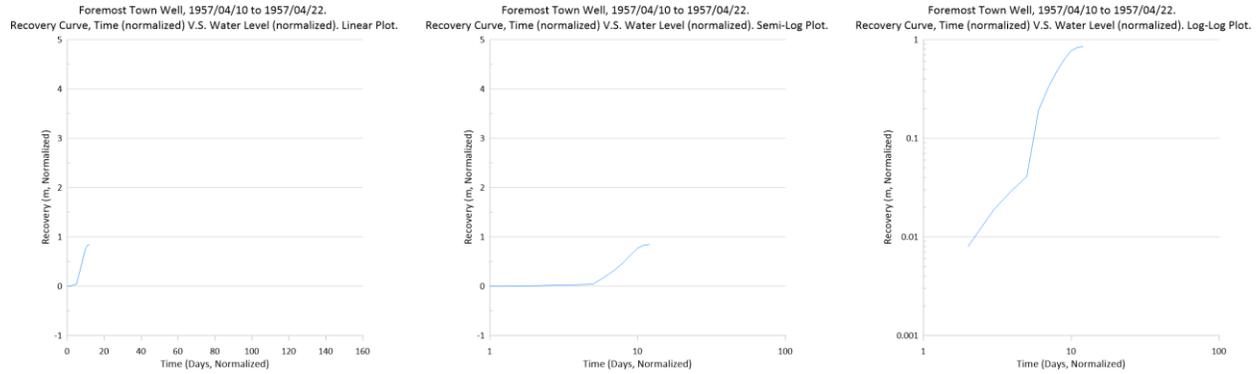


Figure 213: Recovery curve plots for Foremost Town_0221 well, 1957/04/10 to 1957/04/22. Milk River aquifer.

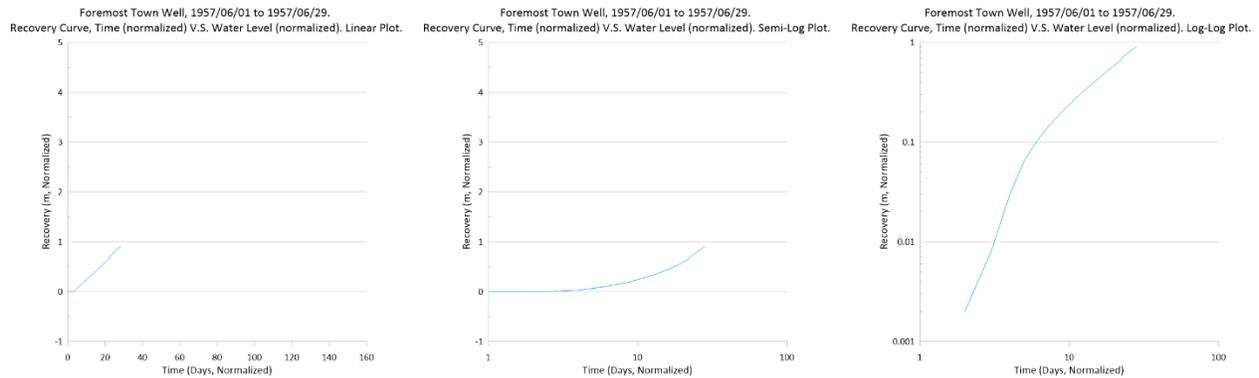


Figure 214: Recovery curve plots for Foremost Town_0221 well, 1957/06/01 to 1957/06/29. Milk River aquifer.

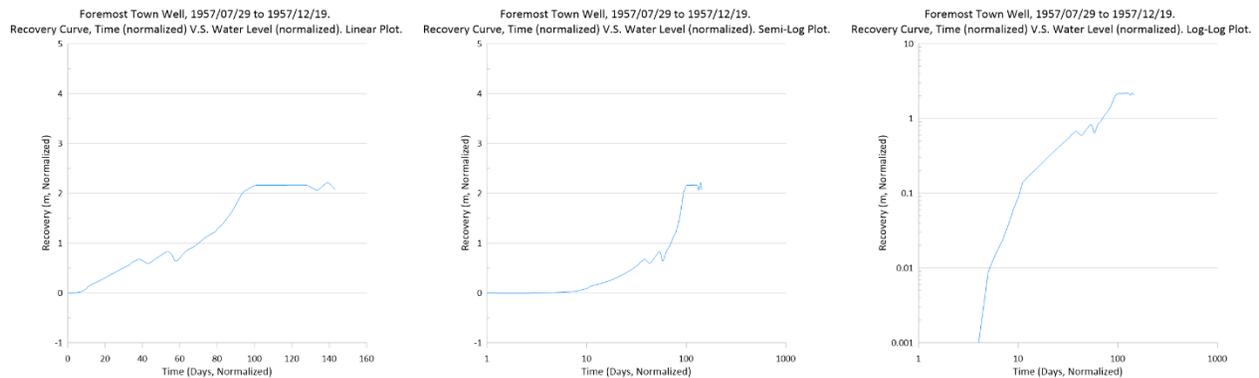


Figure 215: Recovery curve plots for Foremost Town_0221 well, 1957/07/29 to 1957/12/19. Milk River aquifer.

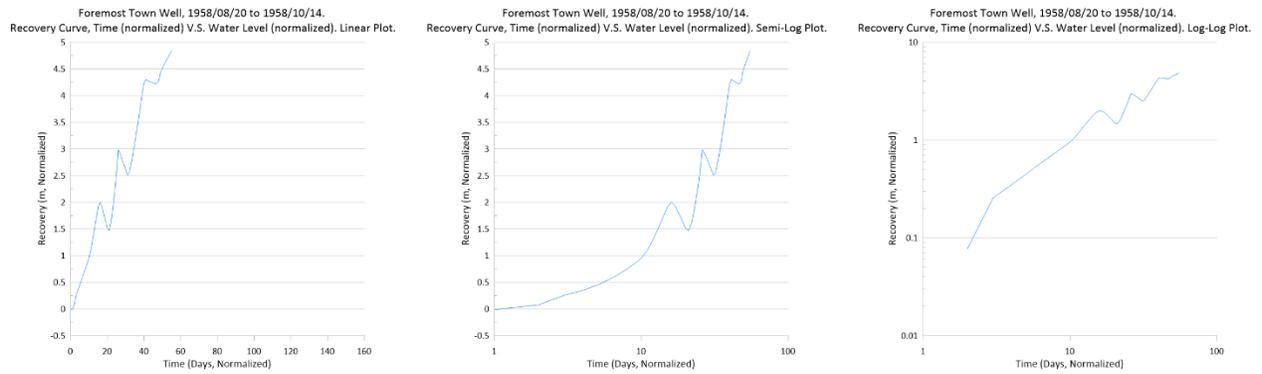


Figure 216: Recovery curve plots for Foremost Town_0221 well, 1958/08/20 to 1958/10/14. Milk River aquifer.

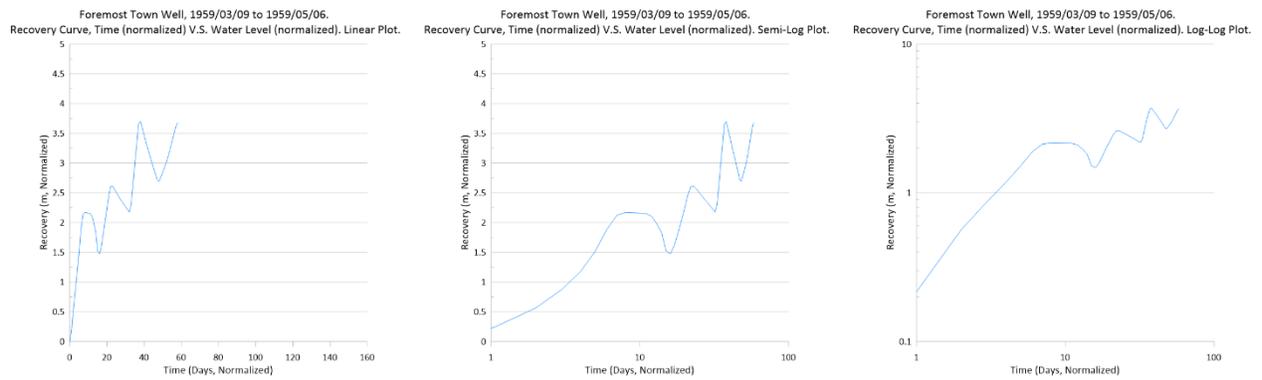


Figure 217: Recovery curve plots for Foremost Town_0221 well, 1959/03/09 to 1959/05/06. Milk River aquifer.

Appendix F2: GOWN Monitoring Well Recovery Curve Plots for Del Bonita 70-3_0101 Well

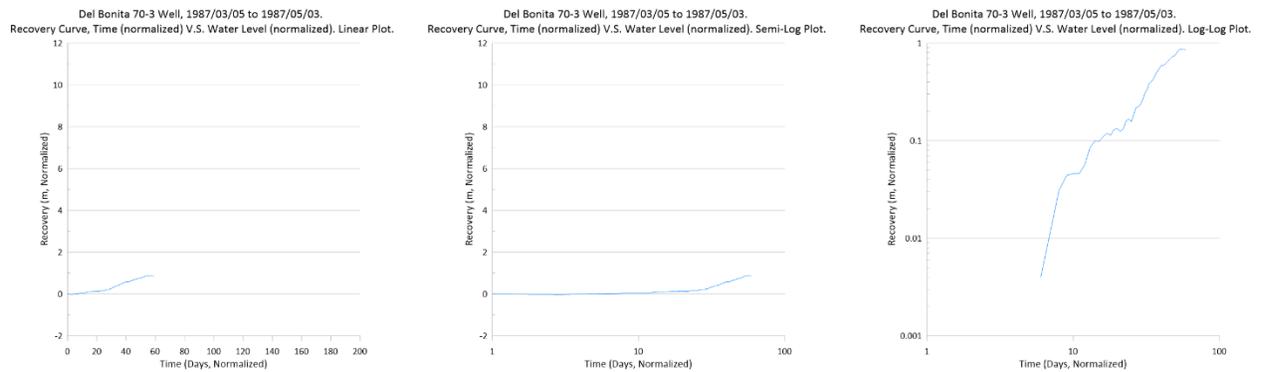


Figure 218: Recovery curve plots for Del Bonita 70-3_0101 well, 1987/03/05 to 1987/05/03. Bearpaw formation aquifer.

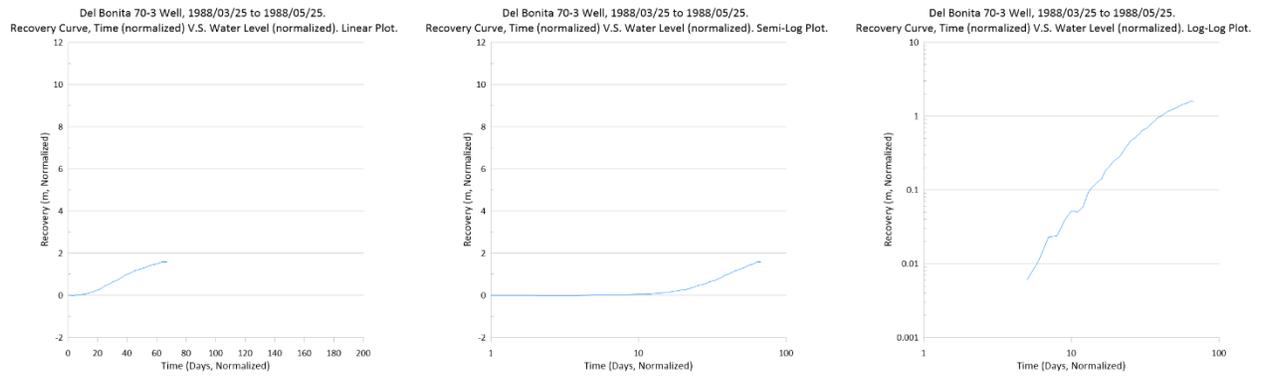


Figure 219: Recovery curve plots for Del Bonita 70-3_0101 well, 1988/03/25 to 1988/05/25. Bearpaw formation aquifer.

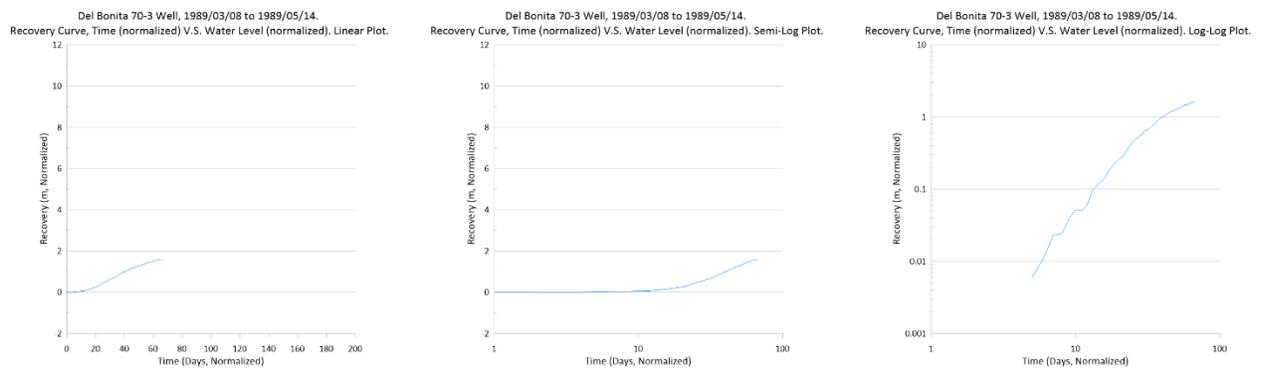


Figure 220: Recovery curve plots for Del Bonita 70-3_0101 well, 1989/03/08 to 1989/05/14. Bearpaw formation aquifer.

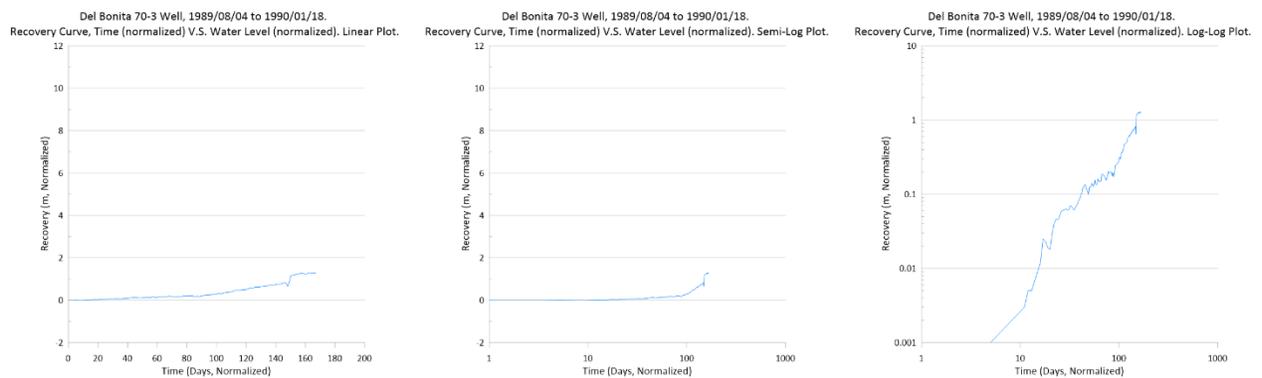


Figure 221: Recovery curve plots for Del Bonita 70-3_0101 well, 1989/08/04 to 1990/01/18. Bearpaw formation aquifer.

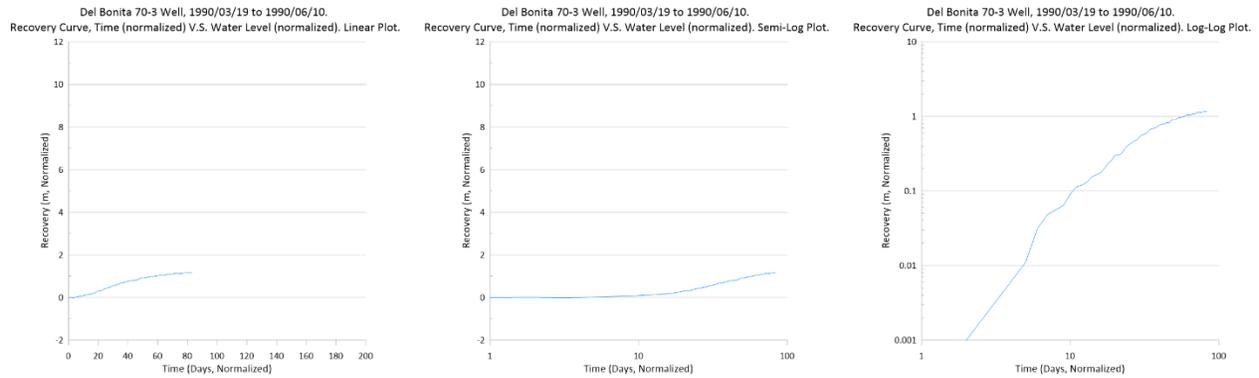


Figure 222: Recovery curve plots for Del Bonita 70-3_ 0101 well, 1990/03/19 to 1990/06/10. Bearpaw formation aquifer.

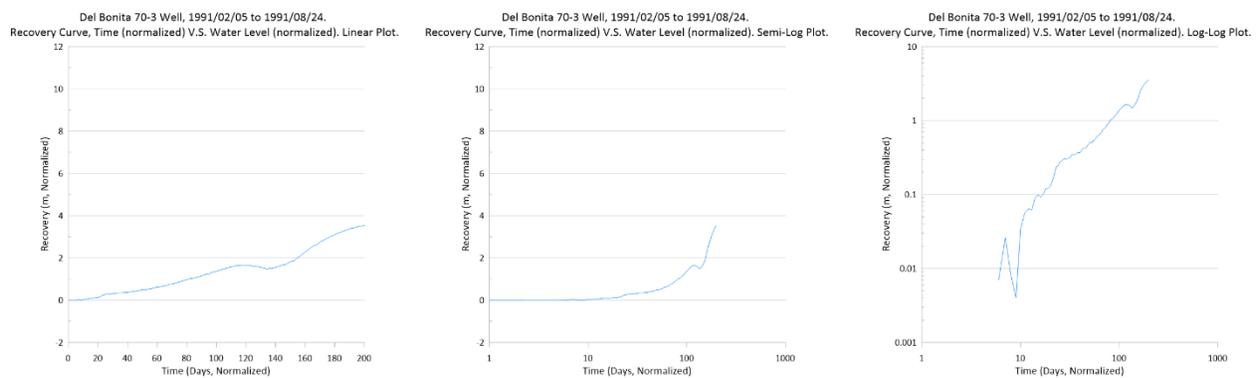


Figure 223: Recovery curve plots for Del Bonita 70-3_ 0101 well, 1991/02/05 to 1991/08/24. Bearpaw formation aquifer.

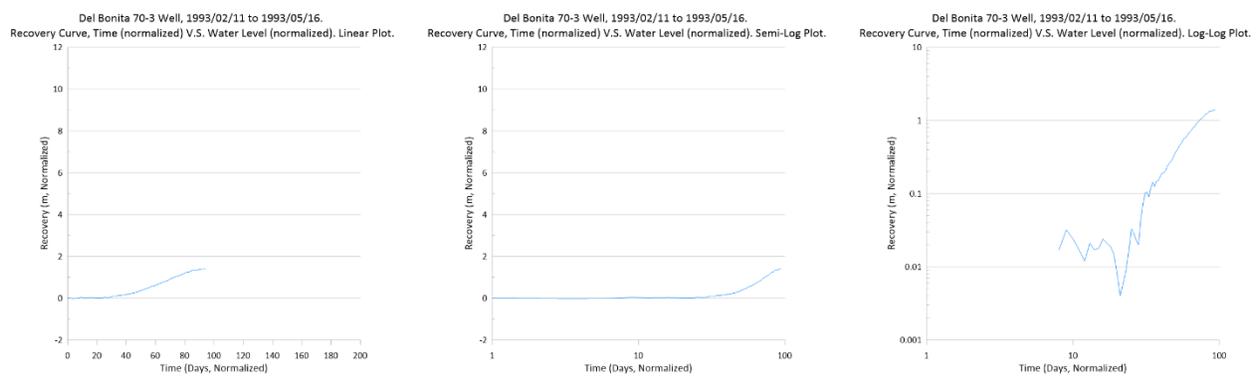


Figure 224: Recovery curve plots for Del Bonita 70-3_ 0101 well, 1992/02/11 to 1993/05/16. Bearpaw formation aquifer.

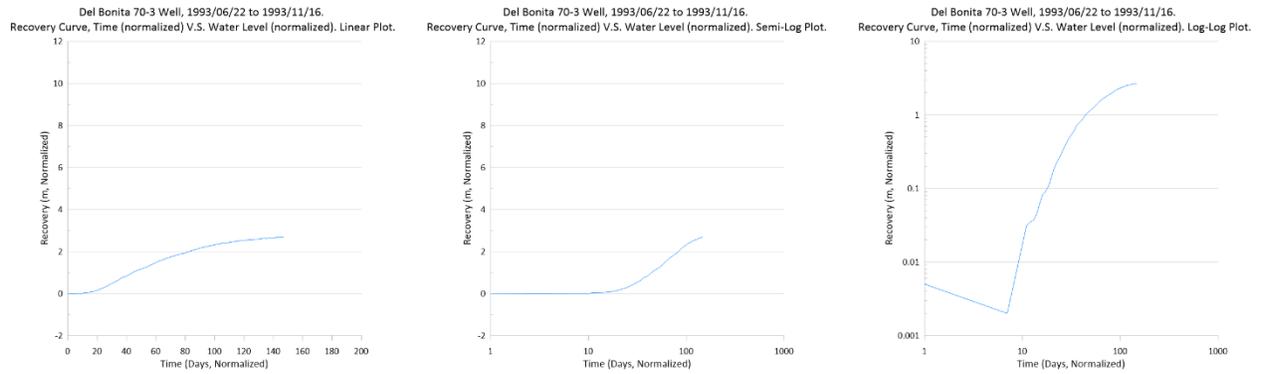


Figure 225: Recovery curve plots for Del Bonita 70-3_0101 well, 1993/06/22 to 1993/11/16. Bearpaw formation aquifer.

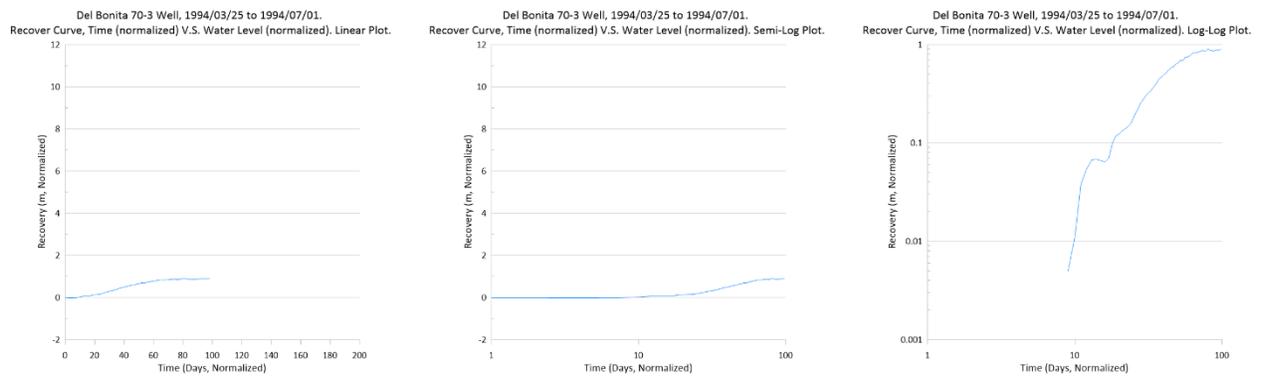


Figure 226: Recovery curve plots for Del Bonita 70-3_0101 well, 1994/03/25 to 1994/07/01. Bearpaw formation aquifer.

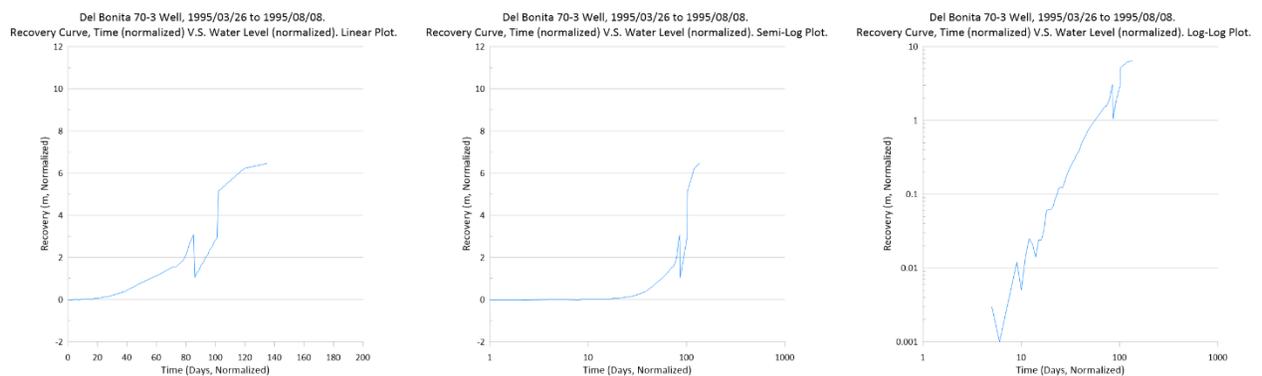


Figure 227: Recovery curve plots for Del Bonita 70-3_0101 well, 1995/03/26 to 1995/08/08. Bearpaw formation aquifer.

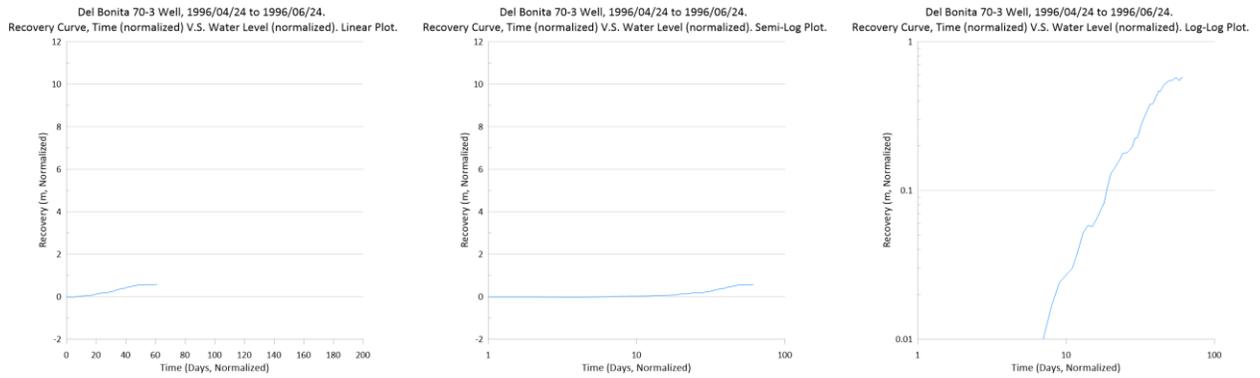


Figure 228: Recovery curve plots for Del Bonita 70-3_0101 well, 1996/04/24 to 1996/06/24. Bearpaw formation aquifer.

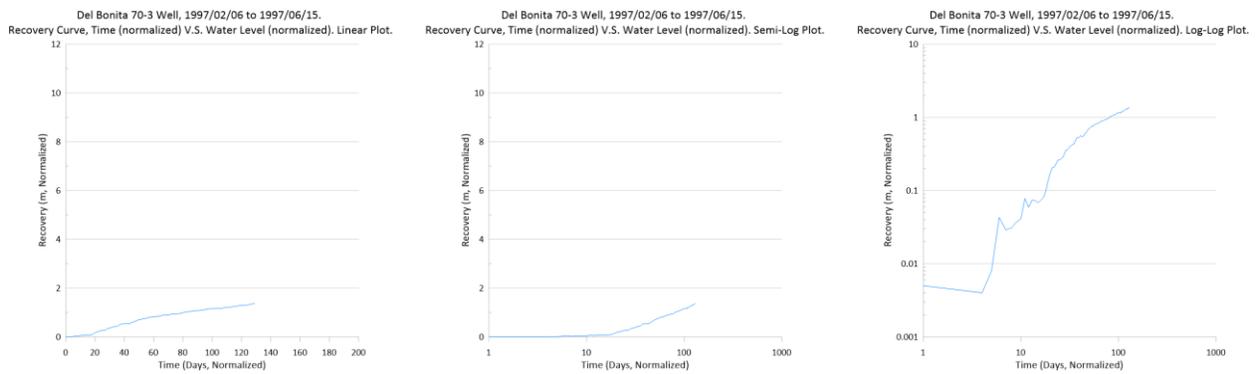


Figure 229: Recovery curve plots for Del Bonita 70-3_0101 well, 1997/02/06 to 1997/06/15. Bearpaw formation aquifer.

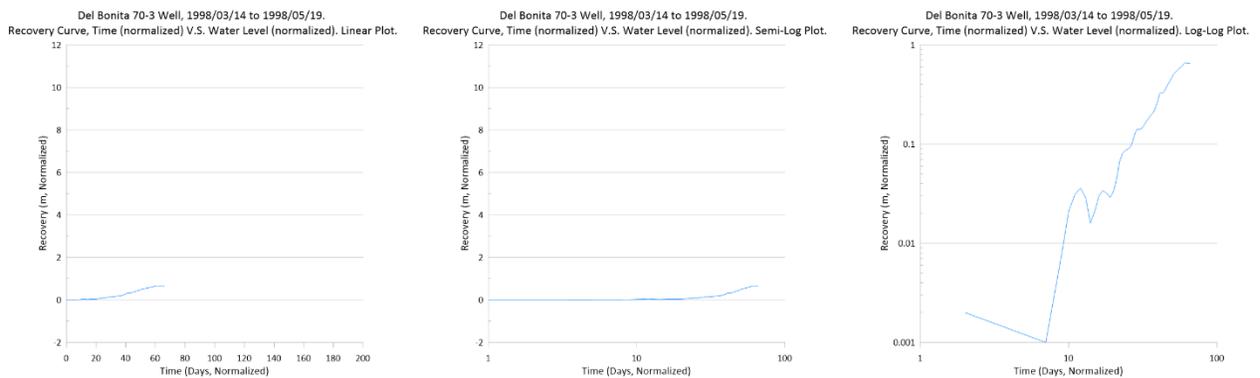


Figure 230: Recovery curve plots for Del Bonita 70-3_0101 well, 1998/03/14 to 1998/05/19. Bearpaw formation aquifer.

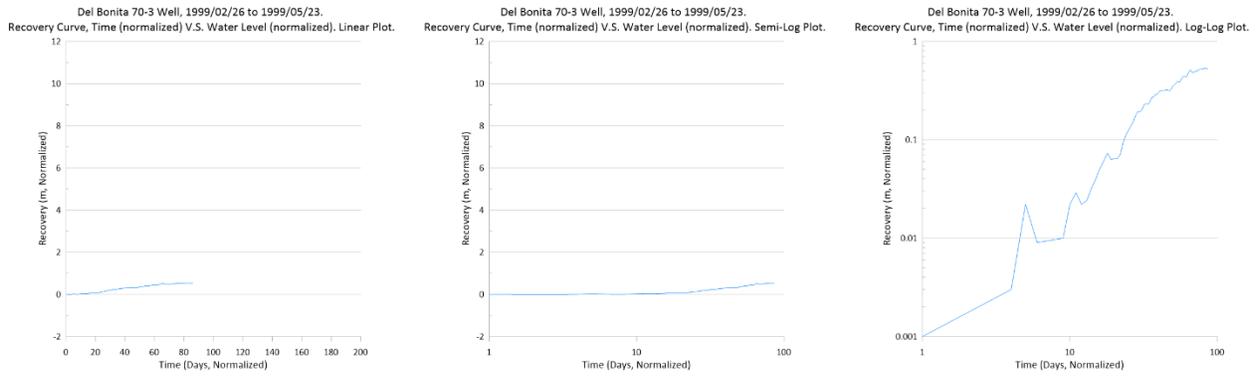


Figure 231: Recovery curve plots for Del Bonita 70-3_0101 well, 1999/02/26 to 1999/05/23. Bearpaw formation aquifer.

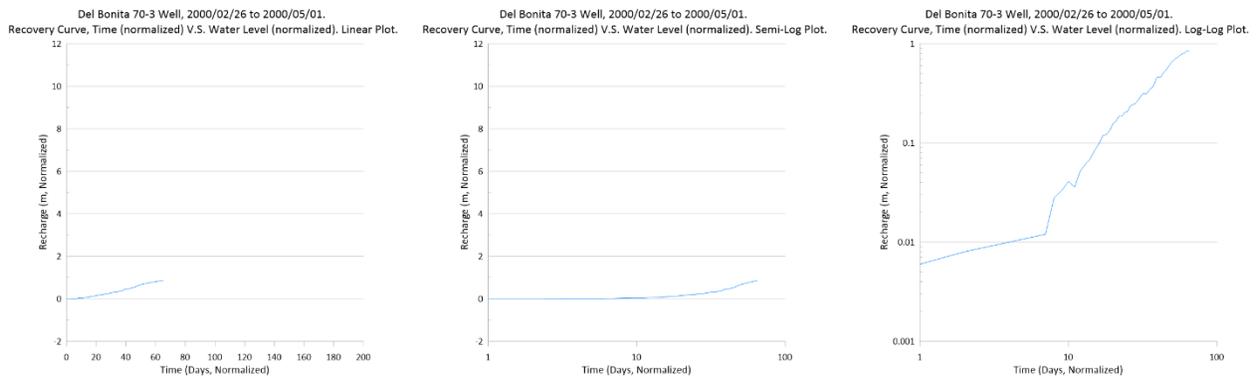


Figure 232: Recovery curve plots for Del Bonita 70-3_0101 well, 2000/02/26 to 2000/05/01. Bearpaw formation aquifer.

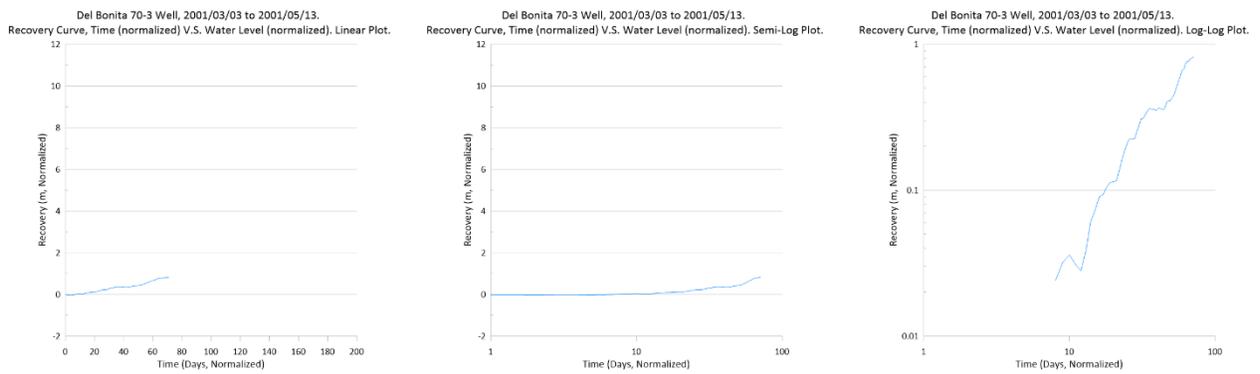


Figure 233: Recovery curve plots for Del Bonita 70-3_0101 well, 2001/03/03 to 2001/05/13. Bearpaw formation aquifer.

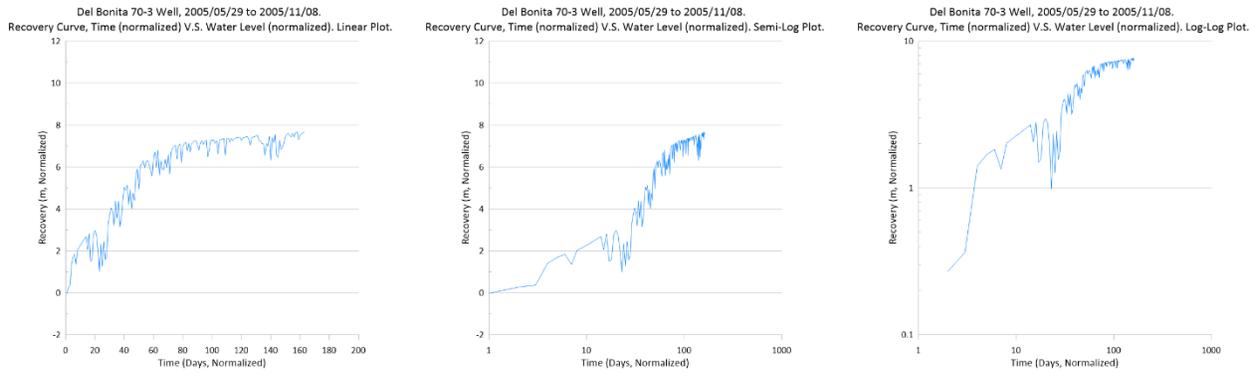


Figure 234: Recovery curve plots for Del Bonita 70-3_0101 well, 2005/05/29 to 2005/11/08. Bearpaw formation aquifer.

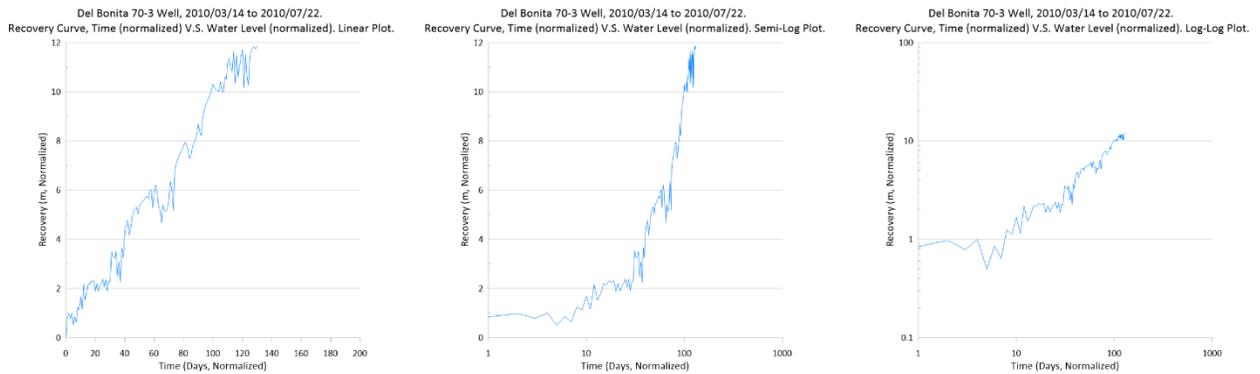


Figure 235: Recovery curve plots for Del Bonita 70-3_0101 well, 2010/03/14 to 2010/07/22. Bearpaw formation aquifer.

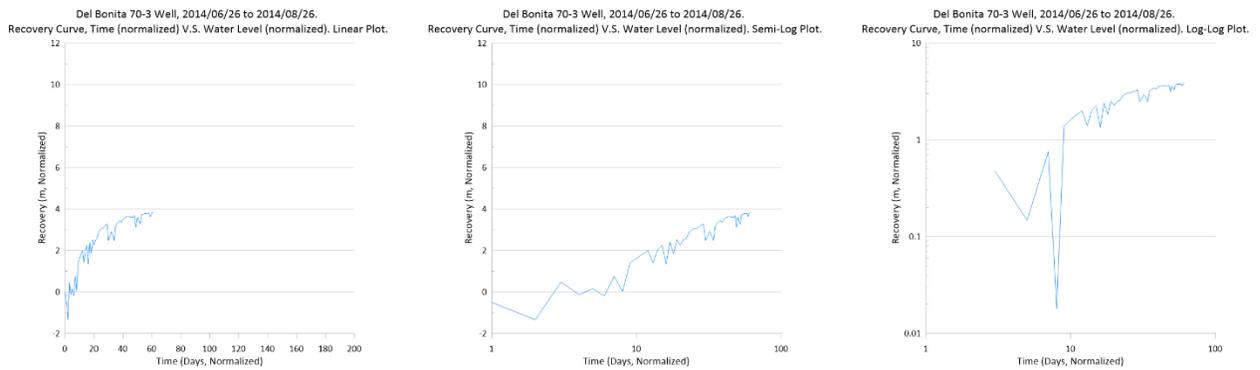


Figure 236: Recovery curve plots for Del Bonita 70-3_0101 well, 2014/06/26 to 2014/08/26. Bearpaw formation aquifer.

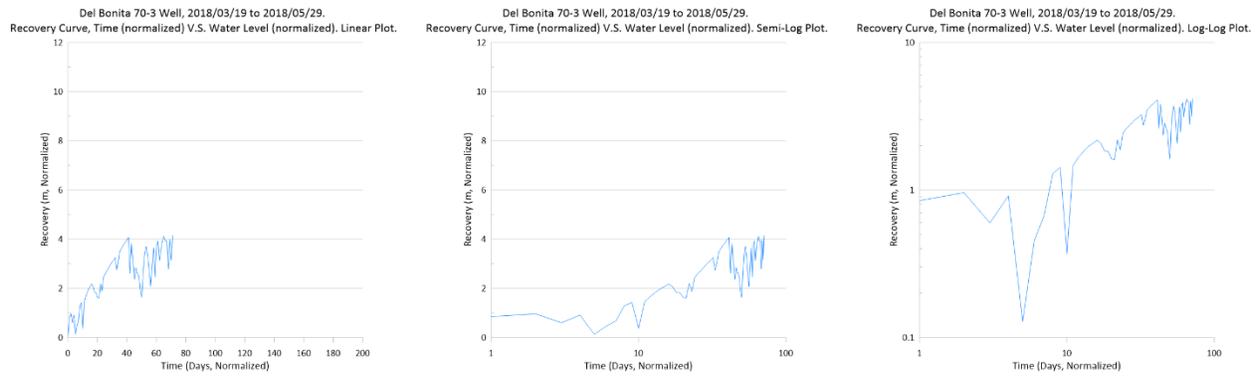


Figure 237: Recovery curve plots for Del Bonita 70-3_0101 well, 2018/03/19 to 2018/05/29. Bearpaw formation aquifer.

Appendix F3: GOWN Monitoring Well Recovery Curve Plots for Orton 1514E_0114 Well

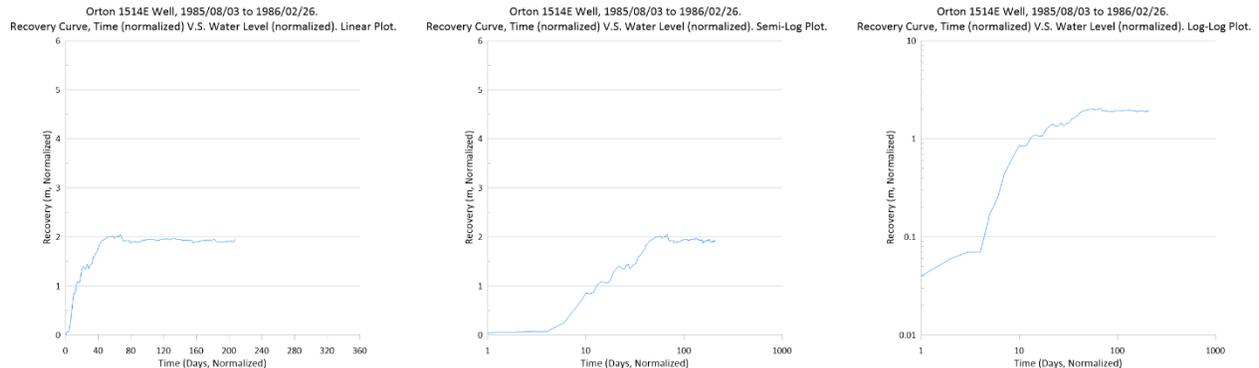


Figure 238: Recovery curve plots for Orton 1514E_0114 well, 1985/08/03 to 1986/02/26. Lethbridge Valley aquifer.

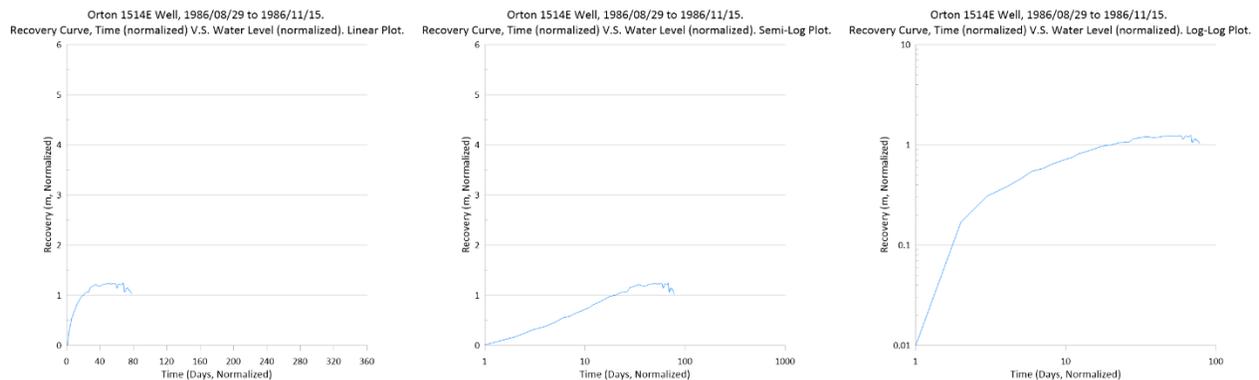


Figure 239: Recovery curve plots for Orton 1514E_0114 well, 1986/08/29 to 1986/11/15. Lethbridge Valley aquifer.

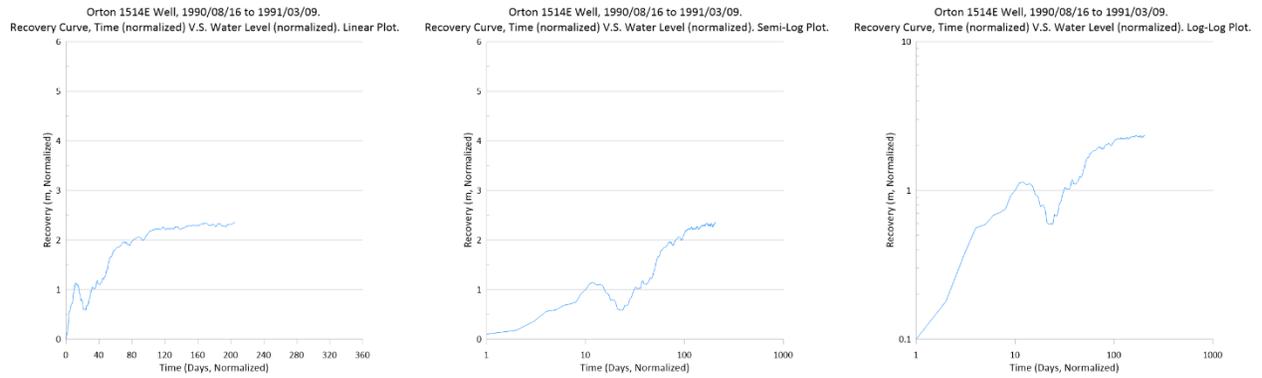


Figure 240: Recovery curve plots for Orton 1514E_0114 well, 1990/08/16 to 1991/03/09. Lethbridge Valley aquifer.

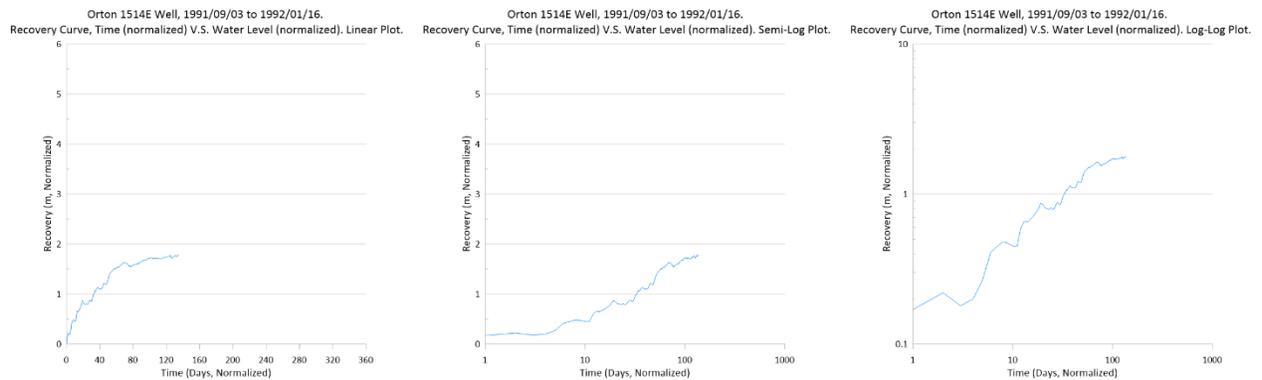


Figure 241: Recovery curve plots for Orton 1514E_0114 well, 1991/09/03 to 1992/01/16. Lethbridge Valley aquifer.

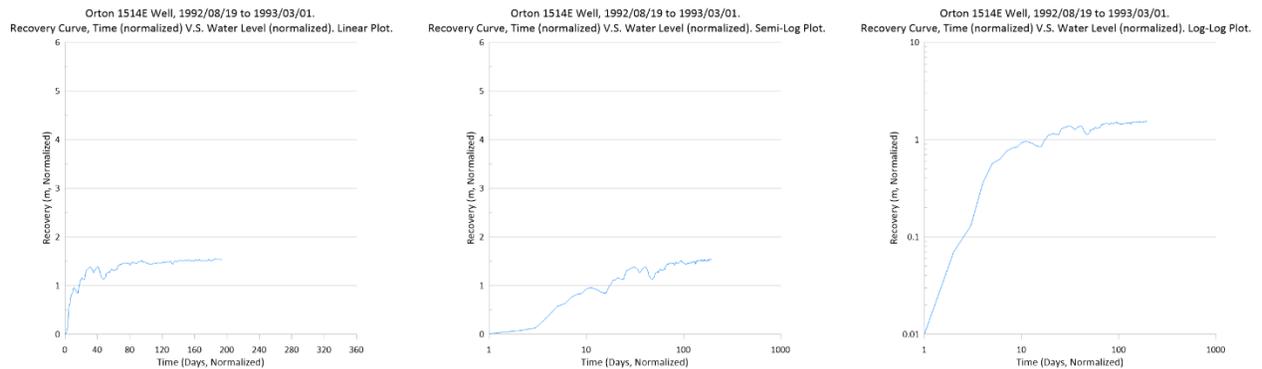


Figure 242: Recovery curve plots for Orton 1514E_0114 well, 1992/08/19 to 1993/03/01. Lethbridge Valley aquifer.

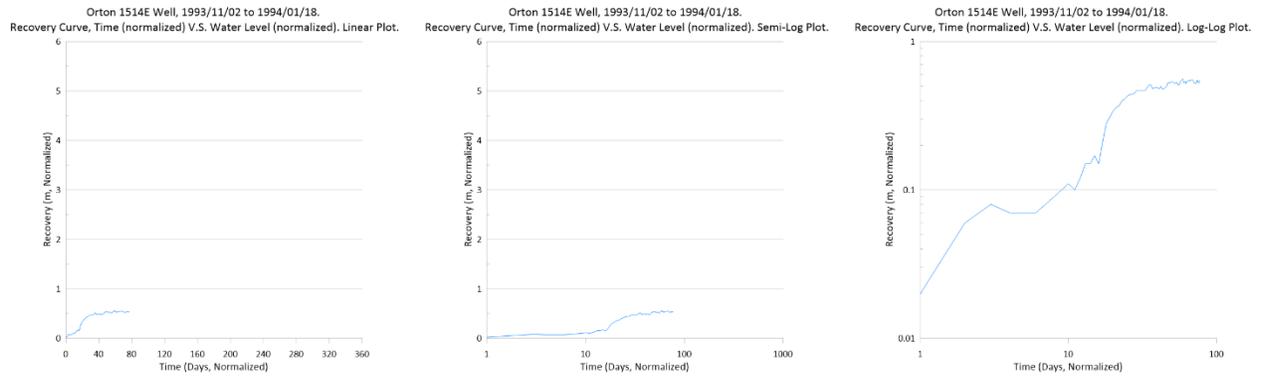


Figure 243: Recovery curve plots for Orton 1514E_0114 well, 1993/11/02 to 1994/01/18. Lethbridge Valley aquifer.

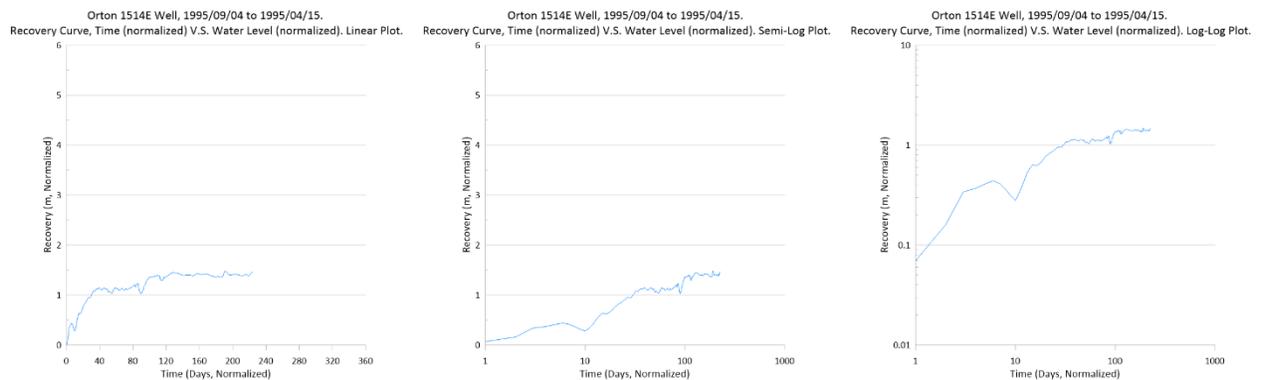


Figure 244: Recovery curve plots for Orton 1514E_0114 well, 1995/09/04 to 1995/04/15. Lethbridge Valley aquifer.

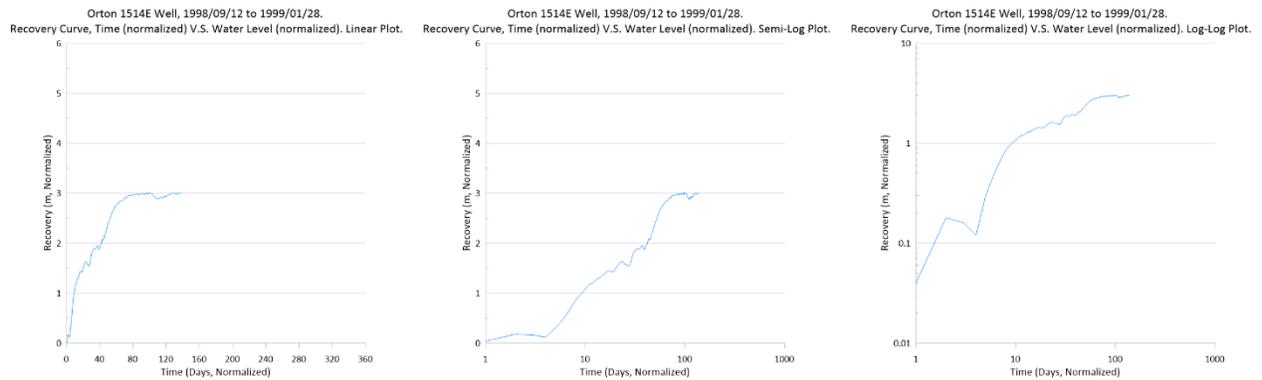


Figure 245: Recovery curve plots for Orton 1514E_0114 well, 1998/09/12 to 1999/01/28. Lethbridge Valley aquifer.

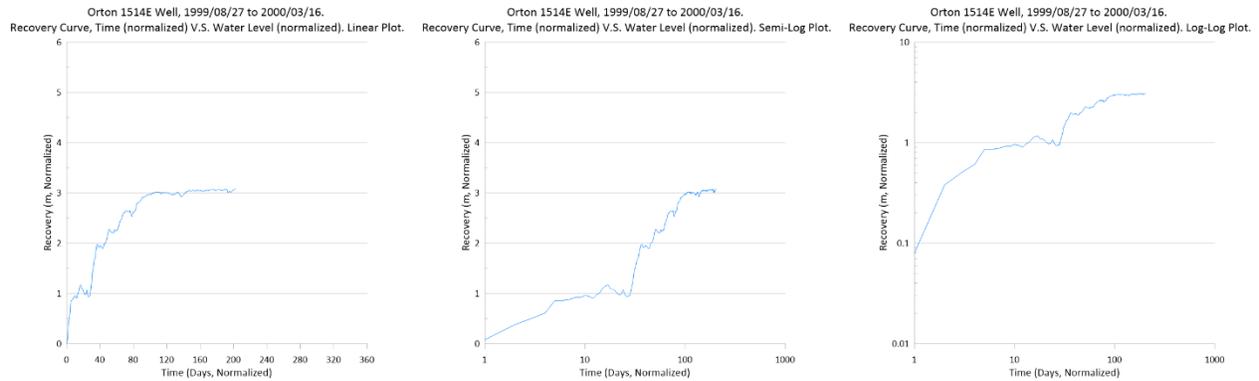


Figure 246: Recovery curve plots for Orton 1514E_0114 well, 1999/08/27 to 1999/08/16. Lethbridge Valley aquifer.

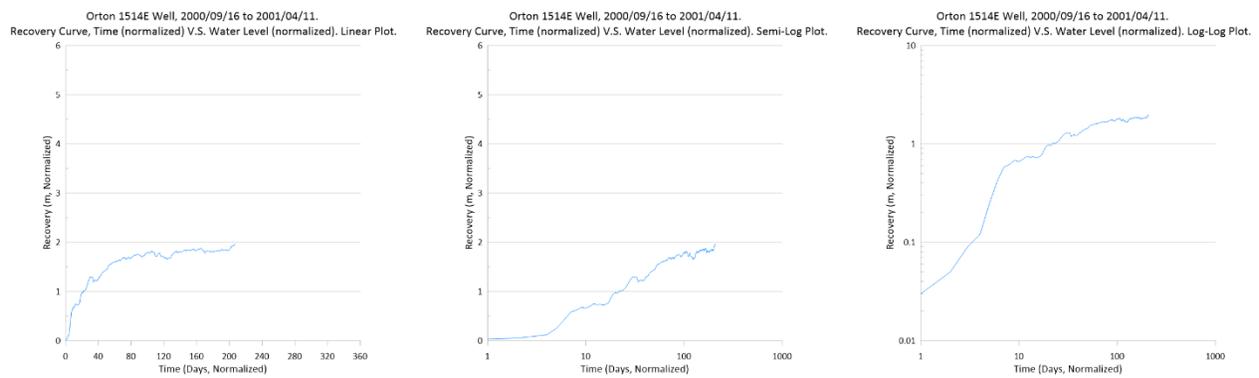


Figure 247: Recovery curve plots for Orton 1514E_0114 well, 2000/09/16 to 2001/04/11. Lethbridge Valley aquifer.

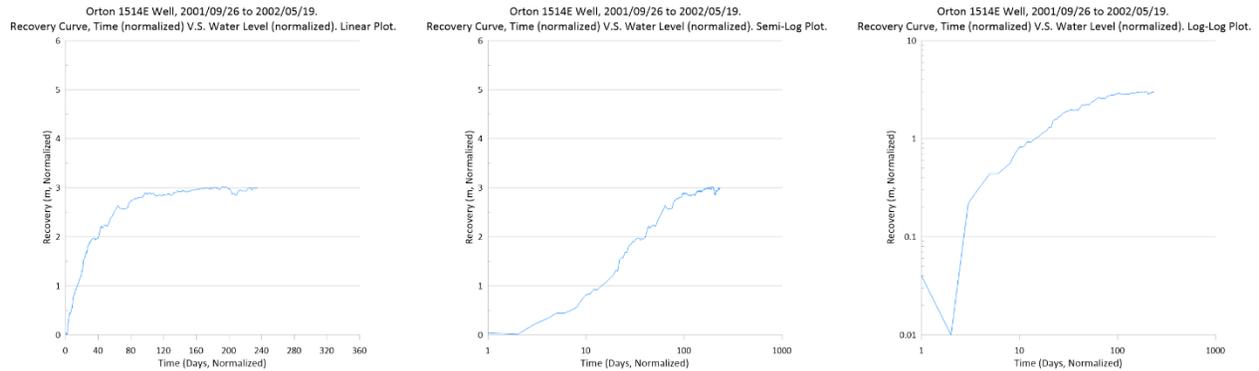


Figure 248: Recovery curve plots for Orton 1514E_0114 well, 2001/09/26 to 2002/05/19. Lethbridge Valley aquifer.

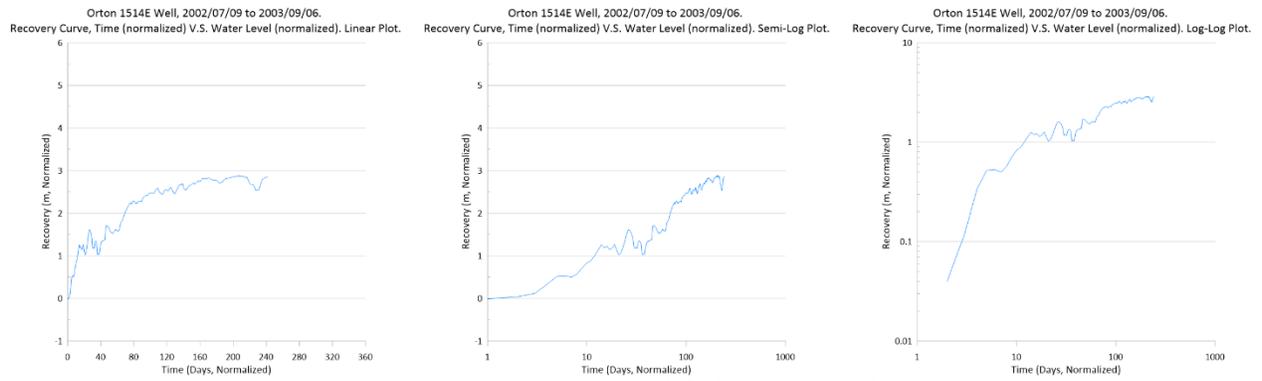


Figure 249: Recovery curve plots for Orton 1514E_0114 well, 2002/07/09 to 2003/09/06. Lethbridge Valley aquifer.

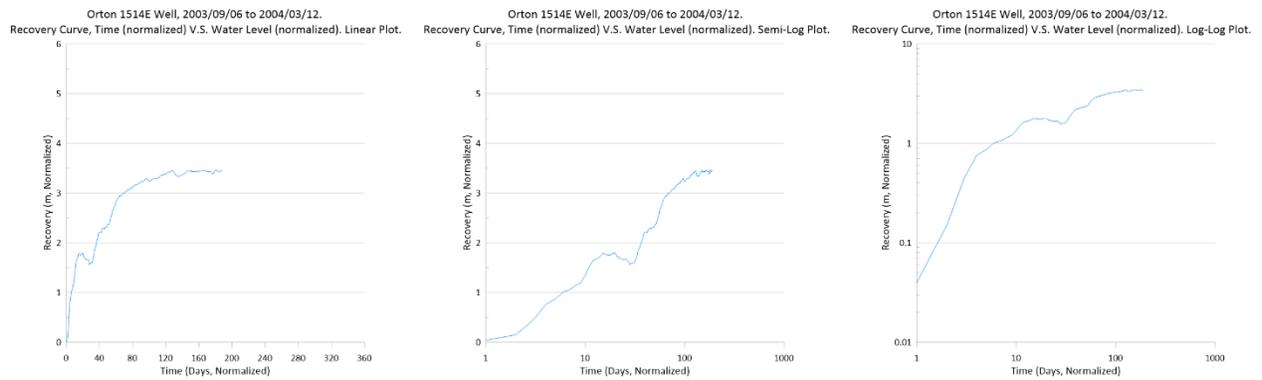


Figure 250: Recovery curve plots for Orton 1514E_0114 well, 2003/09/06 to 2004/03/12. Lethbridge Valley aquifer.

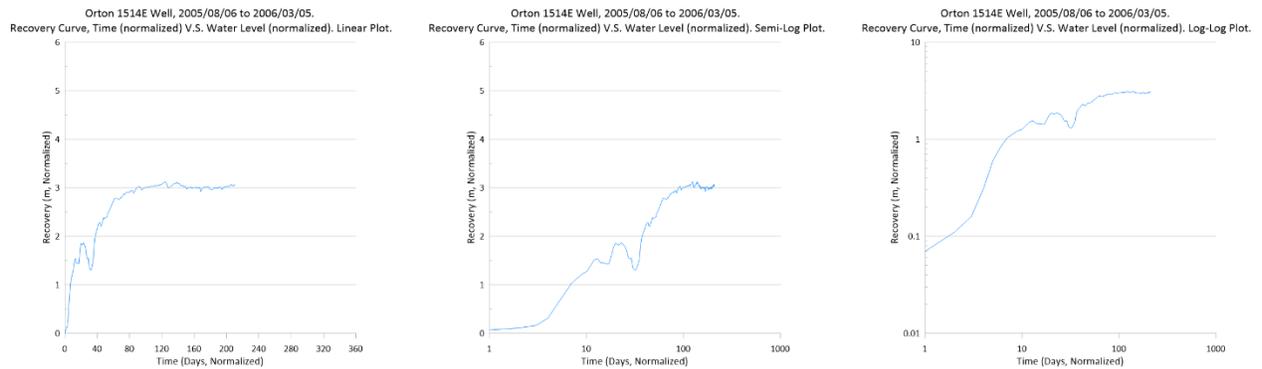


Figure 251: Recovery curve plots for Orton 1514E_0114 well, 2005/08/06 to 2006/03/05. Lethbridge Valley aquifer.

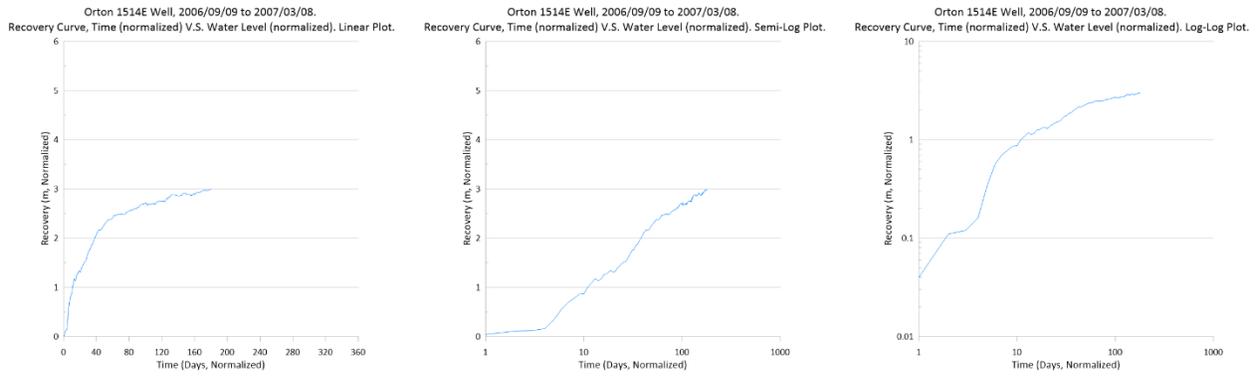


Figure 252: Recovery curve plots for Orton 1514E_0114 well, 2006/09/09 to 2007/03/08. Lethbridge Valley aquifer.

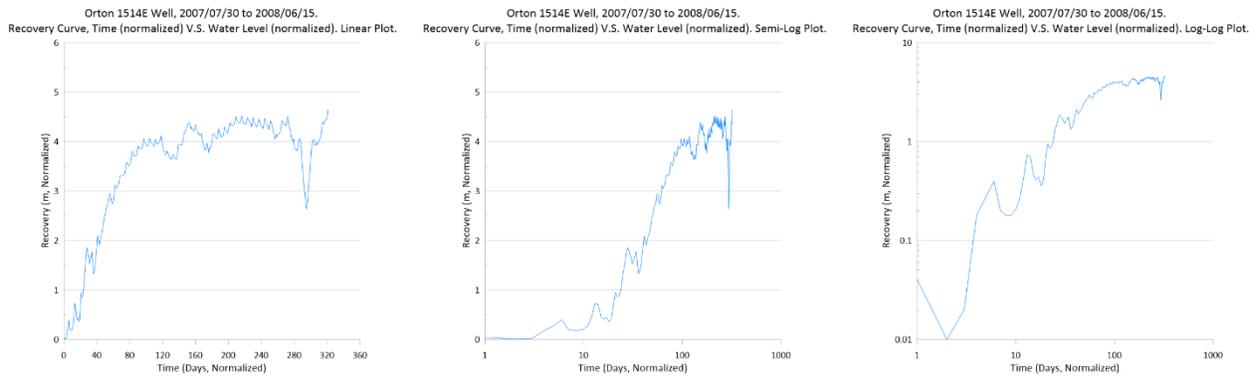


Figure 253: Recovery curve plots for Orton 1514E_0114 well, 2007/07/30 to 2008/06/15. Lethbridge Valley aquifer.

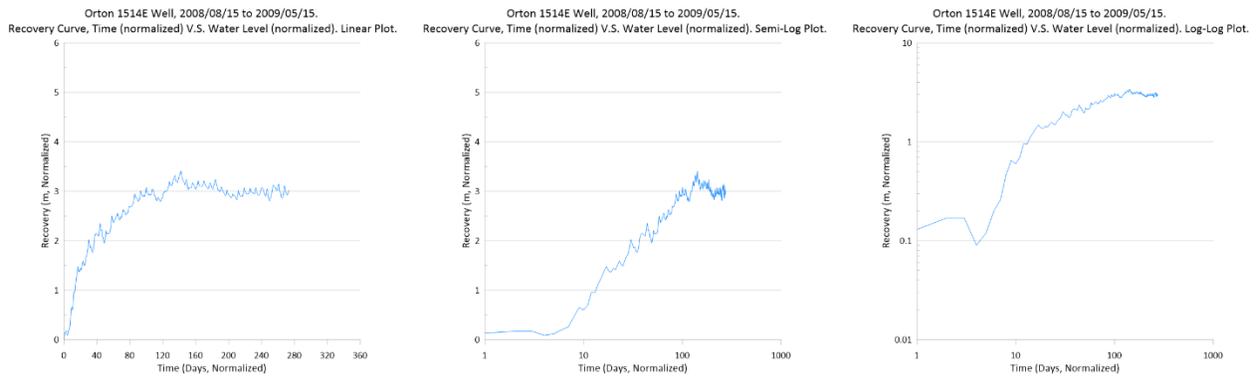


Figure 254: Recovery curve plots for Orton 1514E_0114 well, 2008/08/15 to 2009/05/15. Lethbridge Valley aquifer.

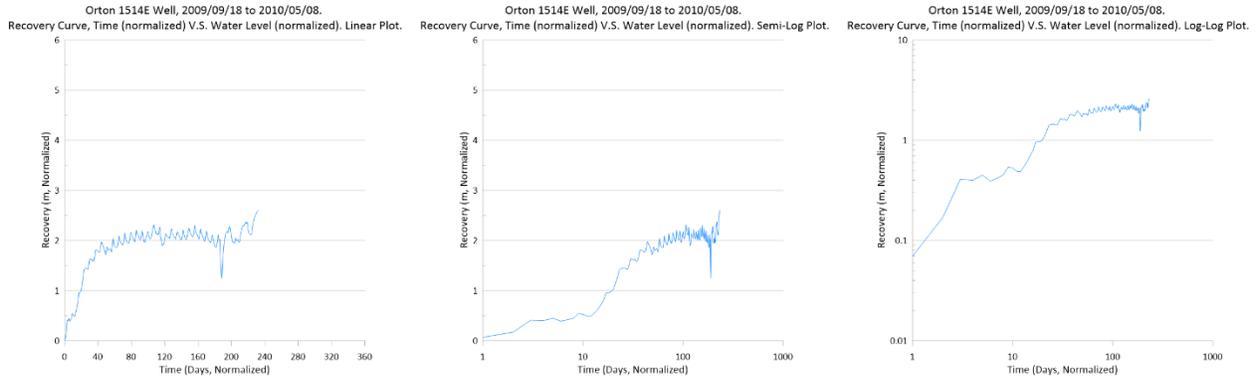


Figure 255: Recovery curve plots for Orton 1514E_0114 well, 2009/09/18 to 2010/05/08. Lethbridge Valley aquifer.

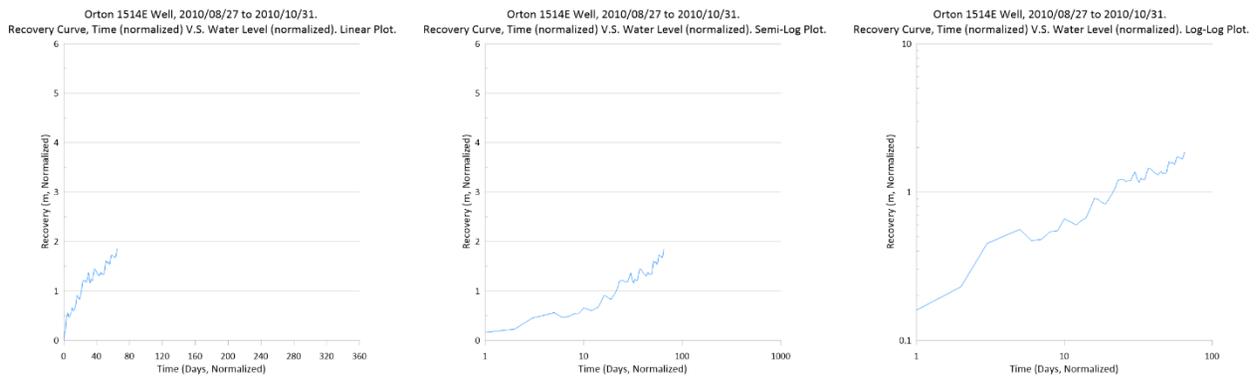


Figure 256: Recovery curve plots for Orton 1514E_0114 well, 2010/08/27 to 2010/10/31. Lethbridge Valley aquifer.

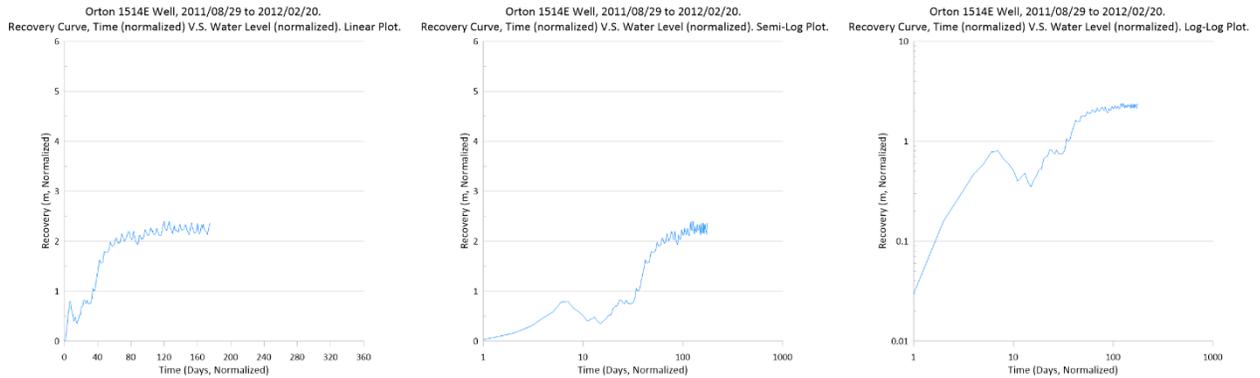


Figure 257: Recovery curve plots for Orton 1514E_0114 well, 2011/08/29 to 2012/02/20. Lethbridge Valley aquifer.

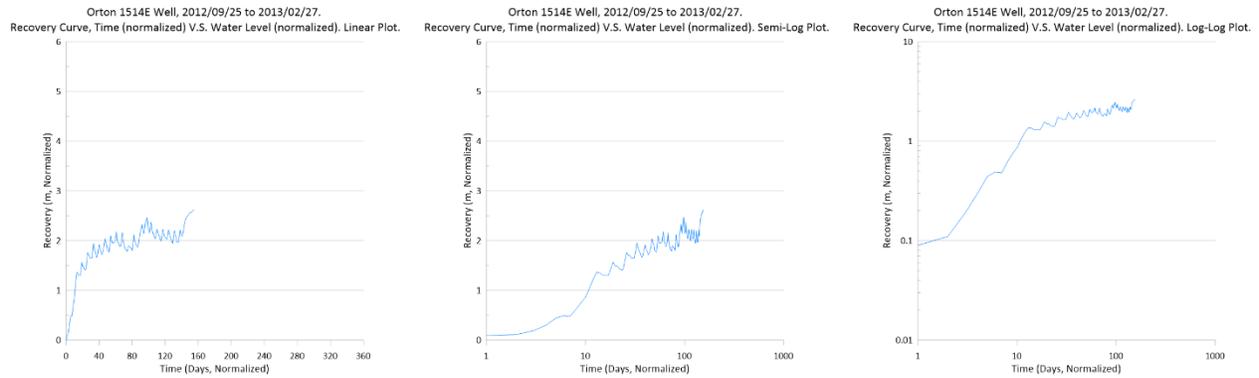


Figure 258: Recovery curve plots for Orton 1514E_0114 well, 2012/09/27 to 2013/02/27. Lethbridge Valley aquifer.

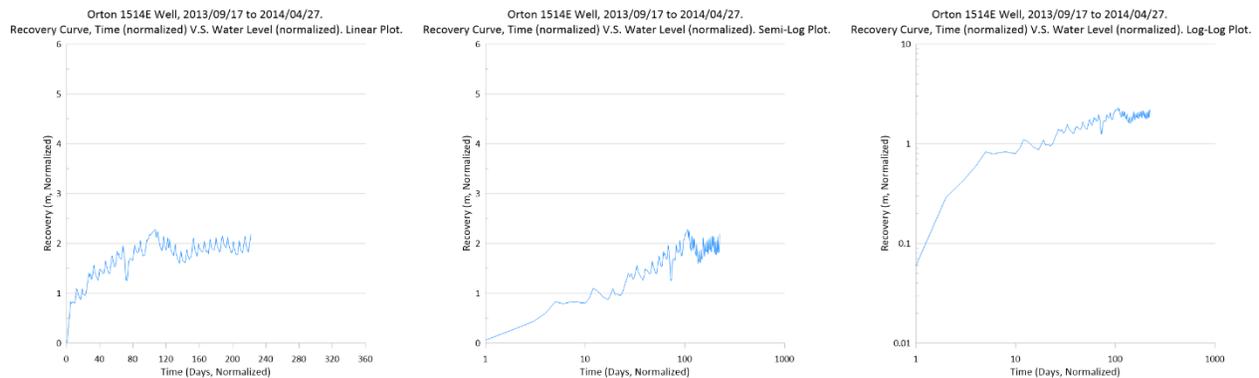


Figure 259: Recovery curve plots for Orton 1514E_0114 well, 2013/09/17 to 2014/04/27. Lethbridge Valley aquifer.

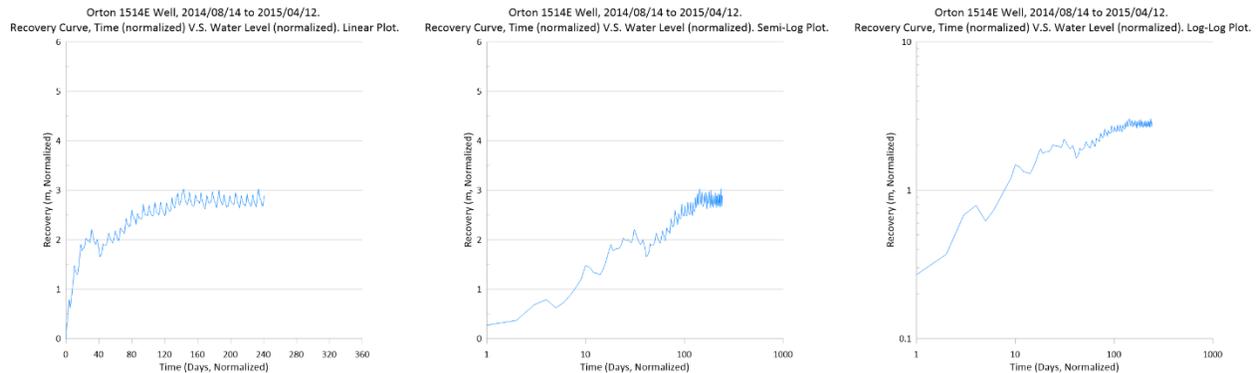


Figure 260: Recovery curve plots for Orton 1514E_0114 well, 2014/08/14 to 2015/04/12. Lethbridge Valley aquifer.

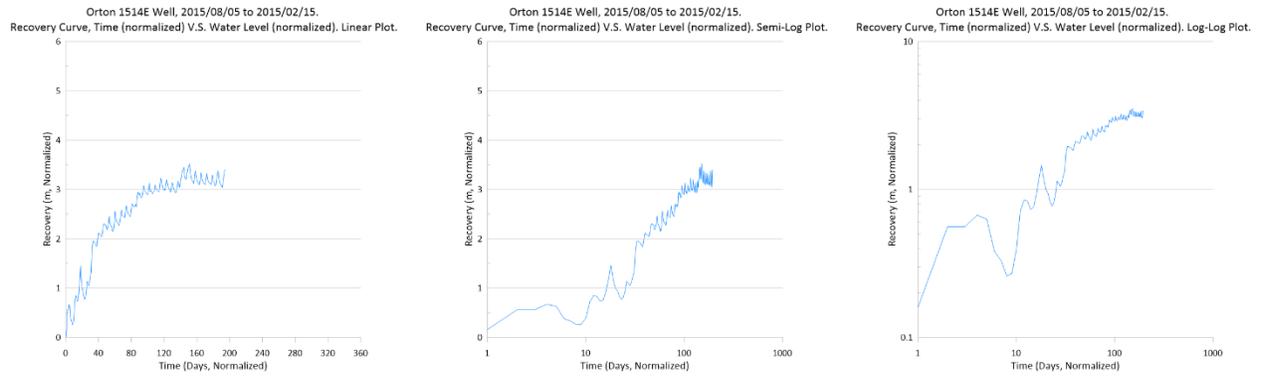


Figure 261: Recovery curve plots for Orton 1514E_0114 well, 2015/08/05 to 2016/02/15. Lethbridge Valley aquifer.

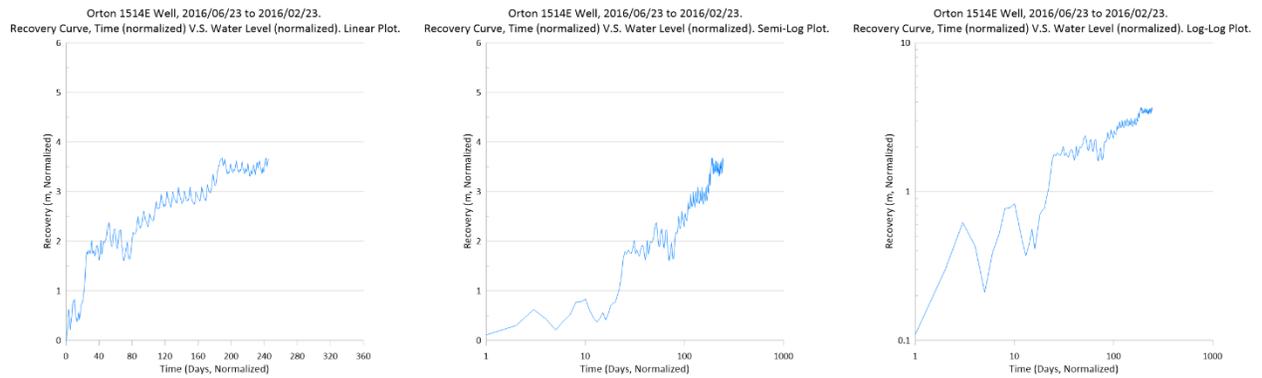


Figure 262: Recovery curve plots for Orton 1514E_0114 well, 2016/06/23 to 2017/02/23. Lethbridge Valley aquifer.

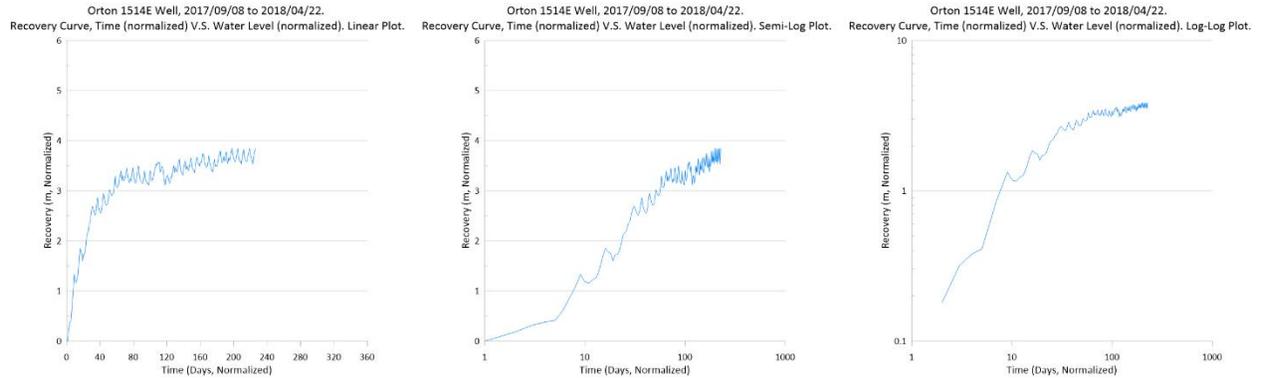


Figure 263: Recovery curve plots for Orton 1514E_0114 well, 2017/09/08 to 2018/04/22. Lethbridge Valley aquifer.

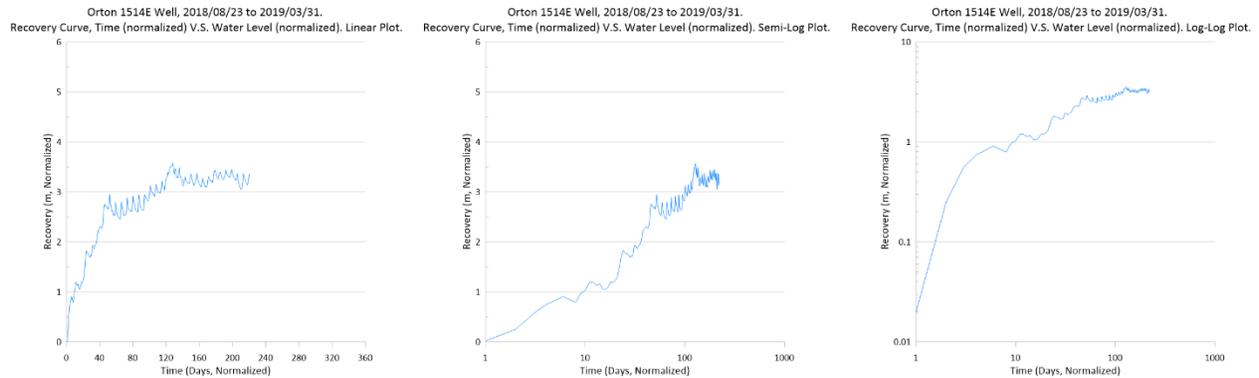


Figure 264: Recovery curve plots for Orton 1514E_0114 well, 2018/08/23 to 2019/03/31. Lethbridge Valley aquifer.

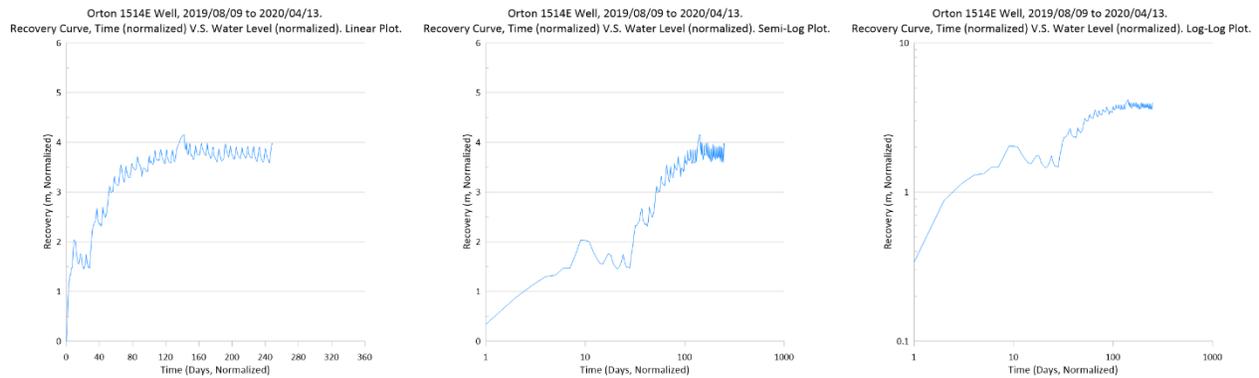


Figure 265: Recovery curve plots for Orton 1514E_0114 well, 2019/08/09 to 2020/04/13. Lethbridge Valley aquifer.

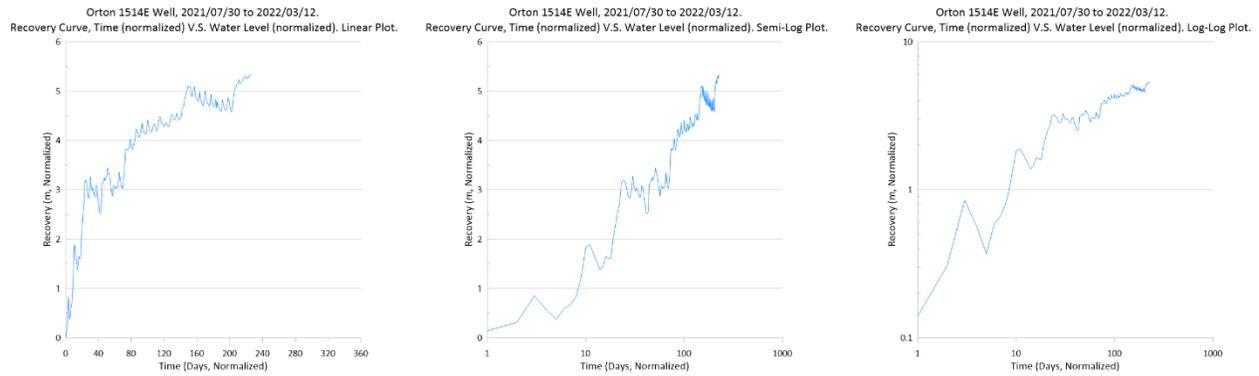


Figure 266: Recovery curve plots for Orton 1514E_0114 well, 2021/07/30 to 2022/03/12. Lethbridge Valley aquifer.

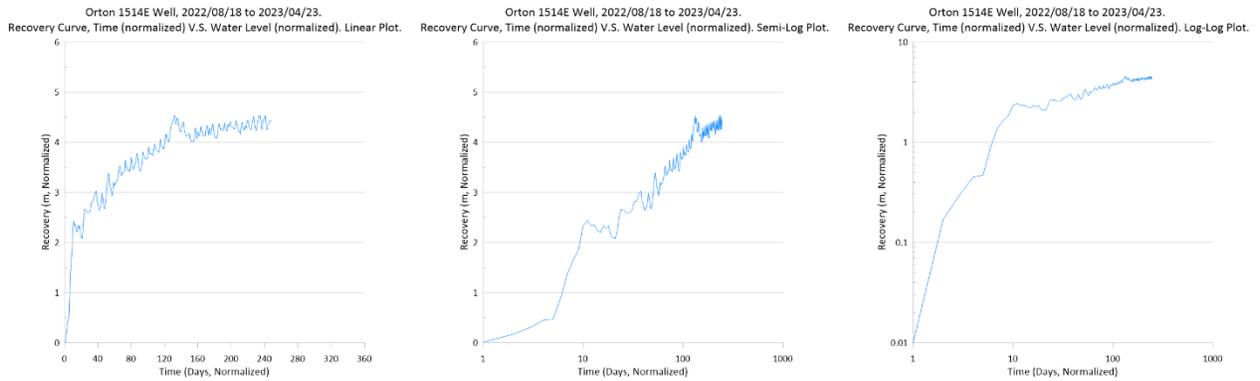


Figure 267: Recovery curve plots for Orton 1514E_0114 well, 2022/08/18 to 2023/04/23. Lethbridge Valley aquifer.

Appendix F4: GOWN Monitoring Well Recovery Curve Plots for McNally_0110 Well

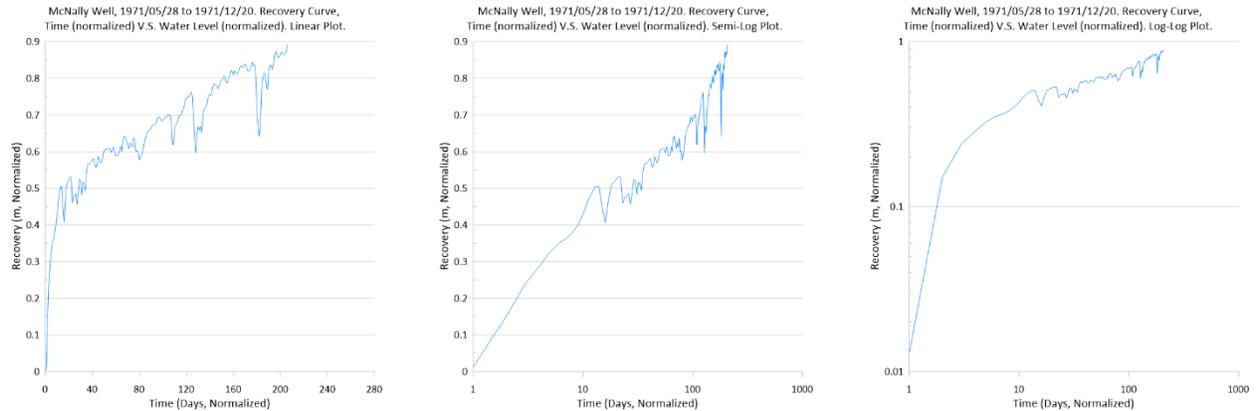


Figure 268: Recovery curve plots for McNally_0110 well, 1971/05/28 to 1971/12/20. Lethbridge Valley aquifer.

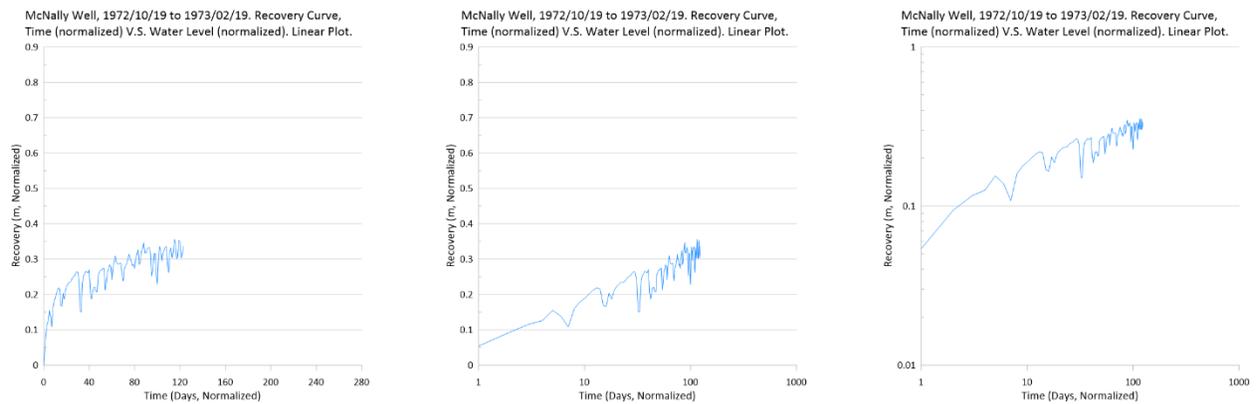


Figure 269: Recovery curve plots for McNally_0110 well, 1972/10/19 to 1973/02/19. Lethbridge Valley aquifer.

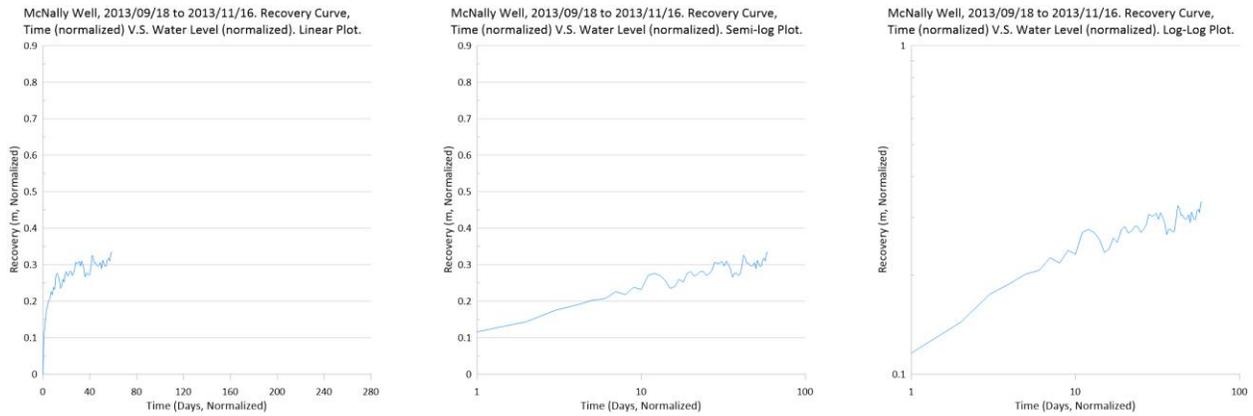


Figure 270: Recovery curve plots for McNally_0110 well, 2013/09/18 to 2013/11/16. Lethbridge Valley aquifer.

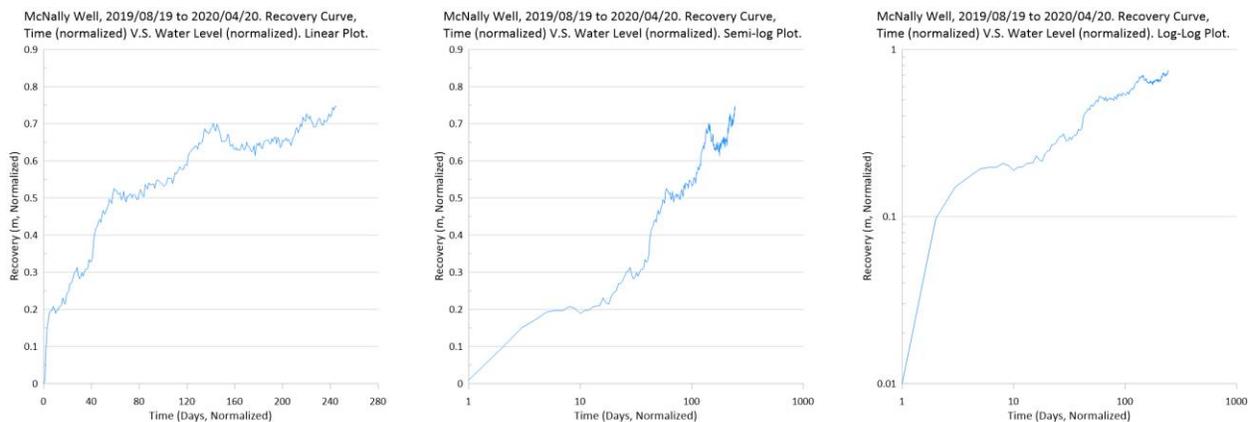


Figure 271: Recovery curve plots for McNally_0110 well, 2019/08/19 to 2020/04/20. Lethbridge Valley aquifer.

Appendix F5: GOWN Monitoring Well Recovery Curve Plots for Viking 2600E_0298 Well

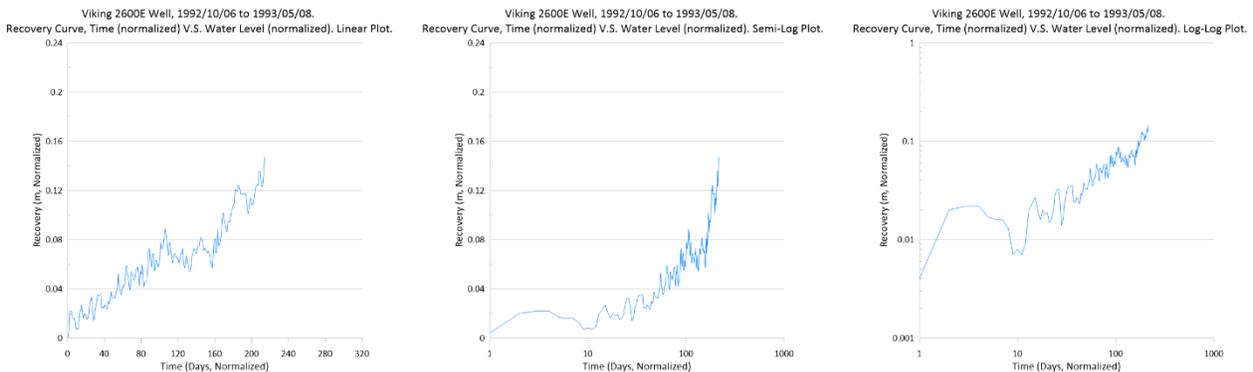


Figure 272: Recovery curve plots for Viking 2600E_0298 well, 1992/10/06 to 1993/05/08. Oldman aquifer.

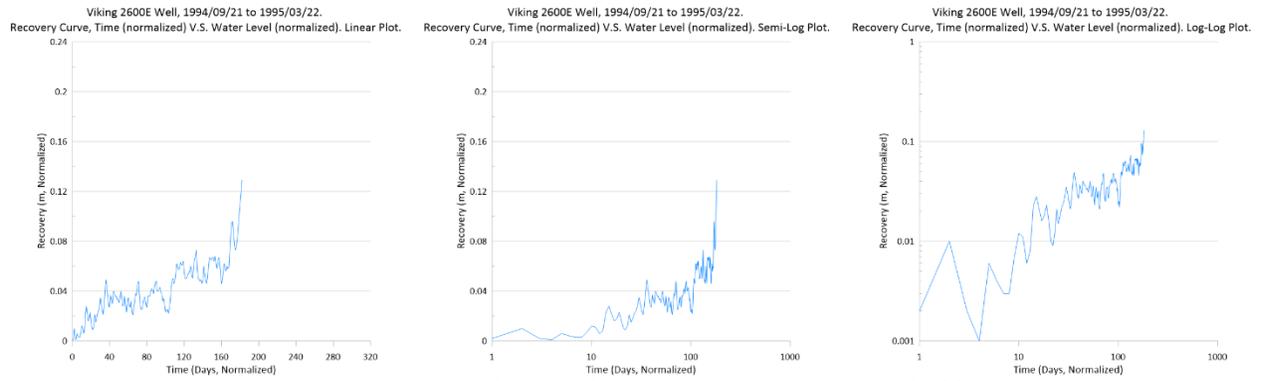


Figure 273: Recovery curve plots for Viking 2600E_0298 well, 1994/09/21 to 1995/03/22. Oldman aquifer.

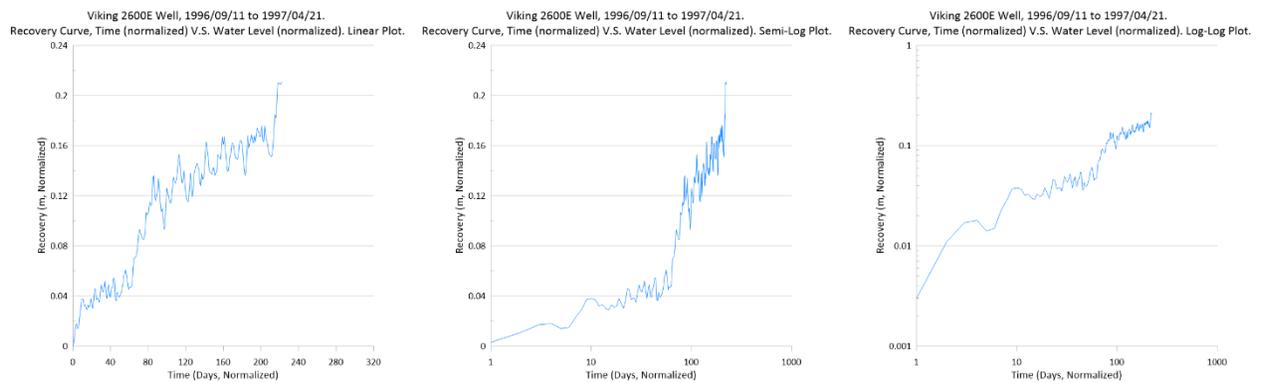


Figure 274: Recovery curve plots for Viking 2600E_0298 well, 1996/09/11 to 1997/04/21. Oldman aquifer.

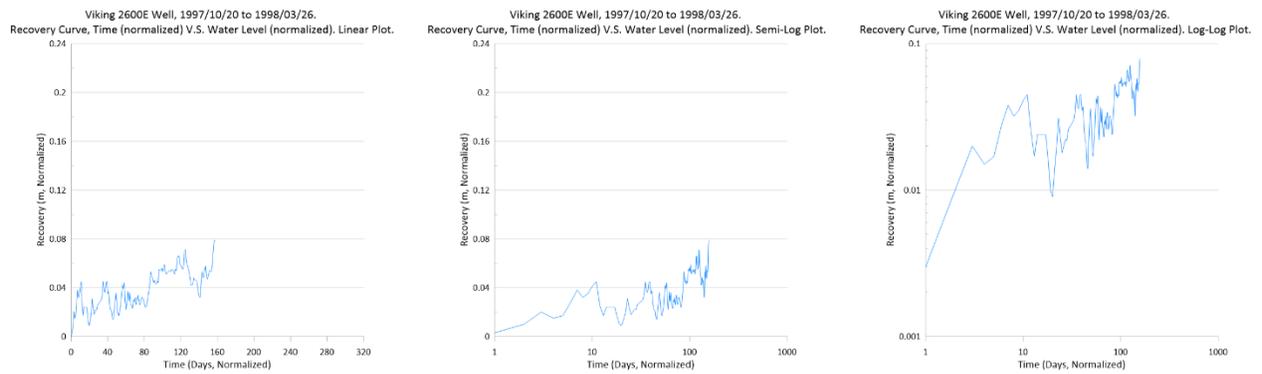


Figure 275: Recovery curve plots for Viking 2600E_0298 well, 1997/10/20 to 1998/03/26. Oldman aquifer.

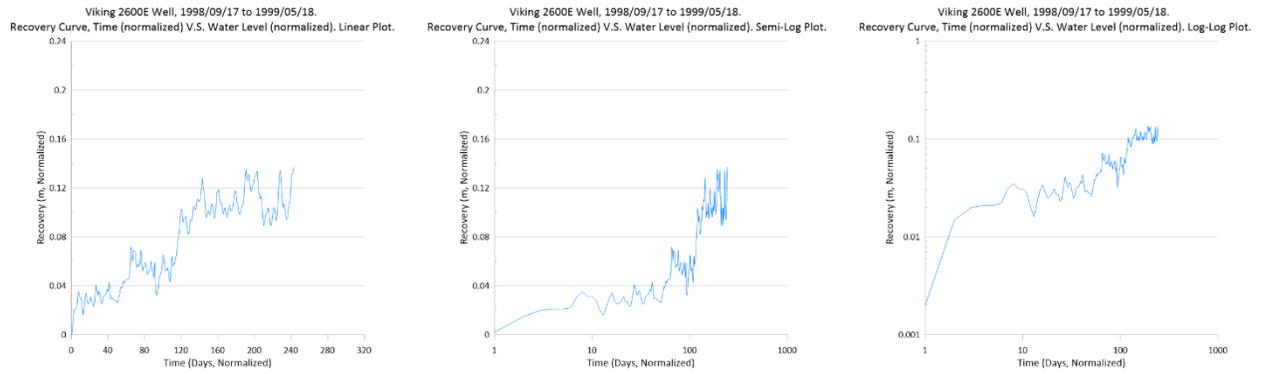


Figure 276: Recovery curve plots for Viking 2600E_0298 well, 1998/09/17 to 1999/05/18. Oldman aquifer.

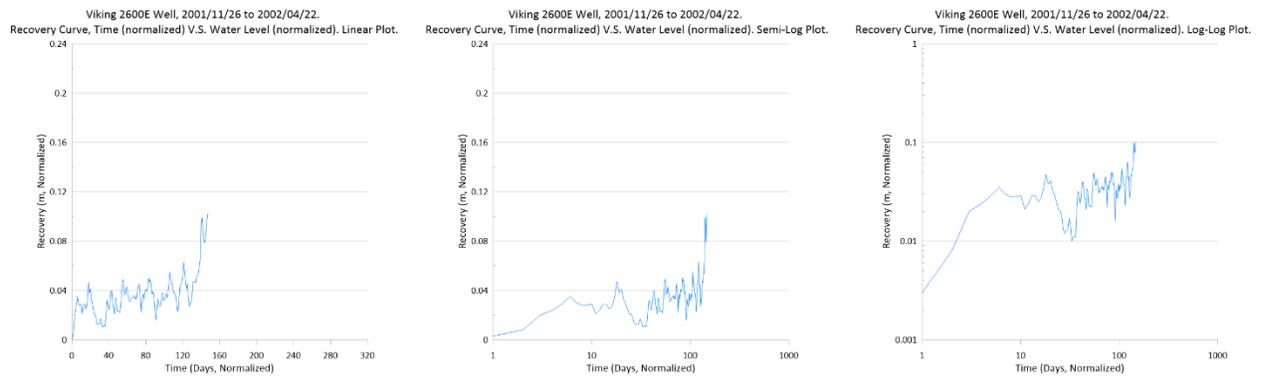


Figure 277: Recovery curve plots for Viking 2600E_0298 well, 2001/11/26 to 2002/04/22. Oldman aquifer.

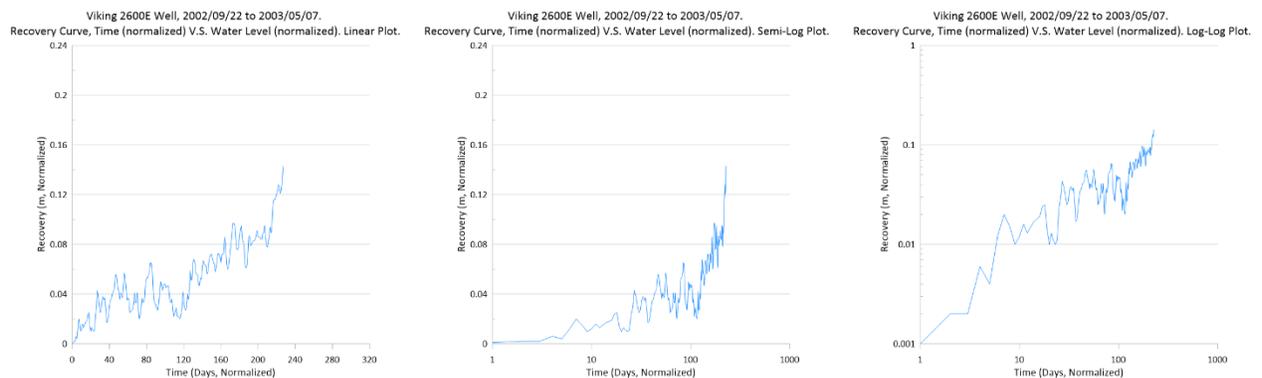


Figure 278: Recovery curve plots for Viking 2600E_0298 well, 2002/09/22 to 2003/05/07. Oldman aquifer.

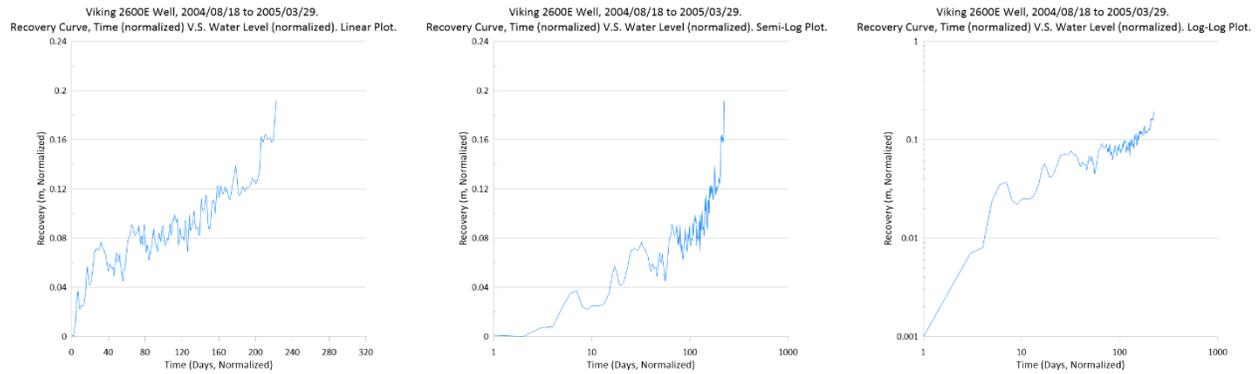


Figure 279: Recovery curve plots for Viking 2600E_0298 well, 2004/08/18 to 2005/03/29. Oldman aquifer.

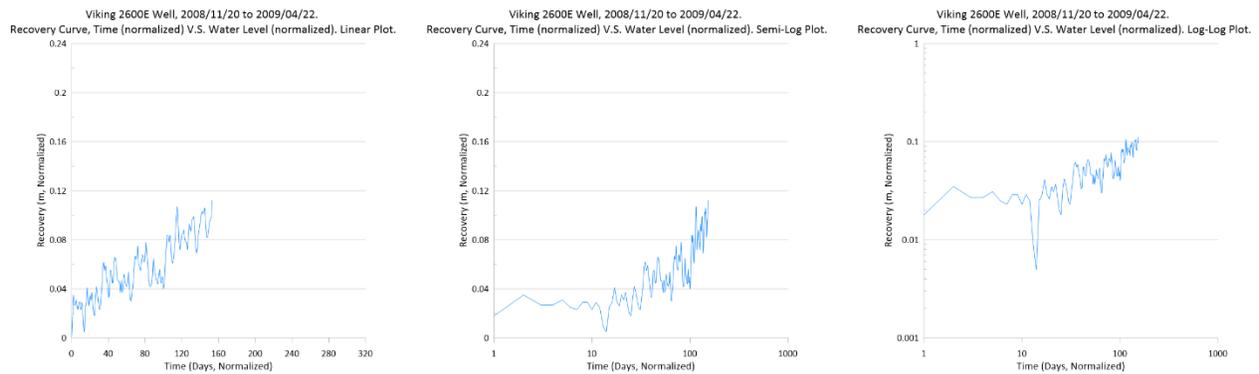


Figure 280: Recovery curve plots for Viking 2600E_0298 well, 2008/11/20 to 2009/04/22. Oldman aquifer.

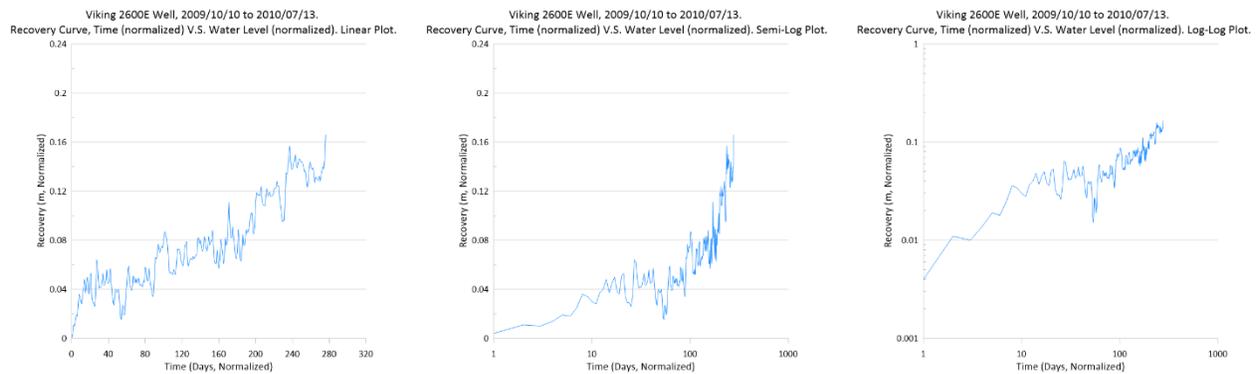


Figure 281: Recovery curve plots for Viking 2600E_0298 well, 2009/10/10 to 2010/07/13. Oldman aquifer.

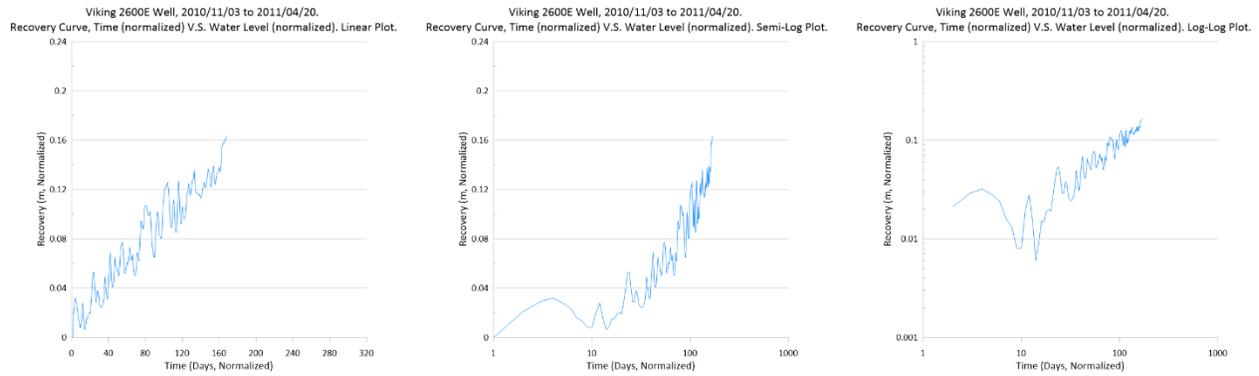


Figure 282: Recovery curve plots for Viking 2600E_0298 well, 2010/11/03 to 2010/04/20. Oldman aquifer.

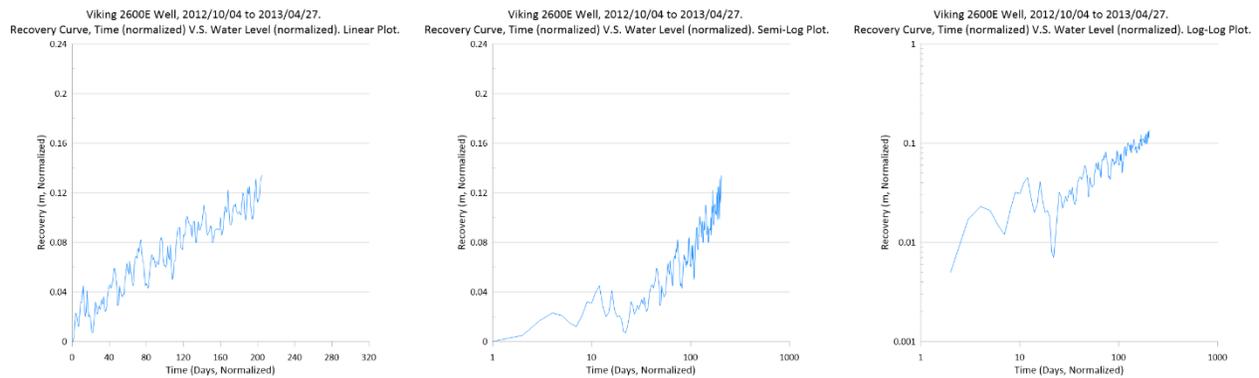


Figure 283: Recovery curve plots for Viking 2600E_0298 well, 2012/10/04 to 2013/04/27. Oldman aquifer.

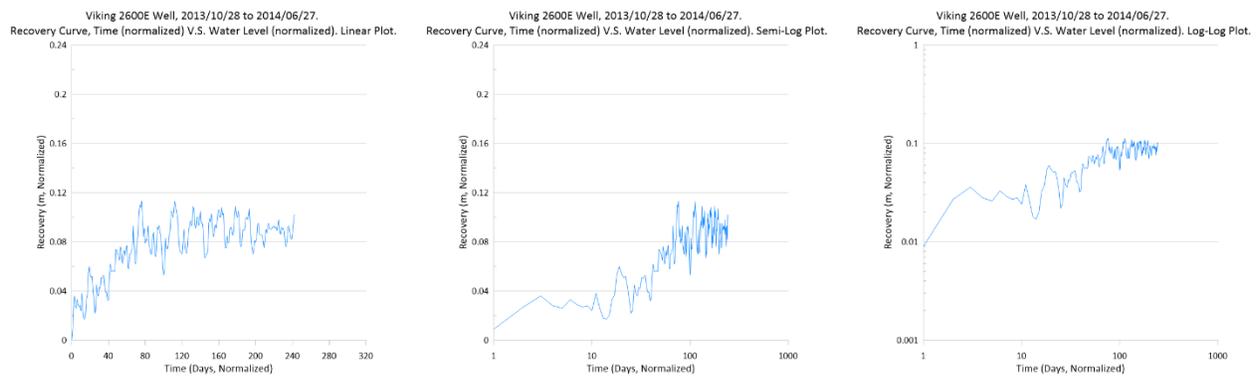


Figure 284: Recovery curve plots for Viking 2600E_0298 well, 2013/10/28 to 2014/06/27. Oldman aquifer.

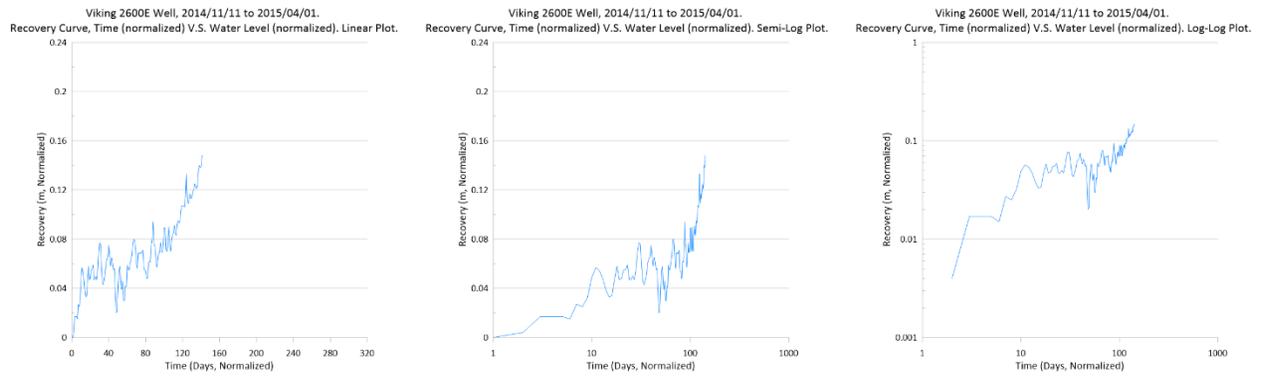


Figure 285: Recovery curve plots for Viking 2600E_0298 well, 2014/11/11 to 2015/04/01. Oldman aquifer.

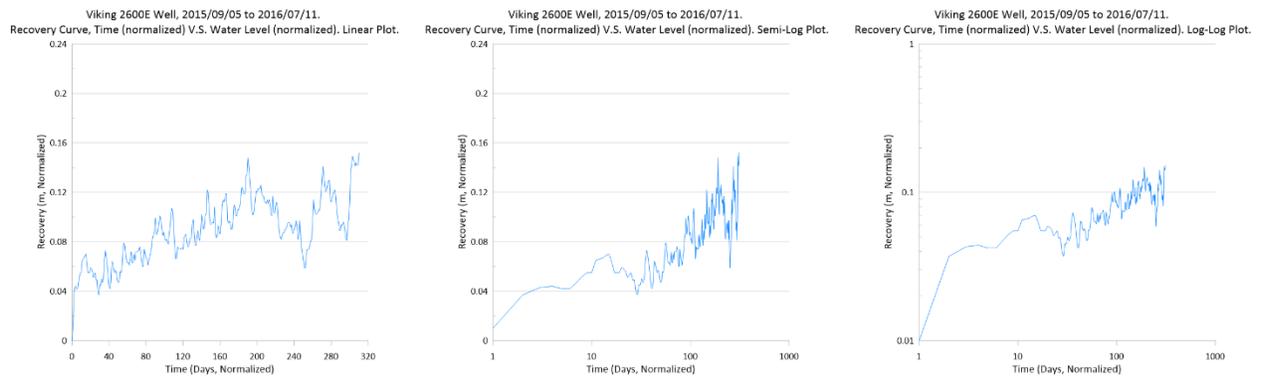


Figure 286: Recovery curve plots for Viking 2600E_0298 well, 2015/09/05 to 2016/07/11. Oldman aquifer.

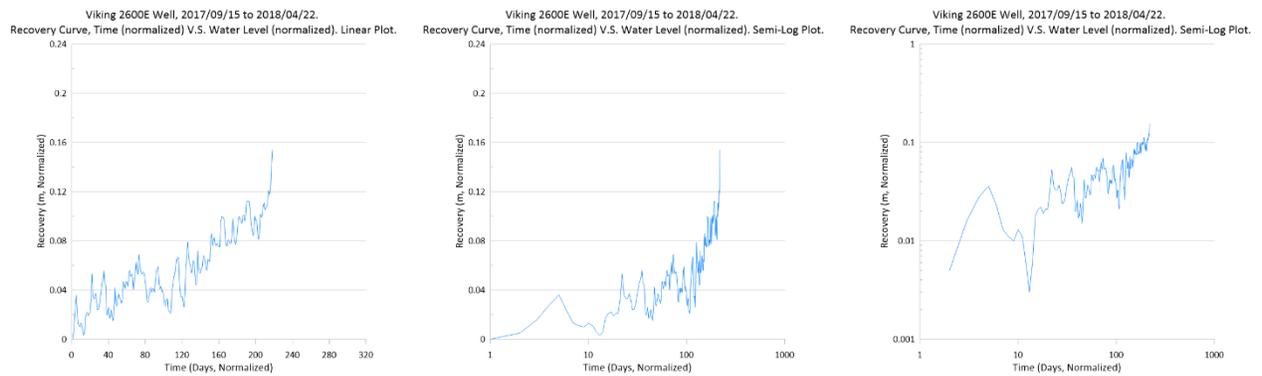


Figure 287: Recovery curve plots for Viking 2600E_0298 well, 2017/09/15 to 2018/04/22. Oldman aquifer.

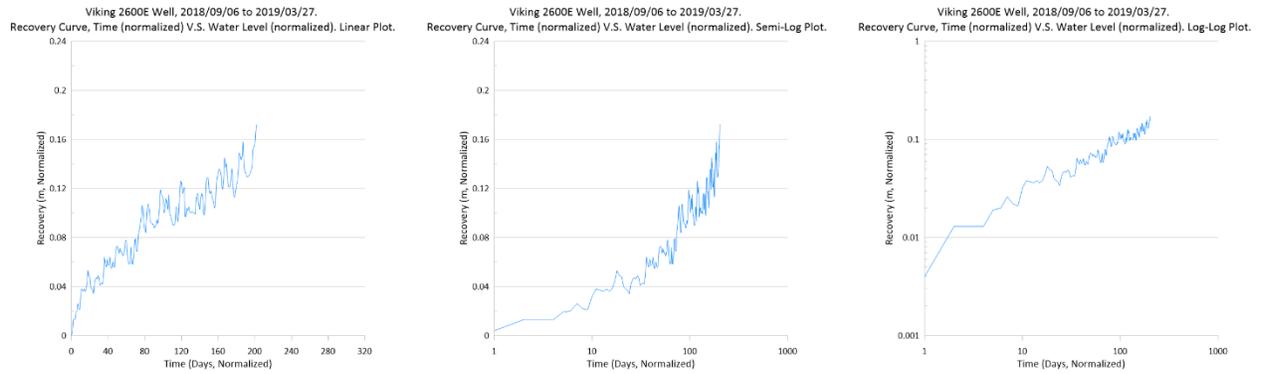


Figure 288: Recovery curve plots for Viking 2600E_0298 well, 2018/09/06 to 2018/03/27. Oldman aquifer.

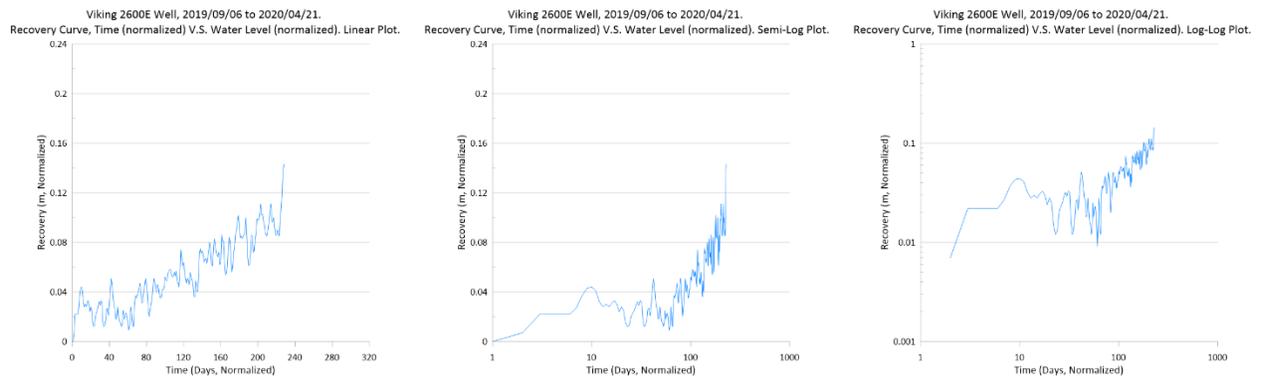


Figure 289: Recovery curve plots for Viking 2600E_0298 well, 2019/09/06 to 2020/04/21. Oldman aquifer.

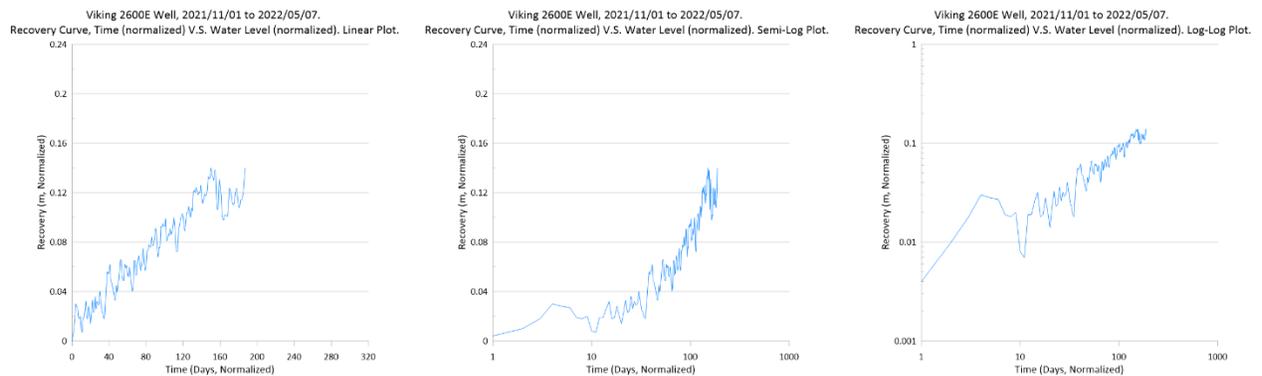


Figure 290: Recovery curve plots for Viking 2600E_0298 well, 2021/11/01 to 2022/05/07. Oldman aquifer.

Appendix F6: GOWN Monitoring Well Recovery Curve Plots for Mud Lake 1537E_0112 Well

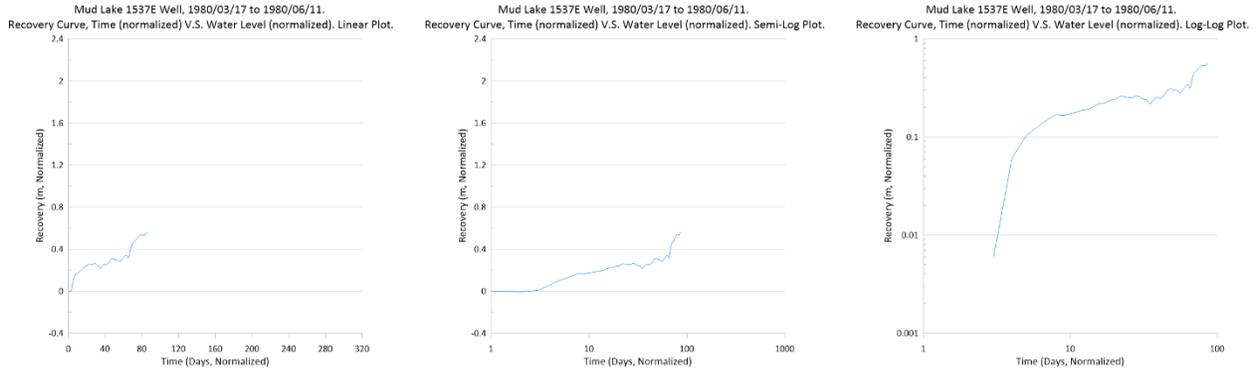


Figure 291: Recovery curve plots for Mud Lake 1537E_0112 well, 1980/03/17 to 1980/06/11. Mud Valley aquifer.

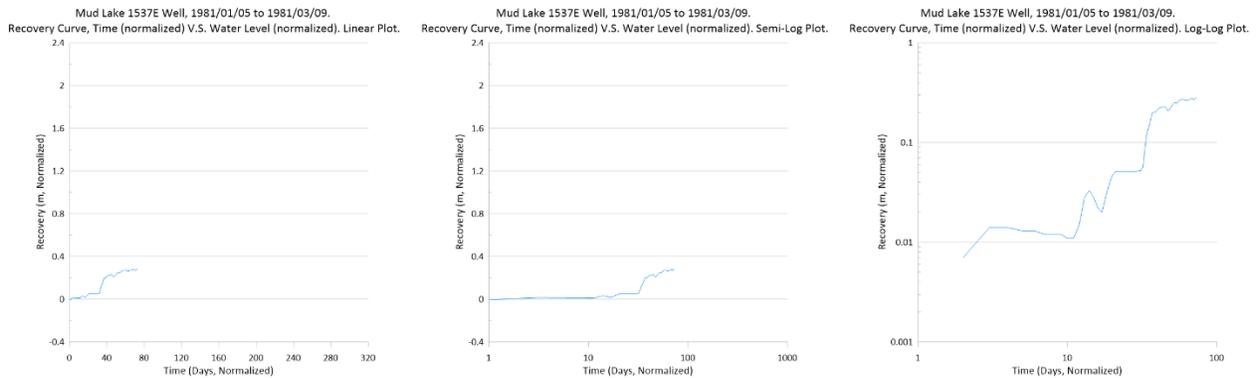


Figure 292: Recovery curve plots for Mud Lake 1537E_0112 well, 1981/01/05 to 1981/03/09. Mud Valley aquifer.

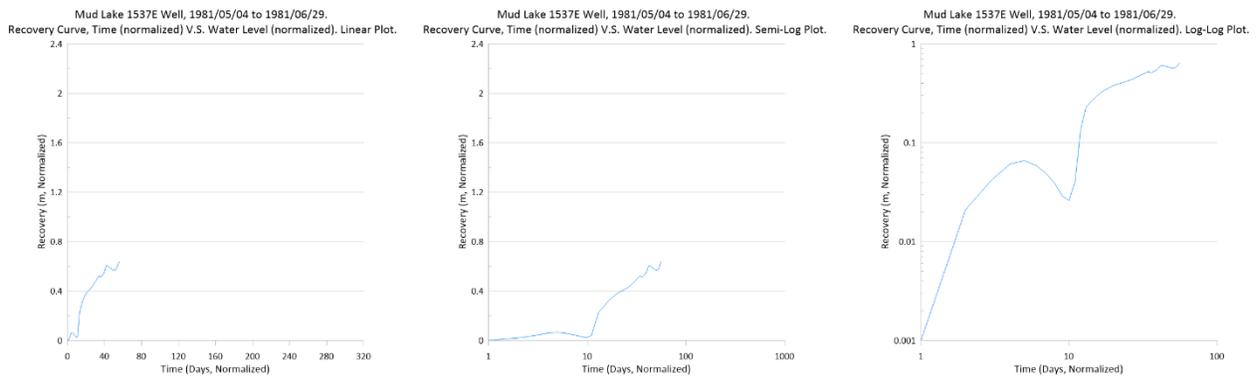


Figure 293: Recovery curve plots for Mud Lake 1537E_0112 well, 1981/05/04 to 1981/06/29. Mud Valley aquifer.

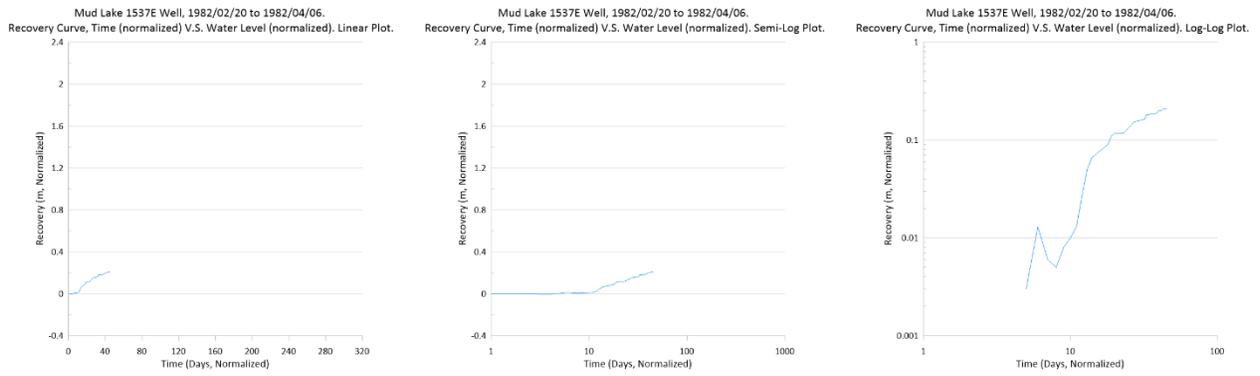


Figure 294: Recovery curve plots for Mud Lake 1537E_0112 well, 1982/02/20 to 1982/04/06. Mud Valley aquifer.

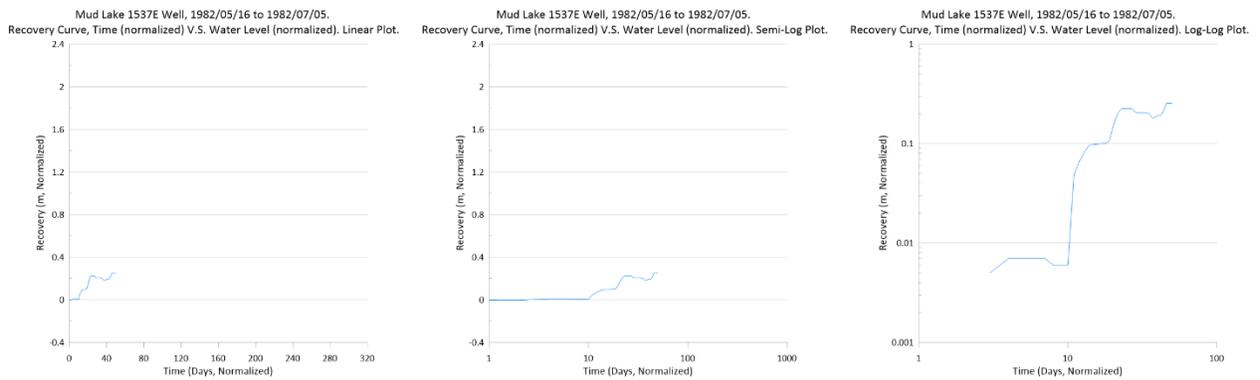


Figure 295: Recovery curve plots for Mud Lake 1537E_0112 well, 1982/05/16 to 1982/07/05. Mud Valley aquifer.

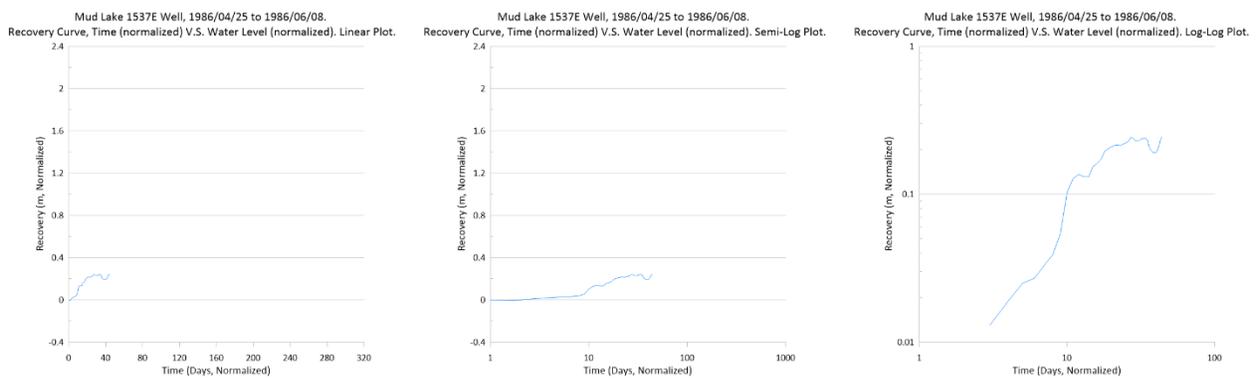


Figure 296: Recovery curve plots for Mud Lake 1537E_0112 well, 1986/04/25 to 1986/06/08. Mud Valley aquifer.

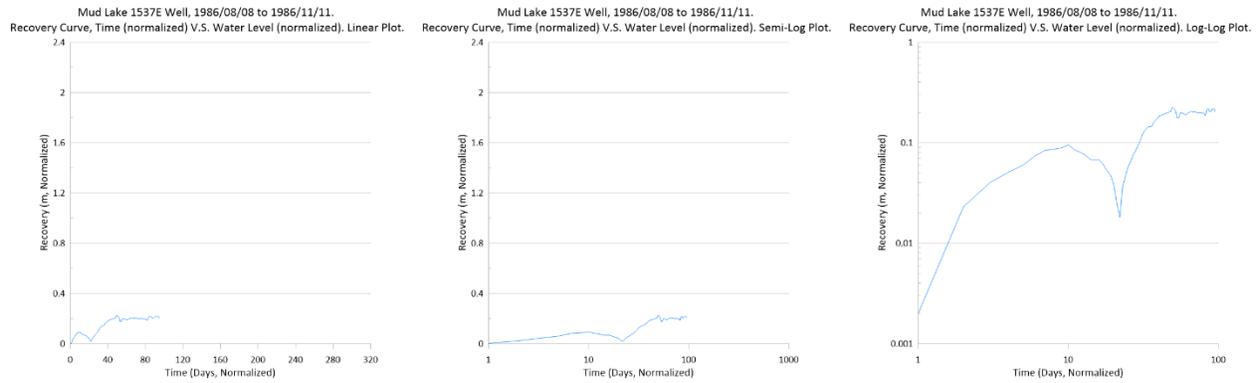


Figure 297: Recovery curve plots for Mud Lake 1537E_0112 well, 1986/08/08 to 1986/11/11. Mud Valley aquifer.

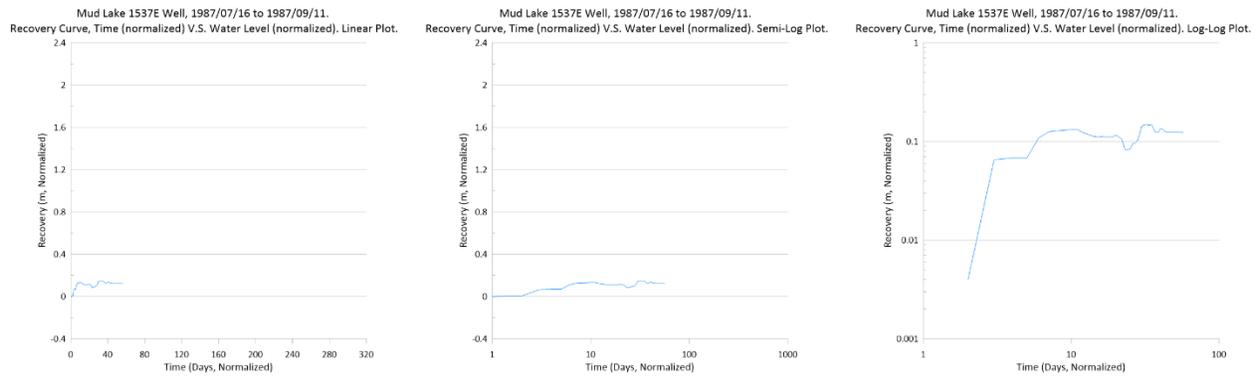


Figure 298: Recovery curve plots for Mud Lake 1537E_0112 well, 1987/07/16 to 1987/09/11. Mud Valley aquifer.

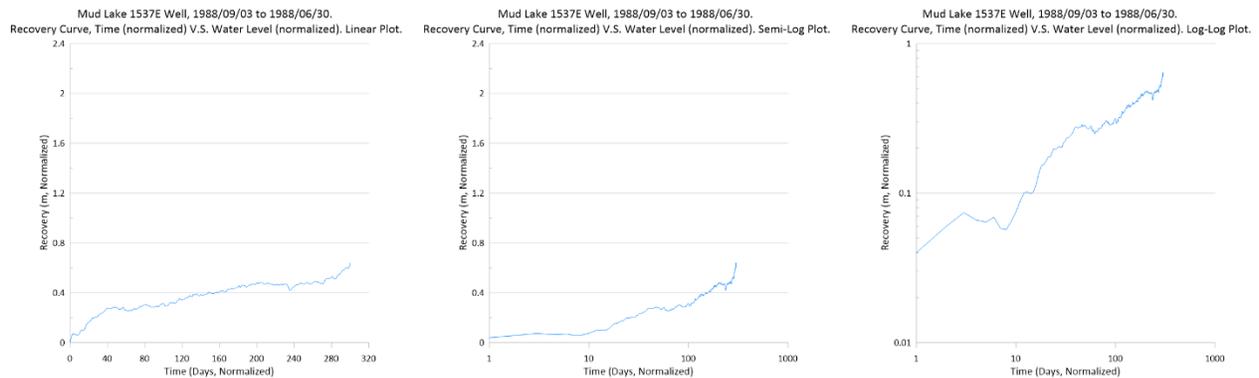


Figure 299: Recovery curve plots for Mud Lake 1537E_0112 well, 1988/09/03 to 1988/06/30. Mud Valley aquifer.

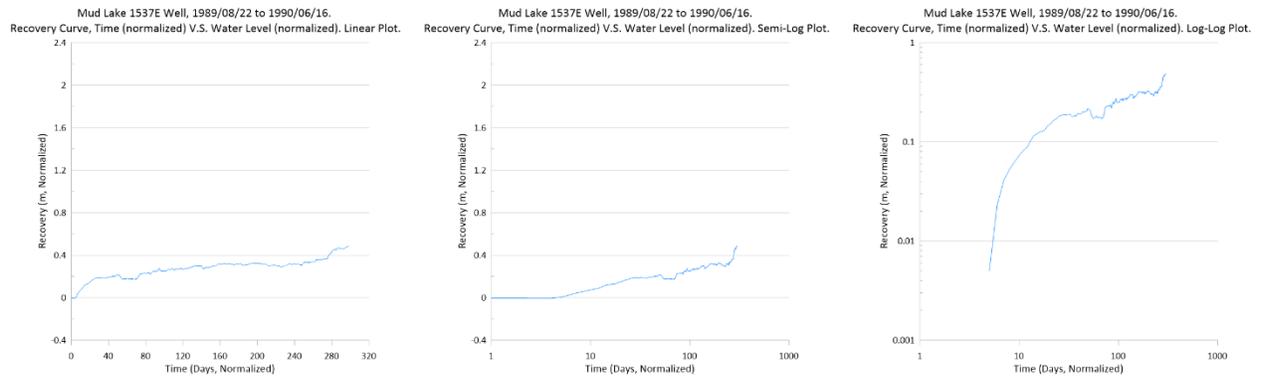


Figure 300: Recovery curve plots for Mud Lake 1537E_0112 well, 1989/08/22 to 1990/06/16. Mud Valley aquifer.

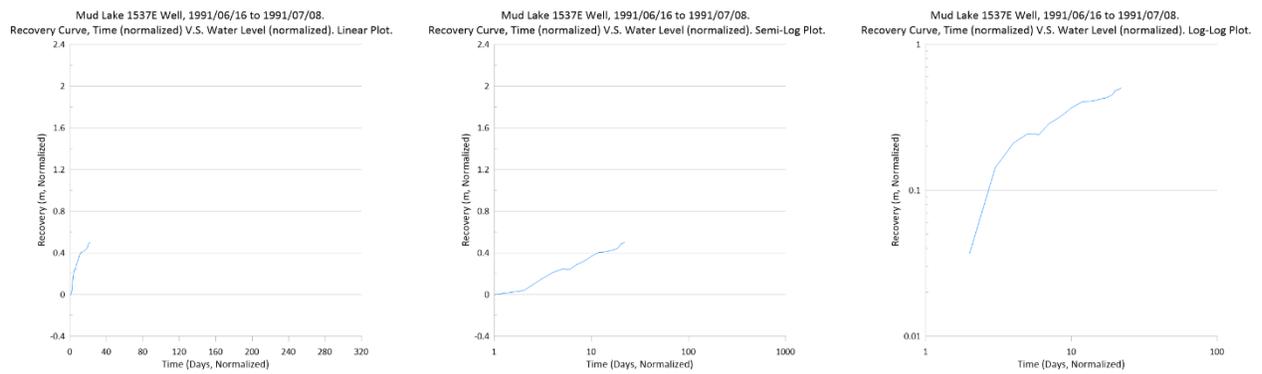


Figure 301: Recovery curve plots for Mud Lake 1537E_0112 well, 1991/06/16 to 1991/07/08. Mud Valley aquifer.

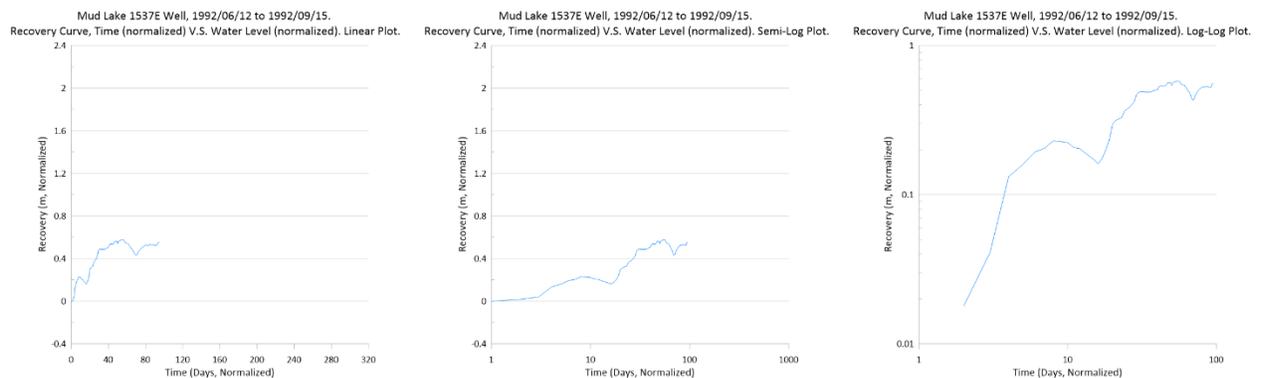


Figure 302: Recovery curve plots for Mud Lake 1537E_0112 well, 1992/06/12 to 1992/09/15. Mud Valley aquifer.

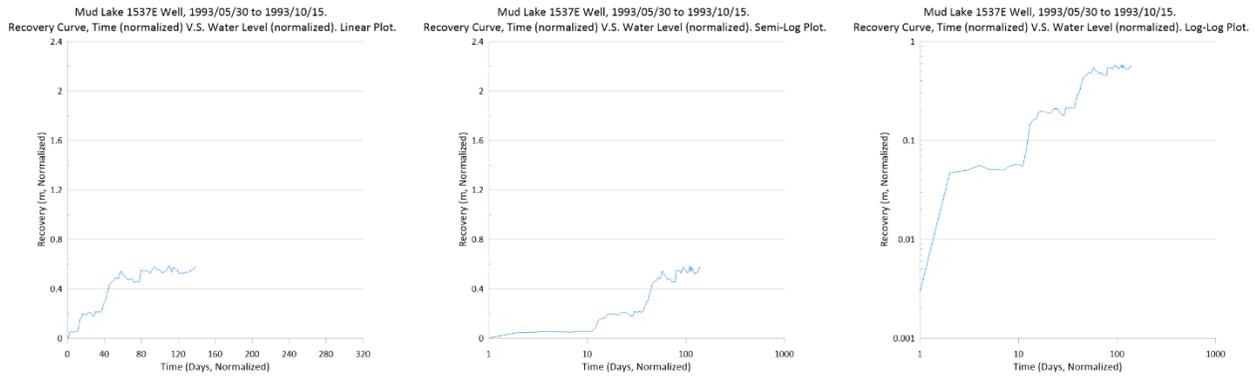


Figure 303: Recovery curve plots for Mud Lake 1537E_0112 well, 1993/05/30 to 1993/10/15. Mud Valley aquifer.

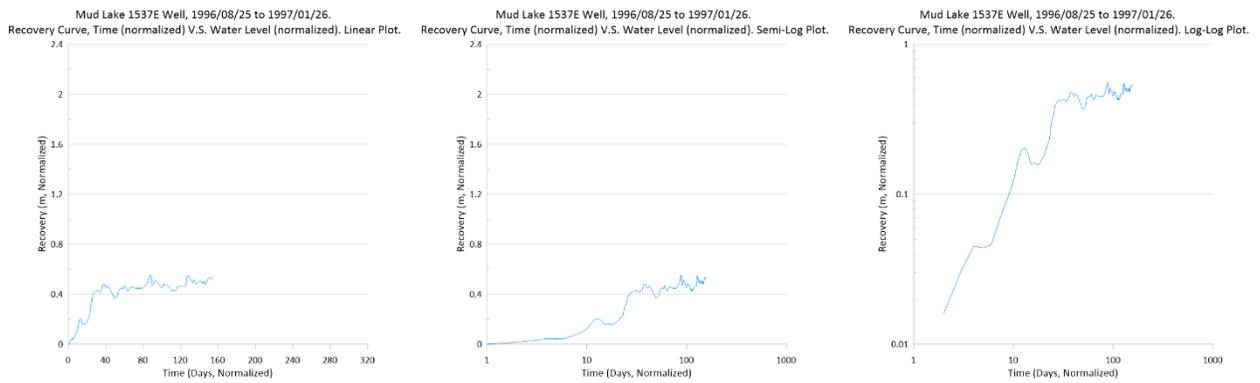


Figure 304: Recovery curve plots for Mud Lake 1537E_0112 well, 1996/08/25 to 1997/01/26. Mud Valley aquifer.

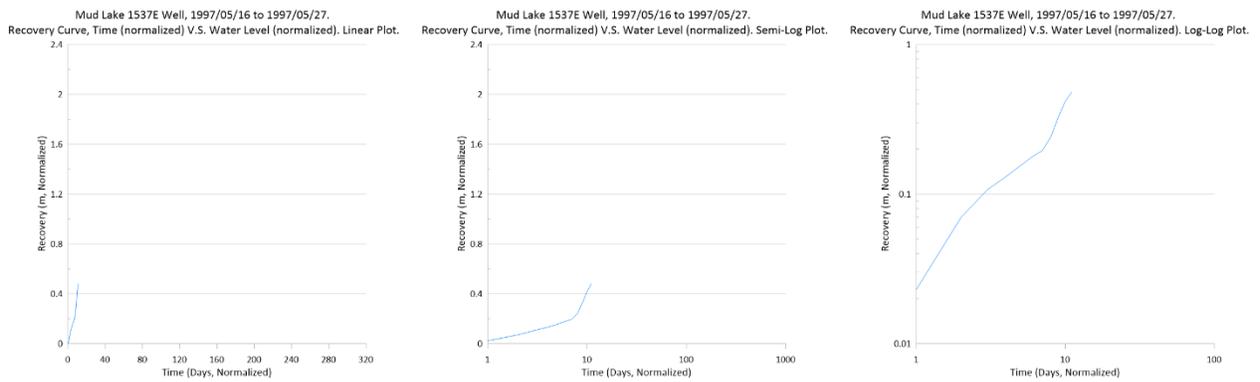


Figure 305: Recovery curve plots for Mud Lake 1537E_0112 well, 1997/05/16 to 1997/05/27. Mud Valley aquifer.

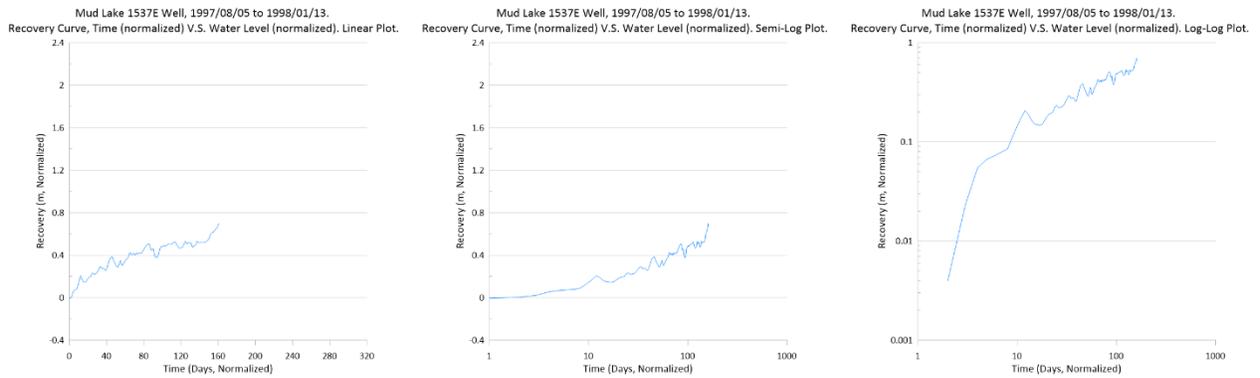


Figure 306: Recovery curve plots for Mud Lake 1537E_0112 well, 1997/08/05 to 1998/01/13. Mud Valley aquifer.

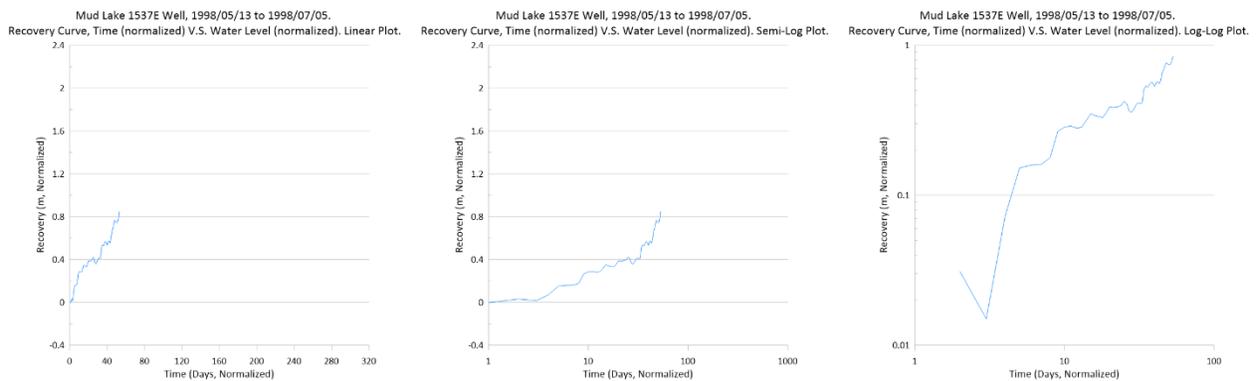


Figure 307: Recovery curve plots for Mud Lake 1537E_0112 well, 1998/05/13 to 1998/07/05. Mud Valley aquifer.

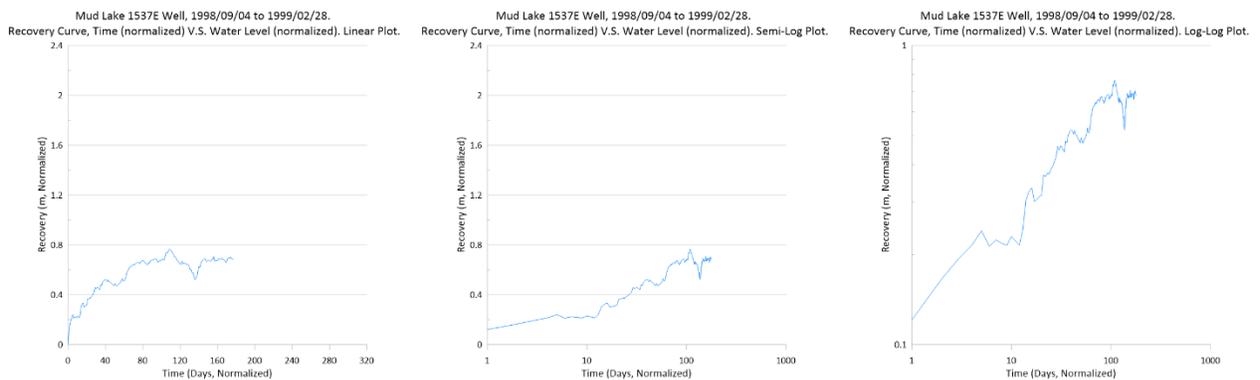


Figure 308: Recovery curve plots for Mud Lake 1537E_0112 well, 1998/09/04 to 1999/02/28. Mud Valley aquifer.

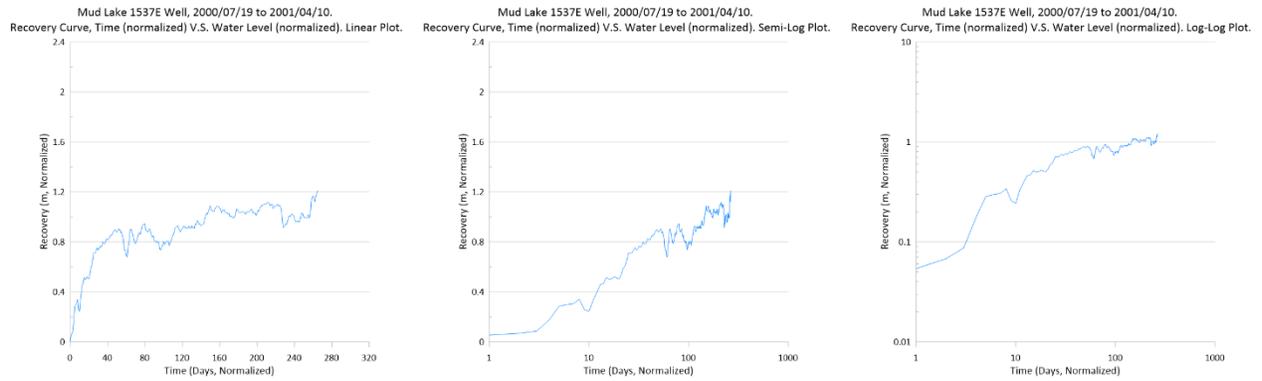


Figure 309: Recovery curve plots for Mud Lake 1537E_0112 well, 2000/07/19 to 2001/04/10. Mud Valley aquifer.

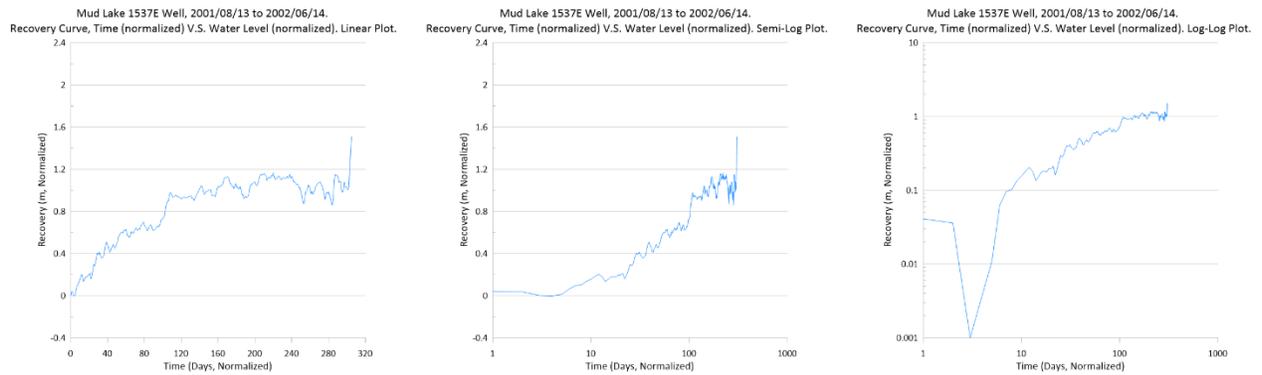


Figure 310: Recovery curve plots for Mud Lake 1537E_0112 well, 2001/08/13 to 2002/06/14. Mud Valley aquifer.

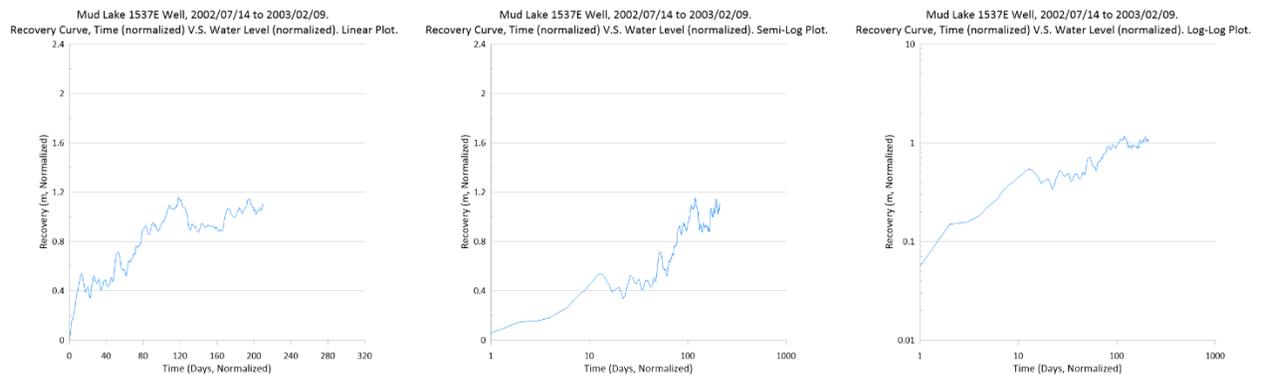


Figure 311: Recovery curve plots for Mud Lake 1537E_0112 well, 2002/07/14 to 2003/02/09. Mud Valley aquifer.

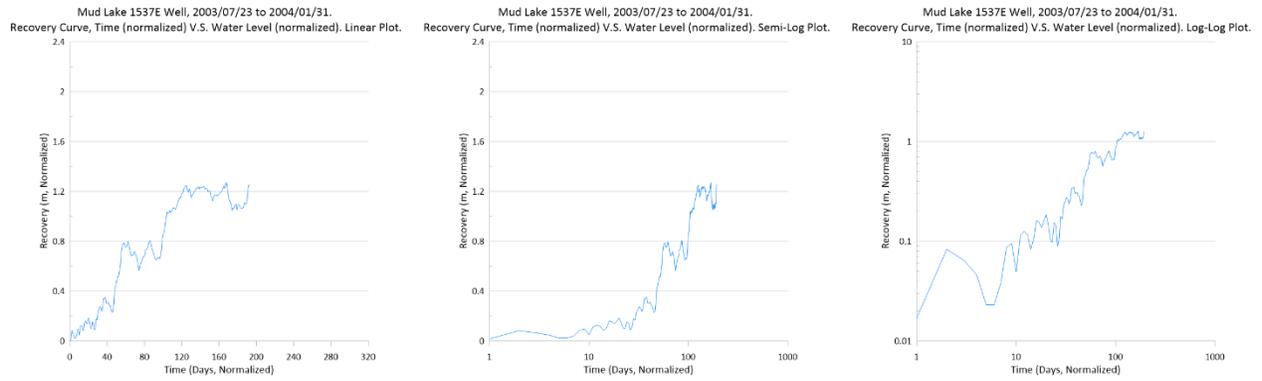


Figure 312: Recovery curve plots for Mud Lake 1537E_0112 well, 2003/07/23 to 2004/01/31. Mud Valley aquifer.

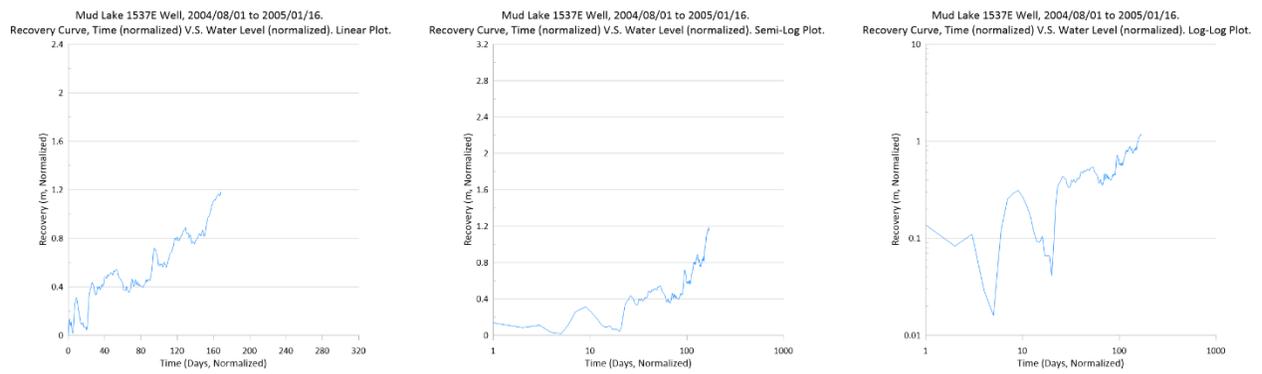


Figure 313: Recovery curve plots for Mud Lake 1537E_0112 well, 2004/08/01 to 2005/01/16. Mud Valley aquifer.

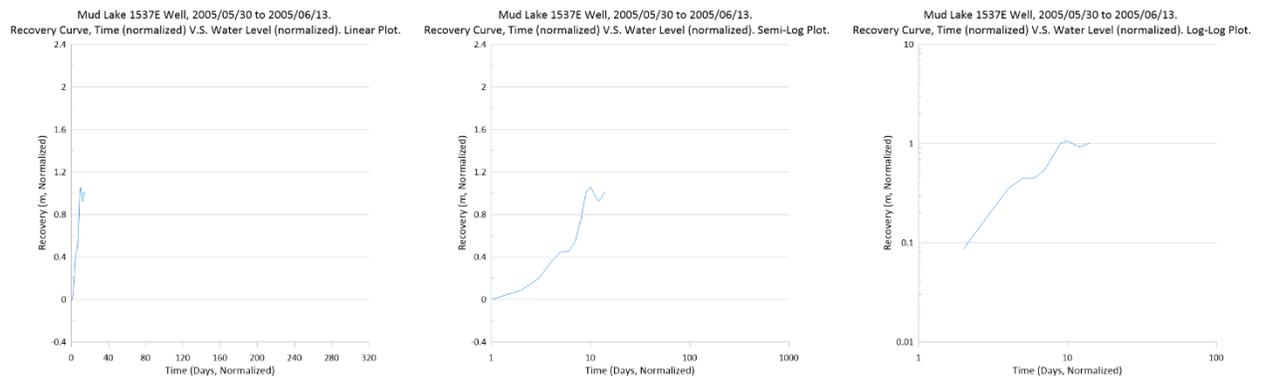


Figure 314: Recovery curve plots for Mud Lake 1537E_0112 well, 2005/05/30 to 2005/06/13. Mud Valley aquifer.

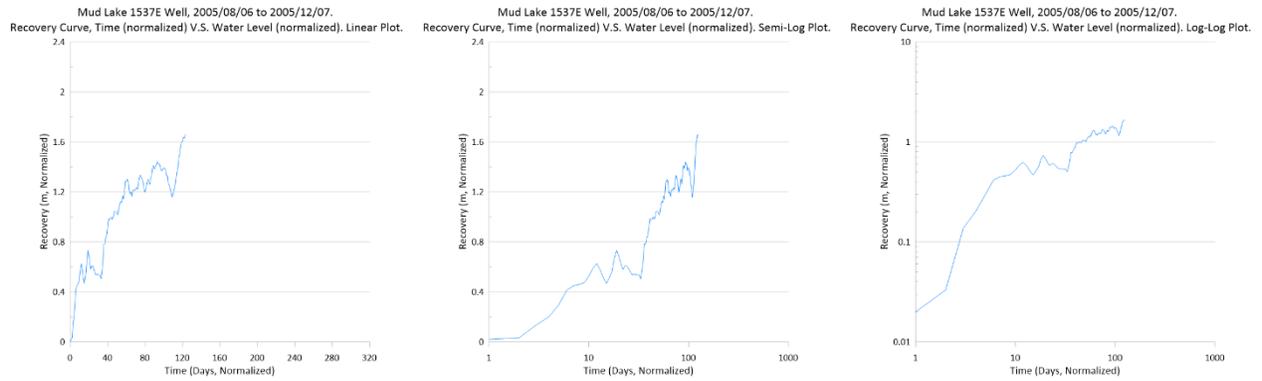


Figure 315: Recovery curve plots for Mud Lake 1537E_0112 well, 2005/08/06 to 2005/12/07. Mud Valley aquifer.

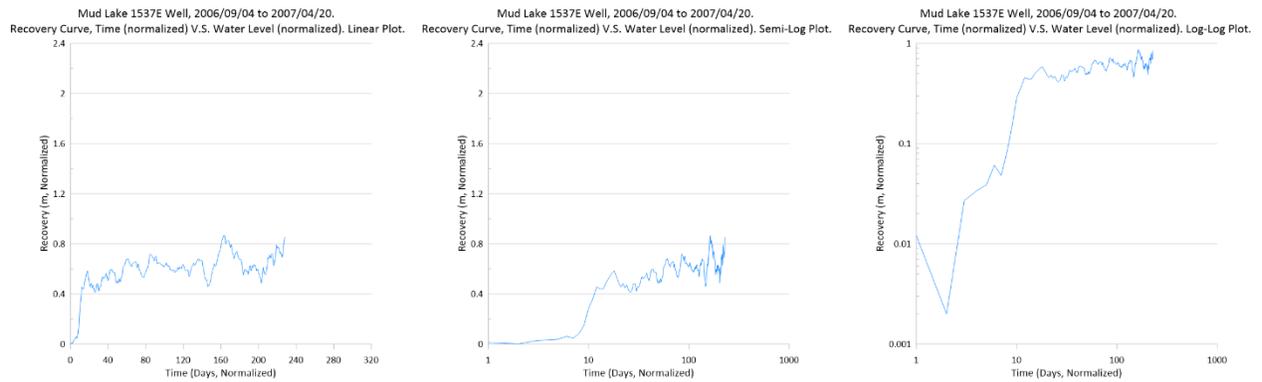


Figure 316: Recovery curve plots for Mud Lake 1537E_0112 well, 2006/09/04 to 2007/04/20. Mud Valley aquifer.

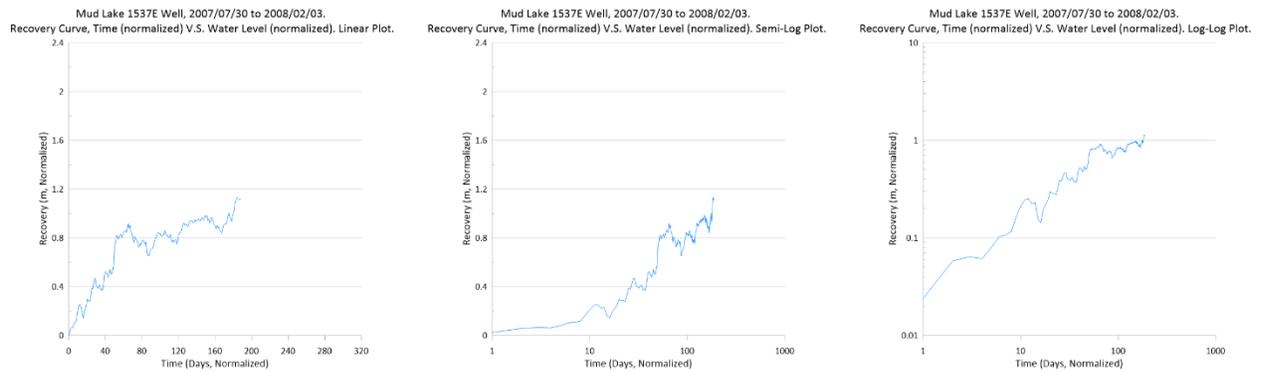


Figure 317: Recovery curve plots for Mud Lake 1537E_0112 well, 2007/07/30 to 2008/02/03. Mud Valley aquifer.

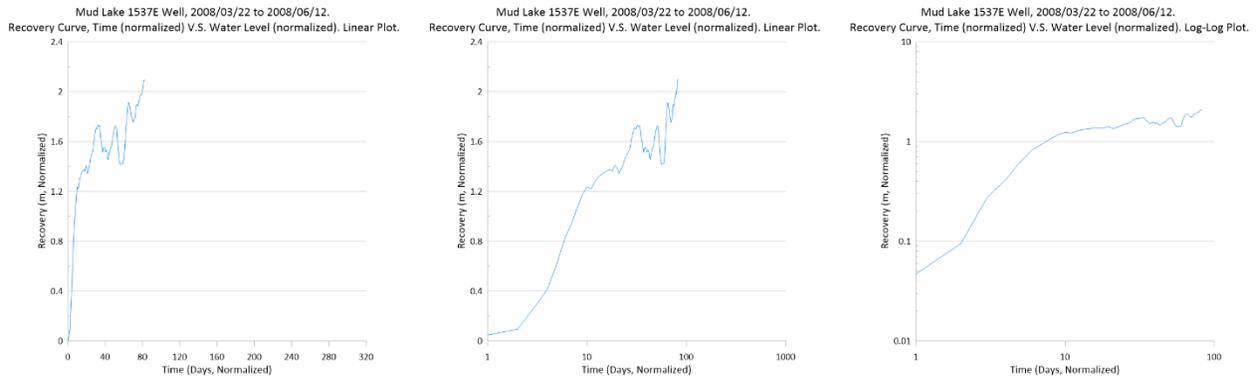


Figure 318: Recovery curve plots for Mud Lake 1537E_0112 well, 2008/03/22 to 2008/06/12. Mud Valley aquifer.

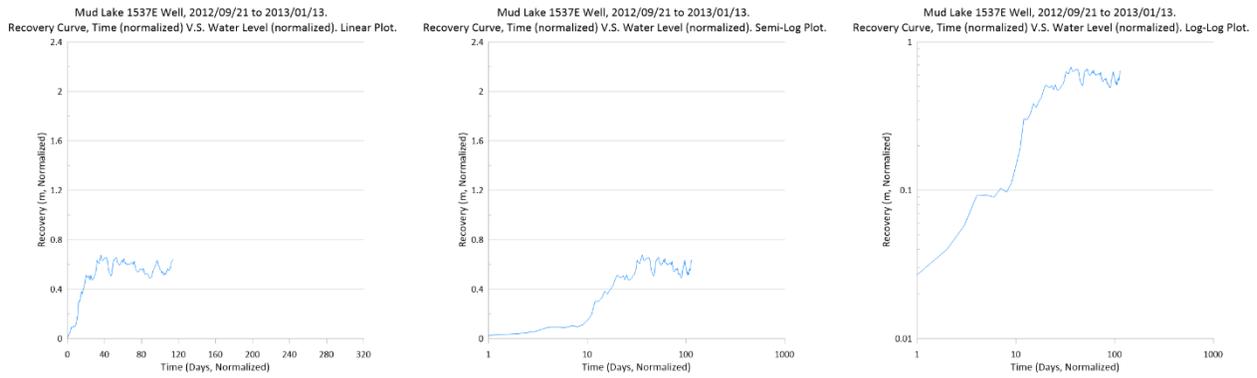


Figure 319: Recovery curve plots for Mud Lake 1537E_0112 well, 2012/09/21 to 2013/01/13. Mud Valley aquifer.

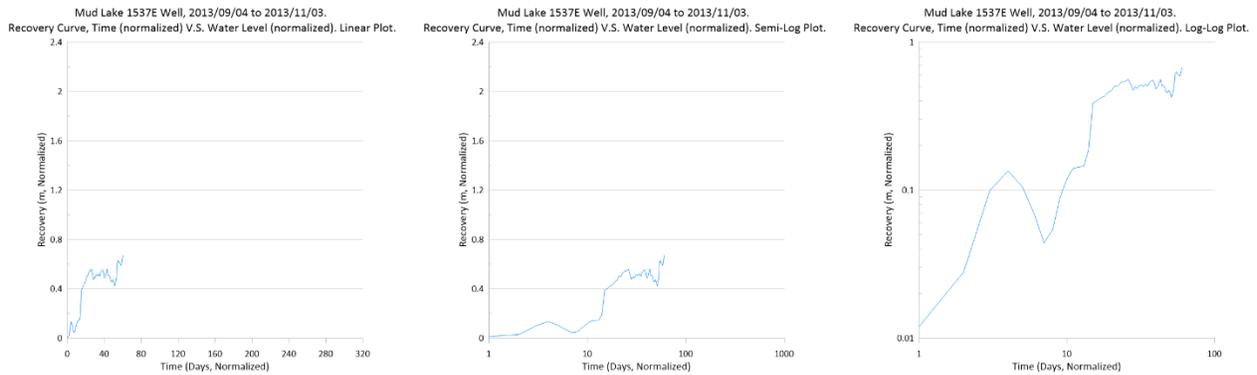


Figure 320: Recovery curve plots for Mud Lake 1537E_0112 well, 2013/09/04 to 2013/11/03. Mud Valley aquifer.

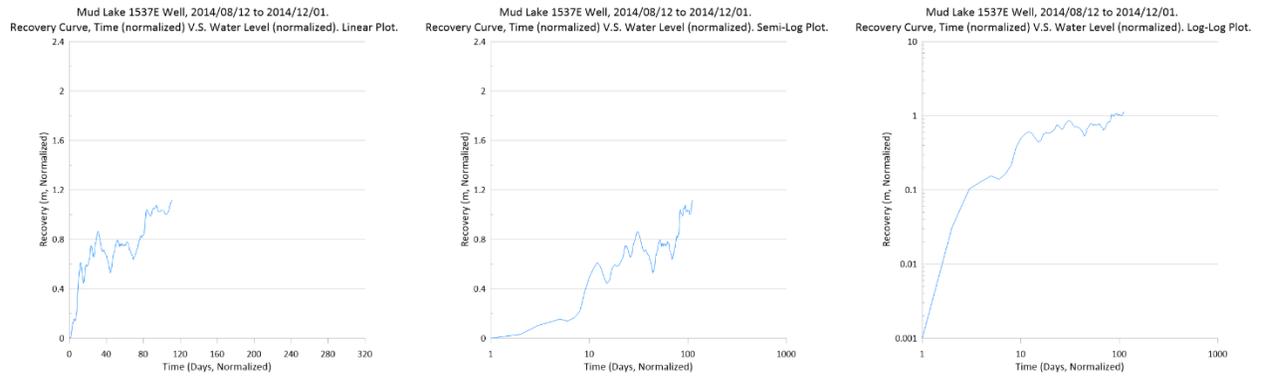


Figure 321: Recovery curve plots for Mud Lake 1537E_0112 well, 2014/08/12 to 2014/12/01. Mud Valley aquifer.

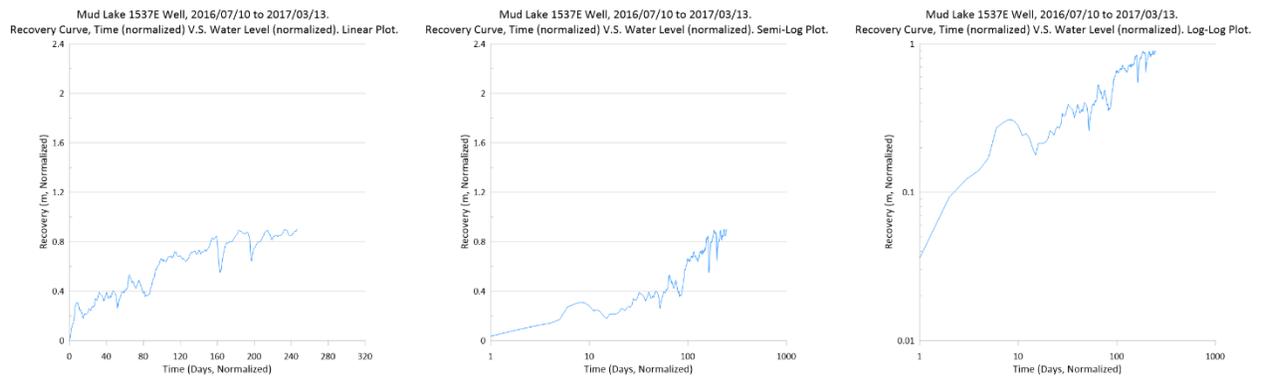


Figure 322: Recovery curve plots for Mud Lake 1537E_0112 well, 2016/07/10 to 2017/03/13. Mud Valley aquifer.

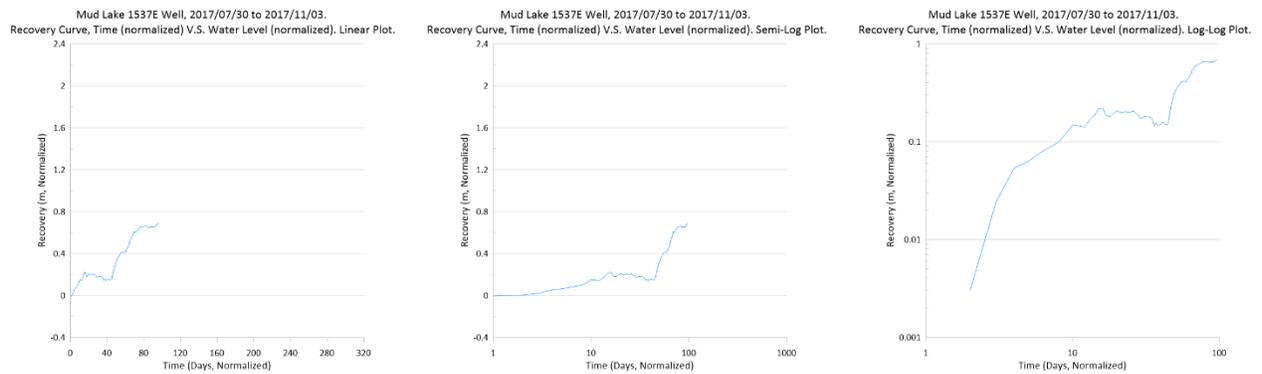


Figure 323: Recovery curve plots for Mud Lake 1537E_0112 well, 2017/07/30 to 2017/11/03. Mud Valley aquifer.

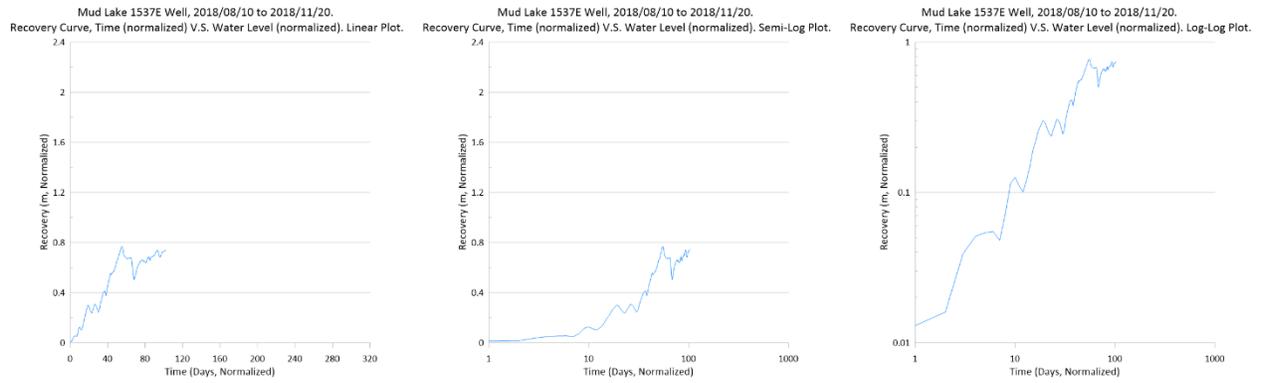


Figure 324: Recovery curve plots for Mud Lake 1537E_0112 well, 2018/08/10 to 2018/11/20. Mud Valley aquifer.

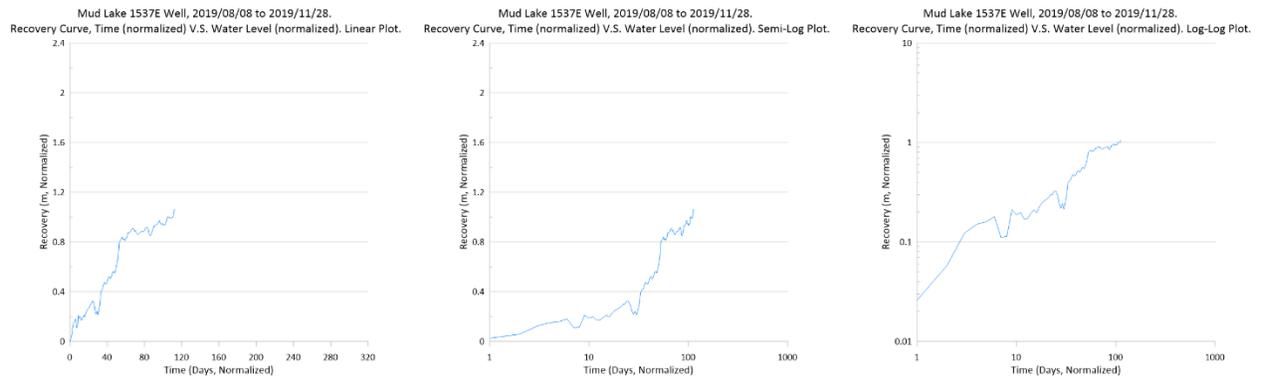


Figure 325: Recovery curve plots for Mud Lake 1537E_0112 well, 2019/08/08 to 2019/11/28. Mud Valley aquifer.

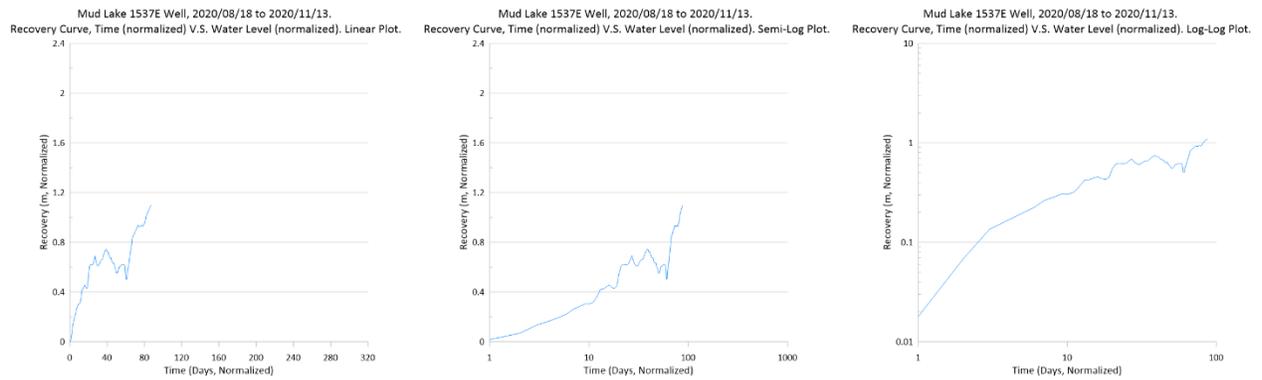


Figure 326: Recovery curve plots for Mud Lake 1537E_0112 well, 2020/08/18 to 2020/11/13. Mud Valley aquifer.

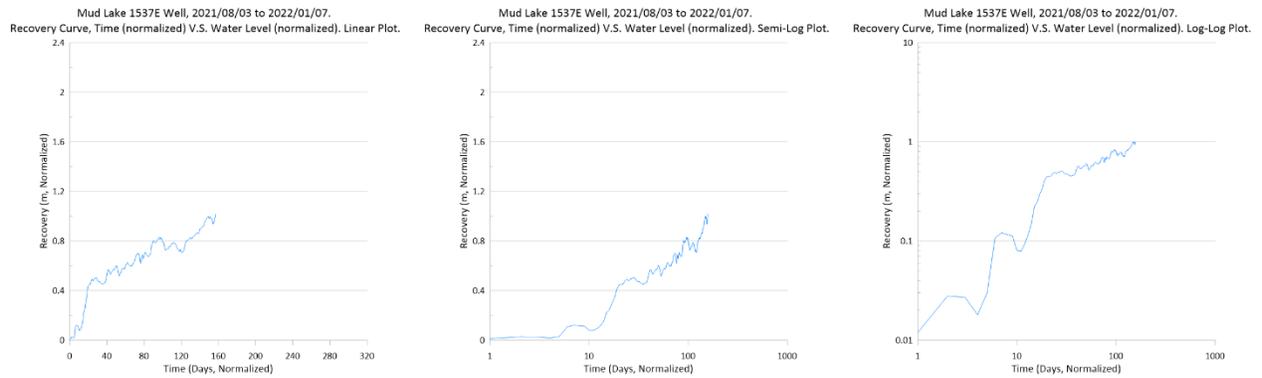


Figure 327: Recovery curve plots for Mud Lake 1537E_0112 well, 2021/08/03 to 2022/01/07. Mud Valley aquifer.

Appendix F7: GOWN Monitoring Well Recovery Curve Plots for Okotoks 05-1 South_0786 Well

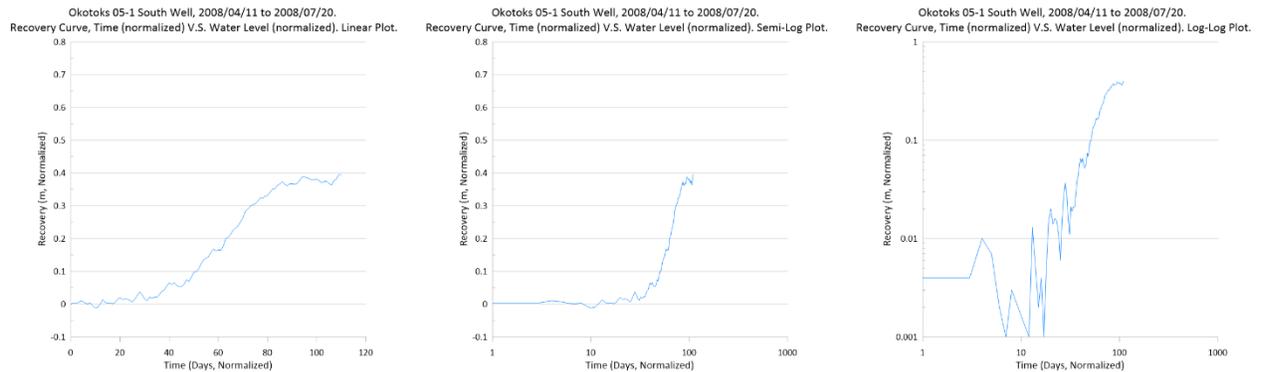


Figure 328: Recovery curve plots for Okotoks 05-1_0786 South well, 2008/04/11 to 2008/07/20. Porcupine Valley aquifer.

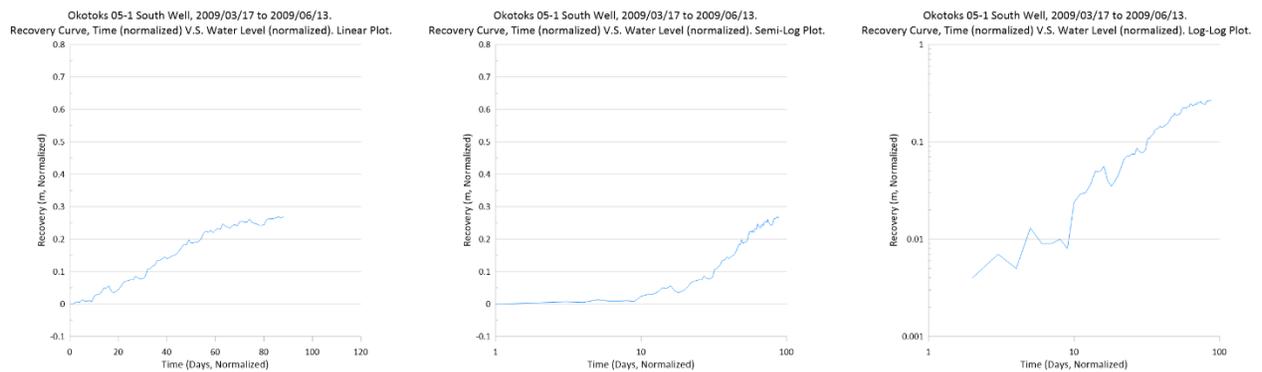


Figure 329: Recovery curve plots for Okotoks 05-1_0786 South well, 2009/03/17 to 2009/06/13. Porcupine Valley aquifer.

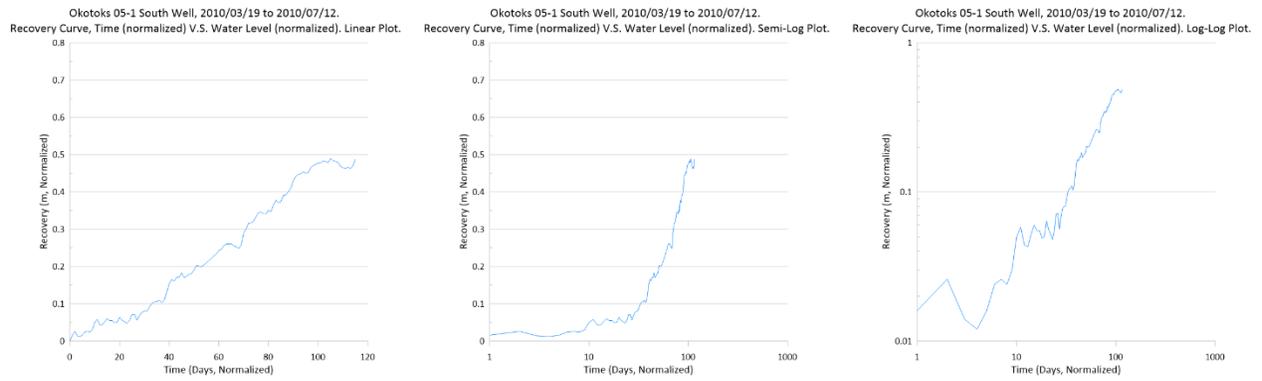


Figure 330: Recovery curve plots for Okotoks 05-1_0786 South well, 2010/03/19 to 2010/07/12. Porcupine Valley aquifer.

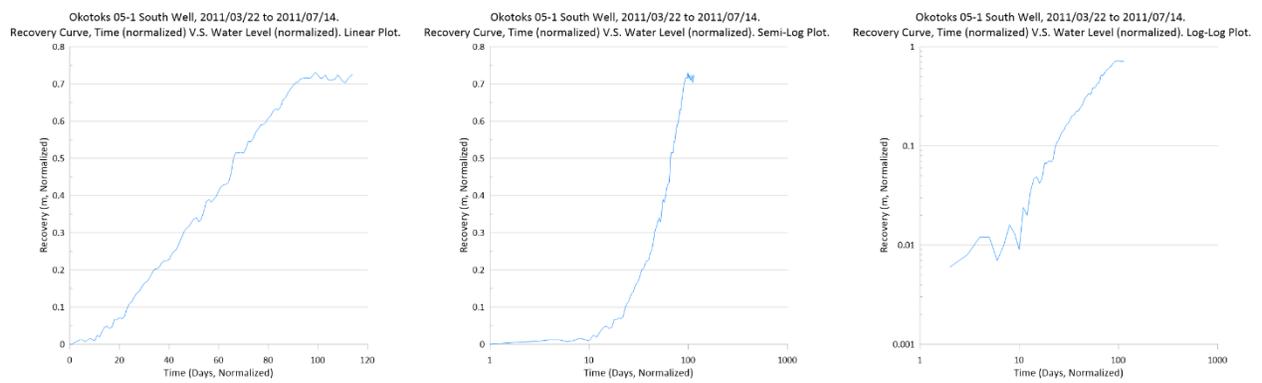


Figure 331: Recovery curve plots for Okotoks 05-1_0786 South well, 2011/01/22 to 2011/07/14. Porcupine Valley aquifer.

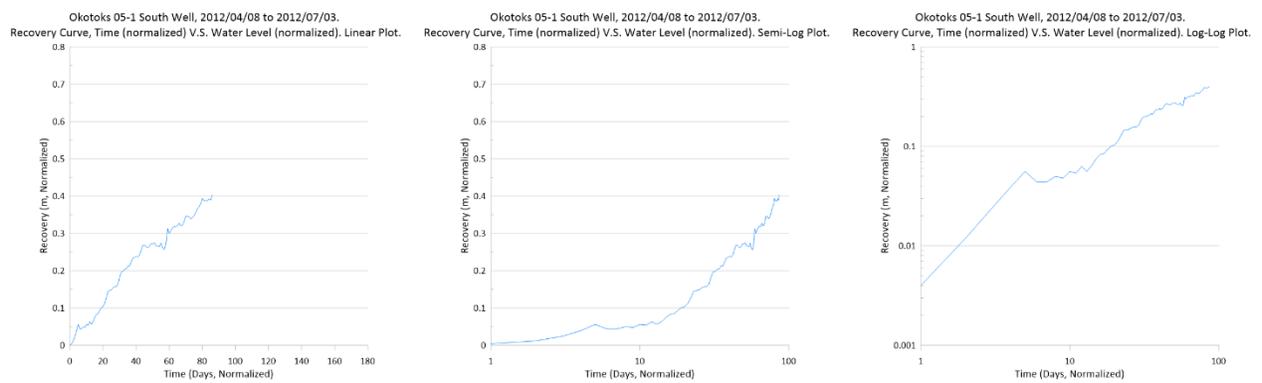
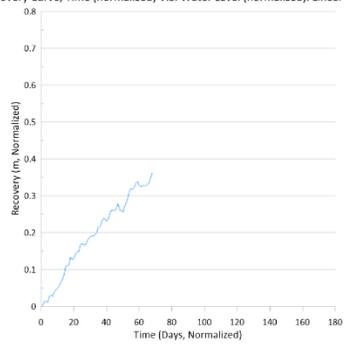
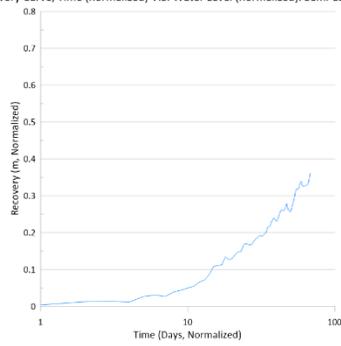


Figure 332: Recovery curve plots for Okotoks 05-1_0786 South well, 2012/04/08 to 2012/07/03. Porcupine Valley aquifer.

Okotoks 05-1 South Well, 2014/03/11 to 2014/05/18.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Linear Plot.



Okotoks 05-1 South Well, 2014/03/11 to 2014/05/18.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Semi-Log Plot.



Okotoks 05-1 South Well, 2014/03/11 to 2014/05/18.
Recovery Curve, Time (normalized) V.S. Water Level (normalized). Log-Log Plot.

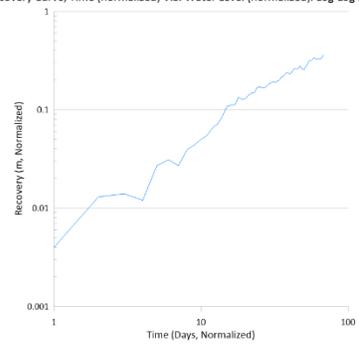


Figure 333: Recovery curve plots for Okotoks 05-1_0786 South well, 2014/03/11 to 2014/05/18. Porcupine Valley aquifer.

Appendix G: GOWN Monitoring Well Recovery Curve Plots for Peace River Valley Region Aquifer Wells

Appendix G1: GOWN Monitoring Well Recovery Curve Plots for Fairview 8-73_0340 Well

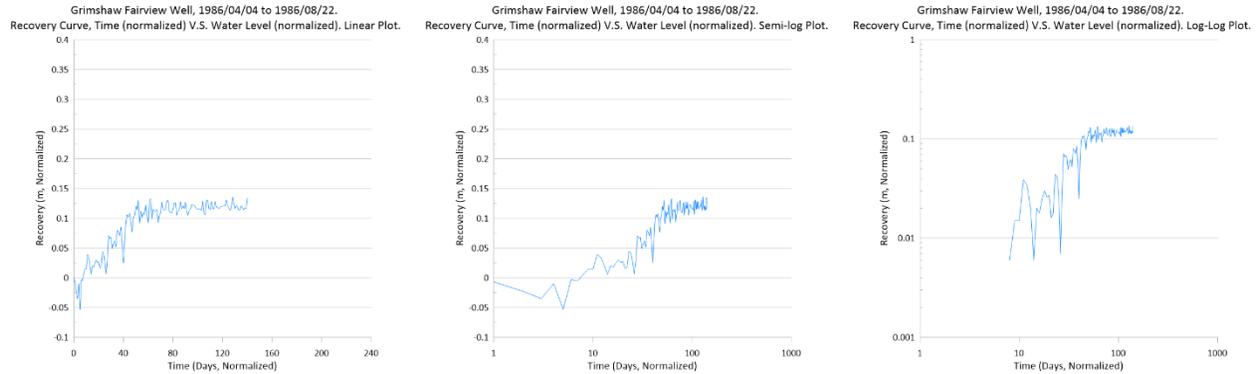


Figure 334: Recovery curve plots for Fairview 8-73_0340 well, 1986/04/04 to 1986/08/22. Grimshaw Gravels aquifer.

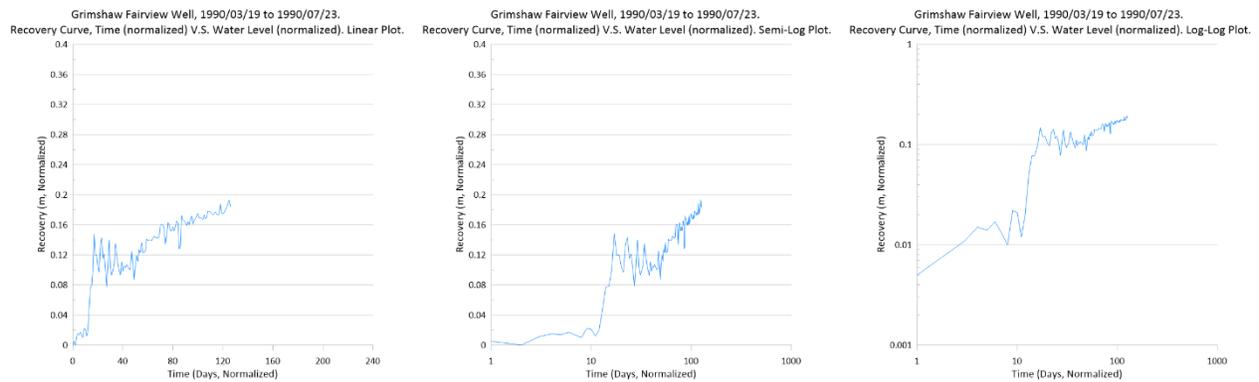


Figure 335: Recovery curve plots for Fairview 8-73_0340 well, 1990/03/19 to 1990/07/23. Grimshaw Gravels aquifer.

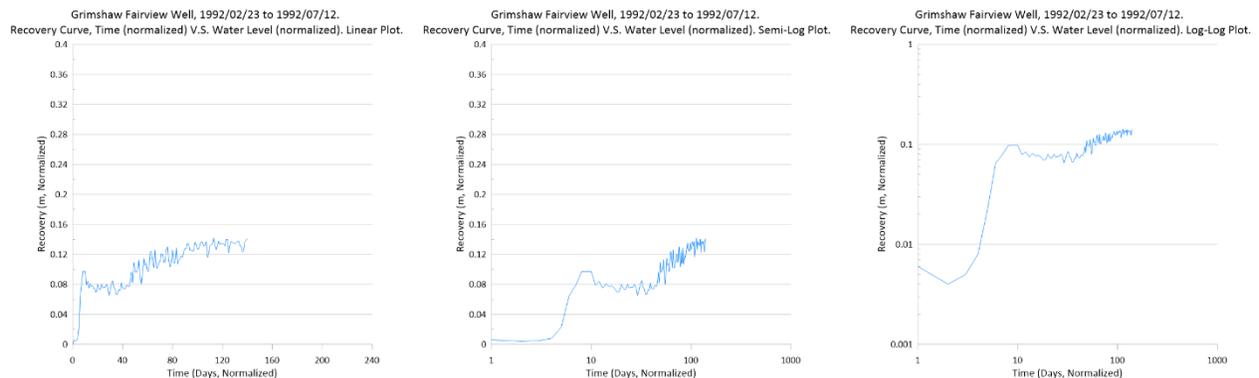


Figure 336: Recovery curve plots for Fairview 8-73_0340 well, 1992/02/23 to 1992/07/12. Grimshaw Gravels aquifer.

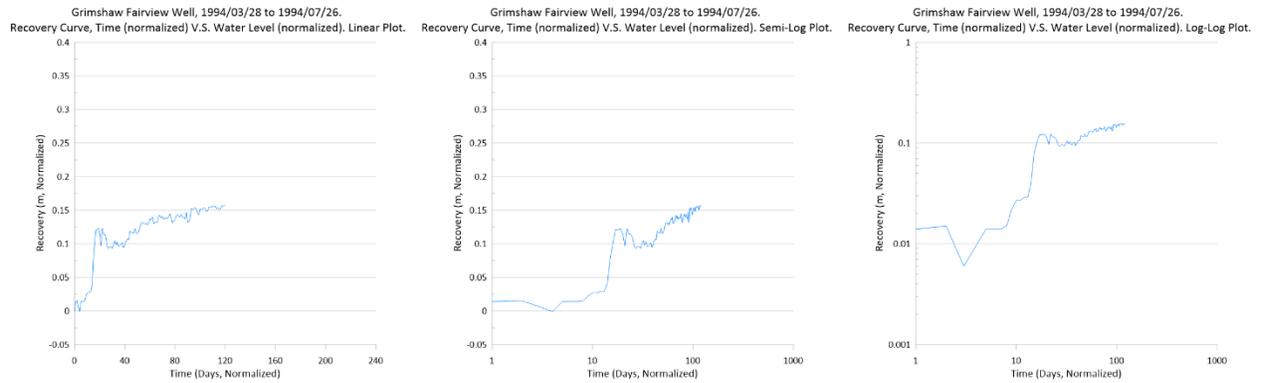


Figure 337: Recovery curve plots for Fairview 8-73_0340 well, 1994/03/28 to 1994/07/26. Grimshaw Gravels aquifer.

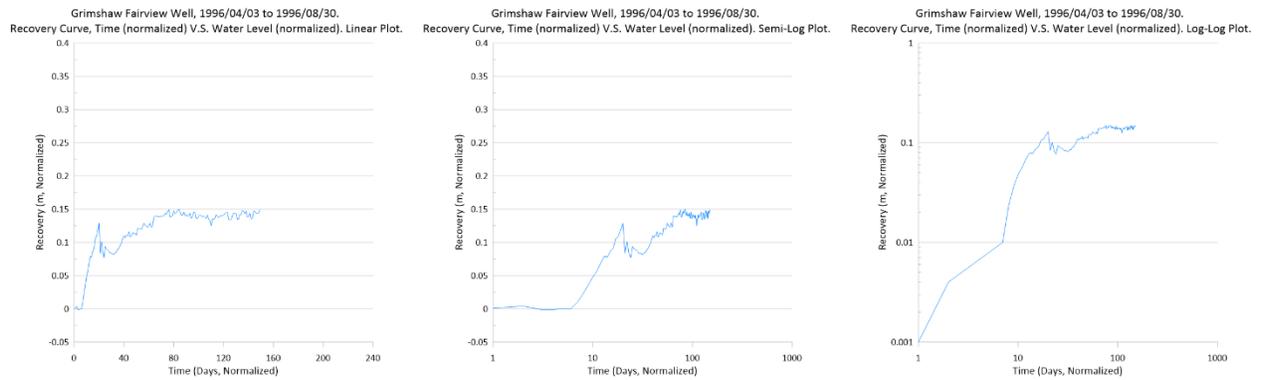


Figure 338: Recovery curve plots for Fairview 8-73_0340 well, 1996/04/03 to 1996/08/30. Grimshaw Gravels aquifer.

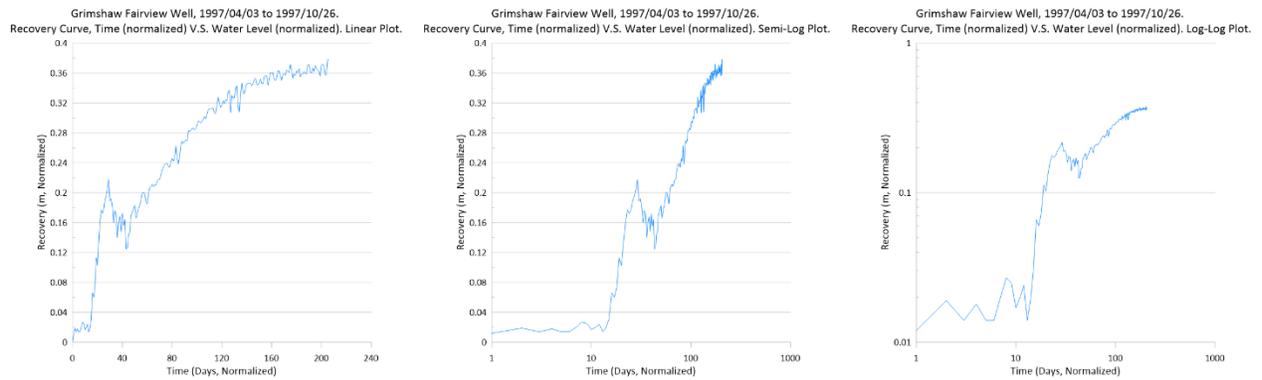


Figure 339: Recovery curve plots for Fairview 8-73_0340 well, 1997/04/03 to 1997/10/26. Grimshaw Gravels aquifer.

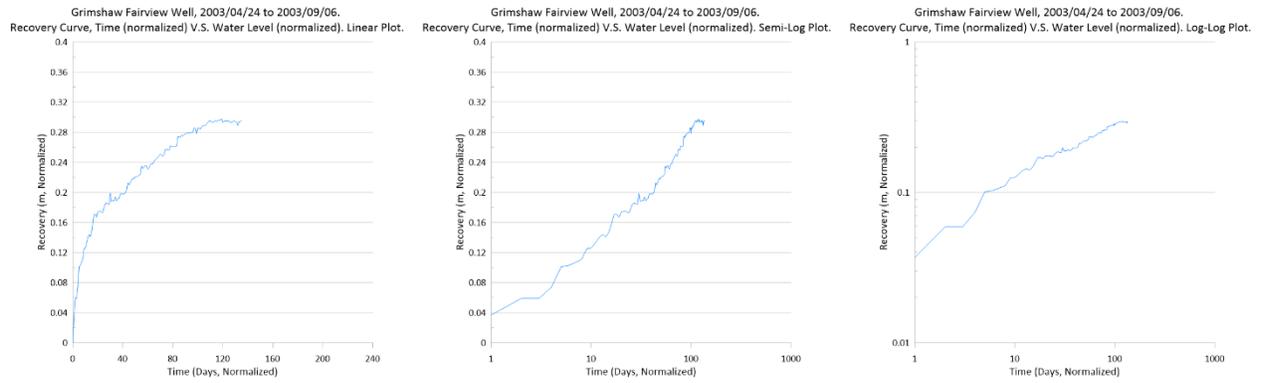


Figure 340: Recovery curve plots for Fairview 8-73_0340 well, 2003/04/24 to 2003/09/06. Grimshaw Gravels aquifer.

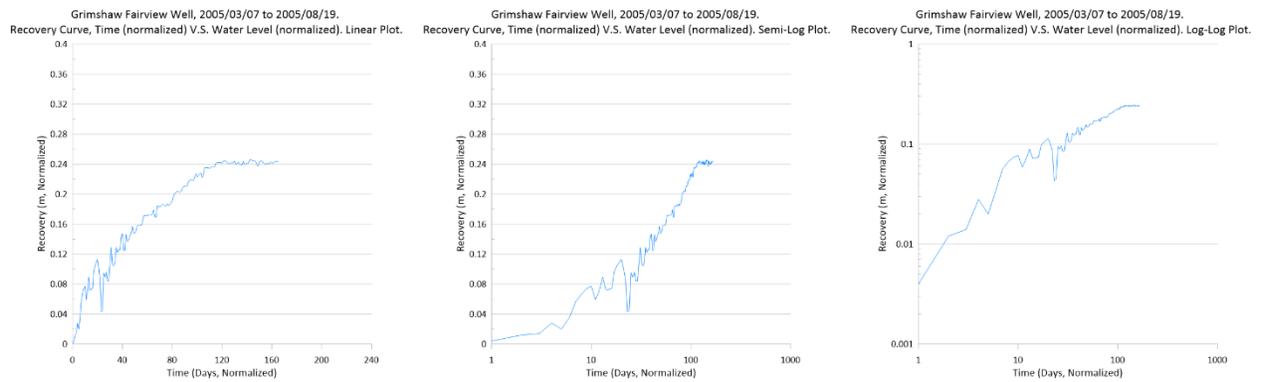


Figure 341: Recovery curve plots for Fairview 8-73_0340 well, 2005/03/07 to 2005/08/19. Grimshaw Gravels aquifer.

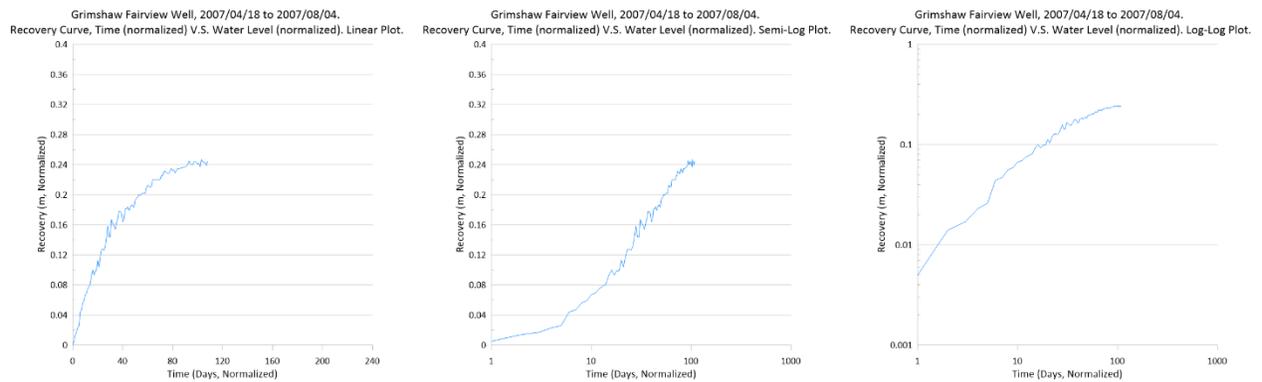


Figure 342: Recovery curve plots for Fairview 8-73_0340 well, 2007/04/18 to 2007/08/04. Grimshaw Gravels aquifer.

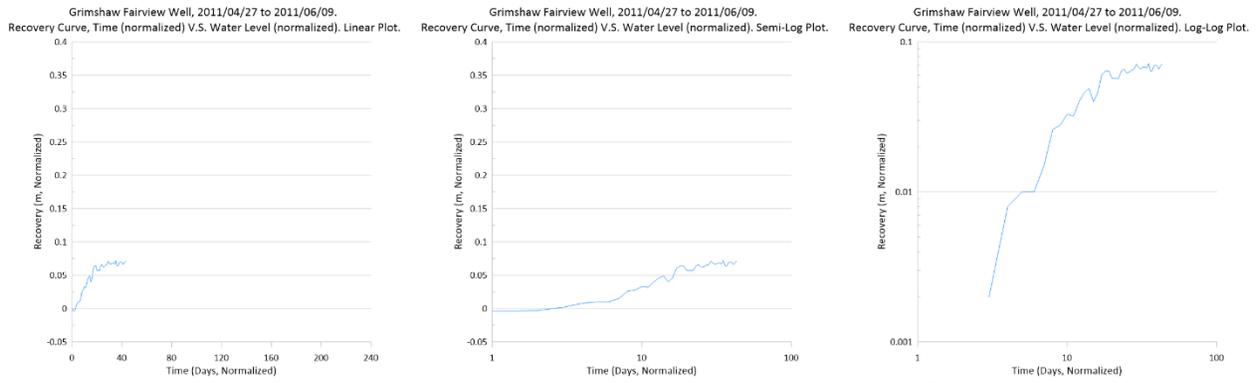


Figure 343: Recovery curve plots for Fairview 8-73_0340 well, 2011/04/27 to 2011/06/09. Grimshaw Gravels aquifer.

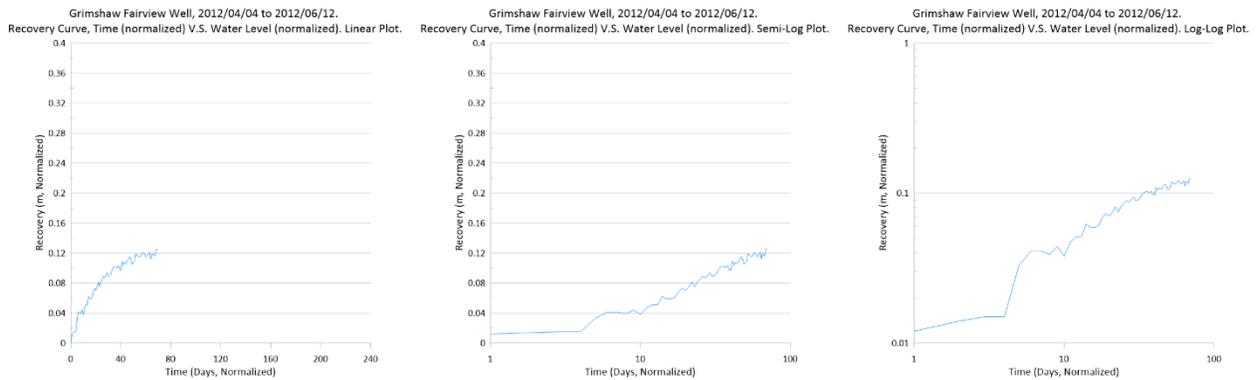


Figure 344: Recovery curve plots for Fairview 8-73_0340 well, 2012/04/04 to 2012/06/12. Grimshaw Gravels aquifer.

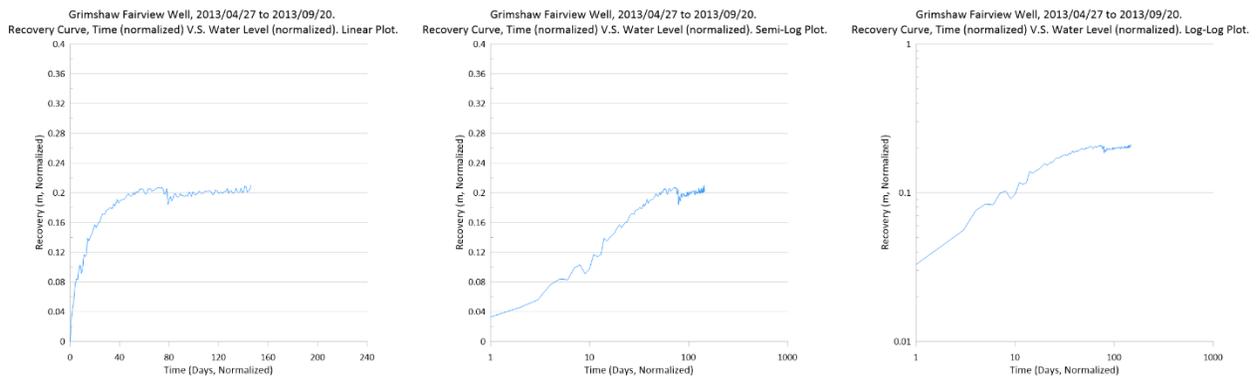


Figure 345: Recovery curve plots for Fairview 8-73_0340 well, 2013/04/27 to 2013/09/20. Grimshaw Gravels aquifer.

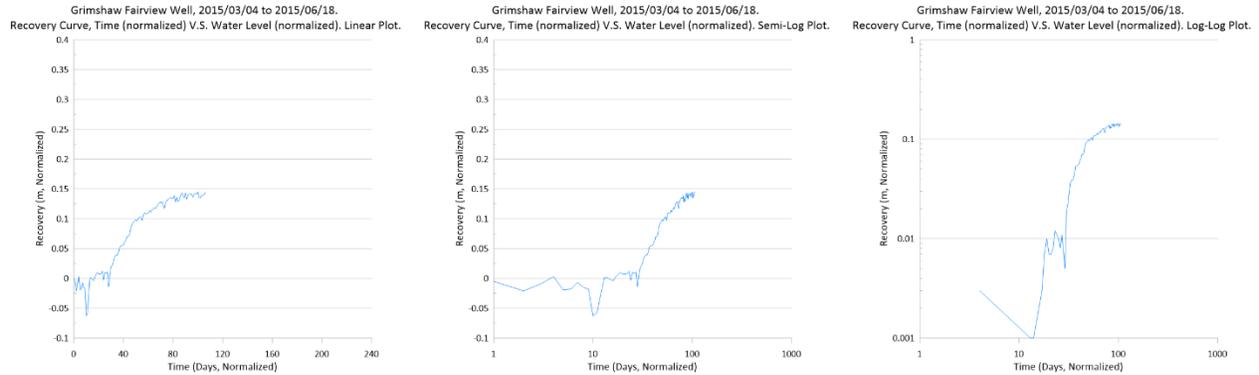


Figure 346: Recovery curve plots for Fairview 8-73_0340 well, 2015/03/04 to 2015/06/18. Grimshaw Gravels aquifer.

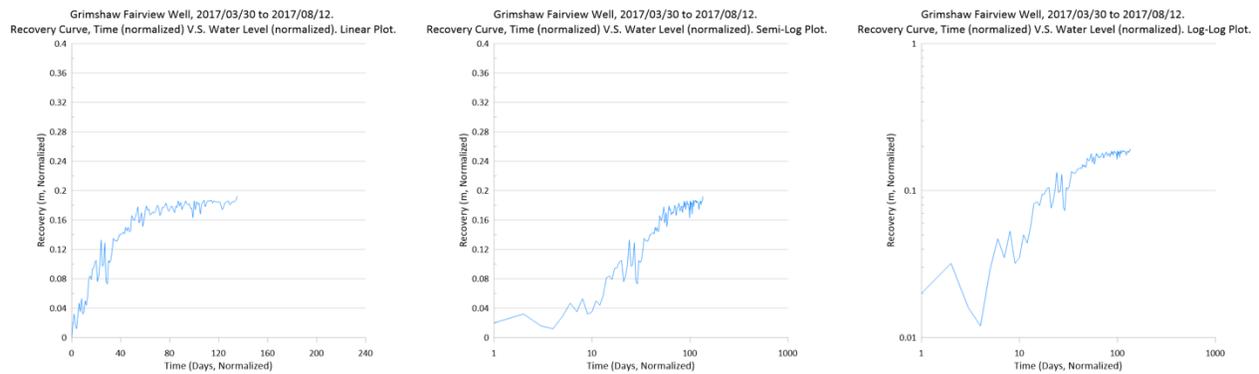


Figure 347: Recovery curve plots for Fairview 8-73_0340 well, 2017/03/30 to 2017/08/12. Grimshaw Gravels aquifer.

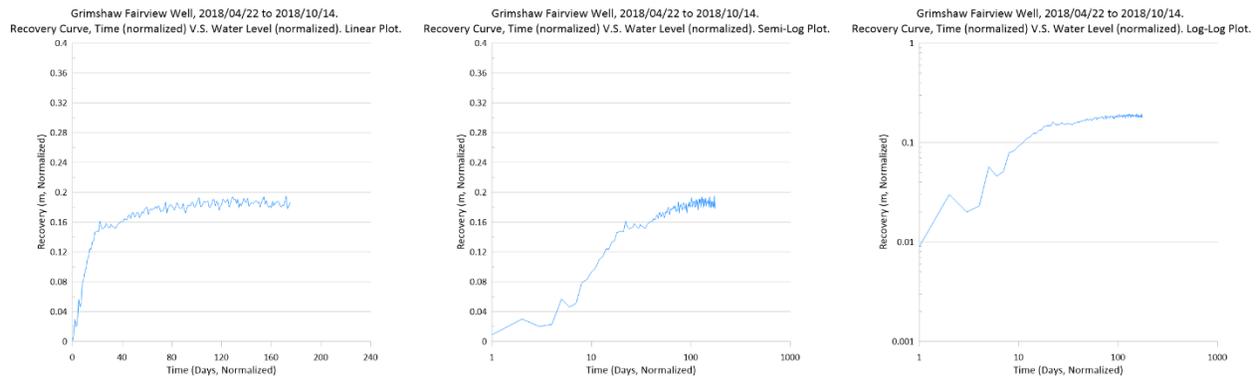


Figure 348: Recovery curve plots for Fairview 8-73_0340 well, 2018/04/22 to 2018/10/14. Grimshaw Gravels aquifer.

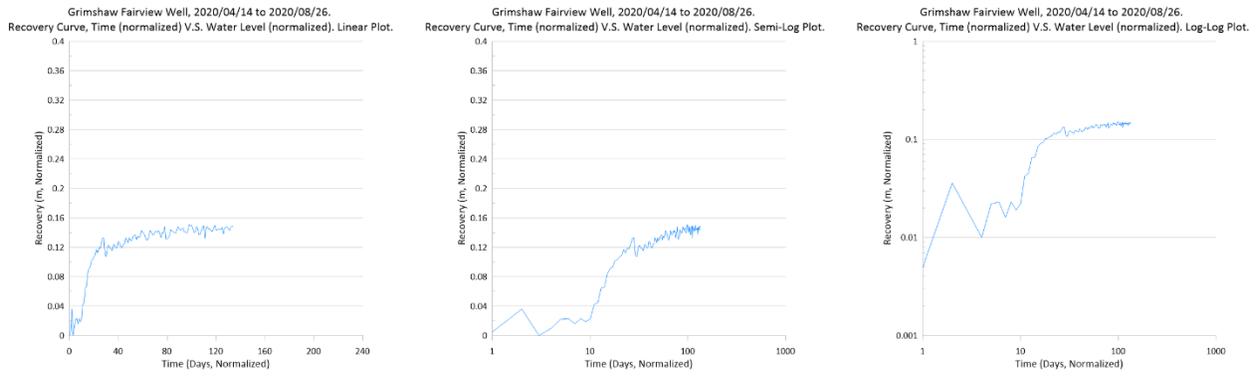


Figure 349: Recovery curve plots for Fairview 8-73_0340 well, 2020/04/14 to 2020/08/26. Grimshaw Gravels aquifer.

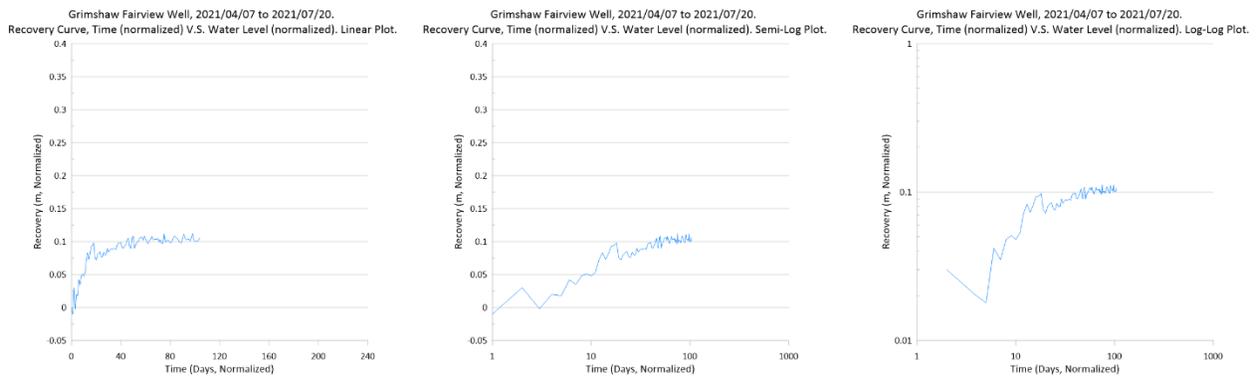


Figure 350: Recovery curve plots for Fairview 8-73_0340 well, 2021/04/07 to 2021/07/20. Grimshaw Gravels aquifer.

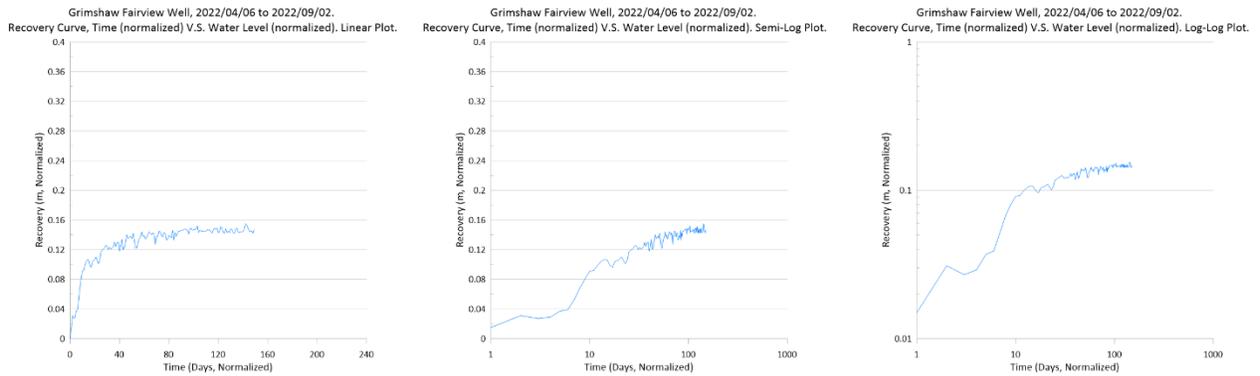


Figure 351: Recovery curve plots for Fairview 8-73_0340 well, 2022/04/06 to 2022/09/02. Grimshaw Gravels aquifer.

Appendix G2: GOWN Monitoring Well Recovery Curve Plots for Grimshaw Kerndale_0339 Well

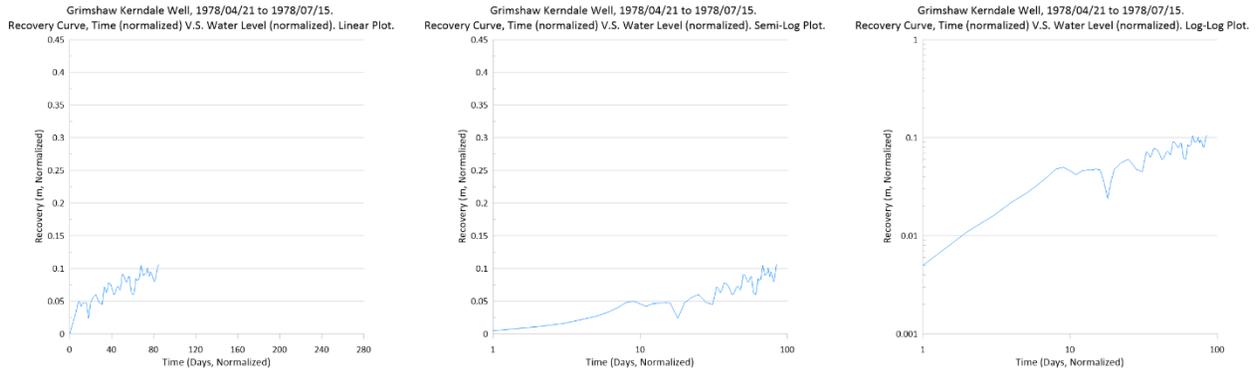


Figure 352: Recovery curve plots for Kerndale_0339 well, 1978/04/21 to 1978/07/15. Grimshaw Gravels aquifer.

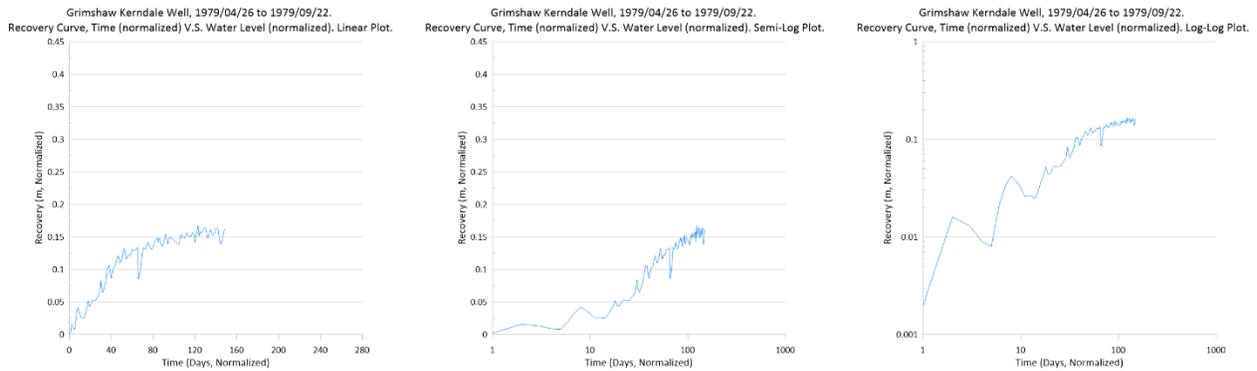


Figure 353: Recovery curve plots for Kerndale_0339 well, 1979/04/26 to 1979/09/22. Grimshaw Gravels aquifer.

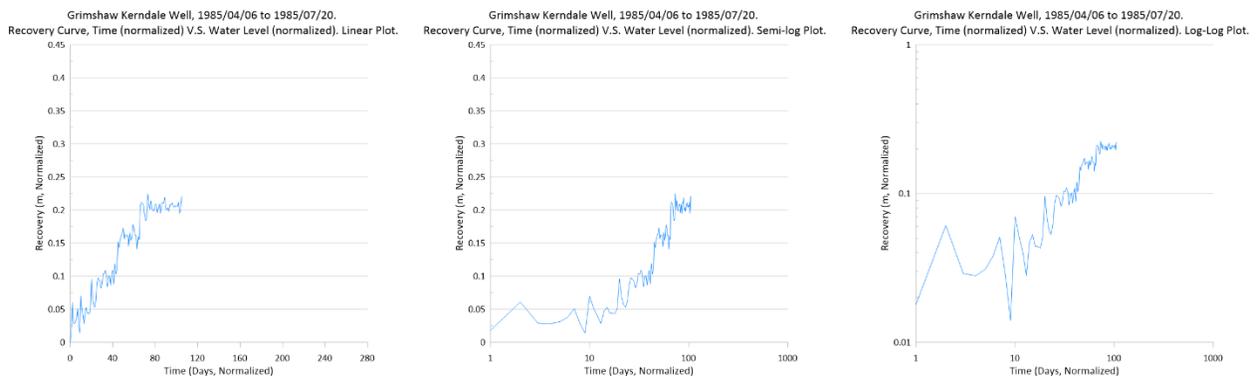


Figure 354: Recovery curve plots for Kerndale_0339 well, 1985/04/06 to 1985/07/20. Grimshaw Gravels aquifer.

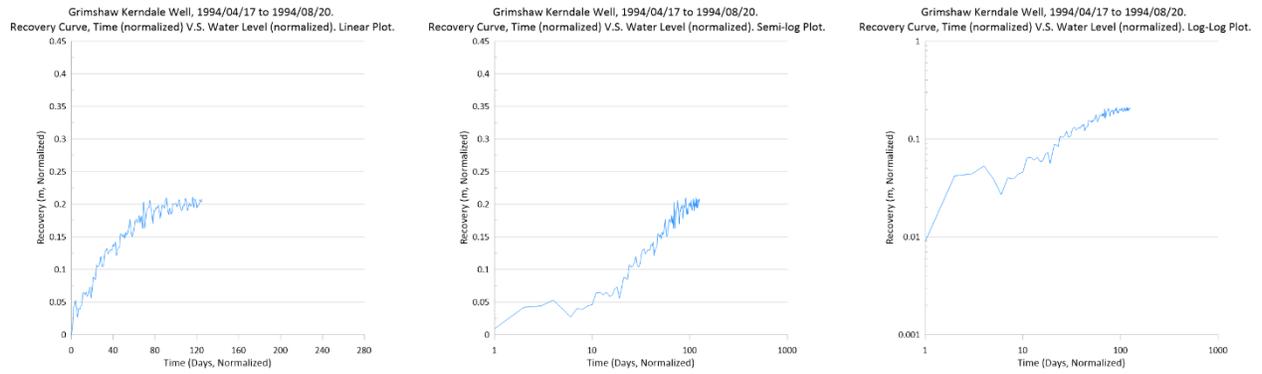


Figure 355: Recovery curve plots for Kerndale_0339 well, 1994/04/17 to 1994/08/20. Grimshaw Gravels aquifer.

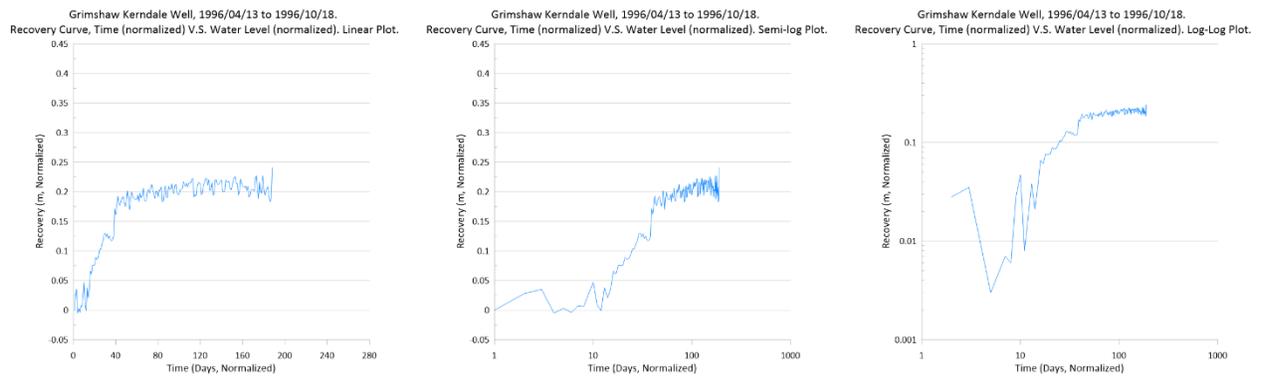


Figure 356: Recovery curve plots for Kerndale_0339 well, 1996/04/13 to 1996/10/18. Grimshaw Gravels aquifer.

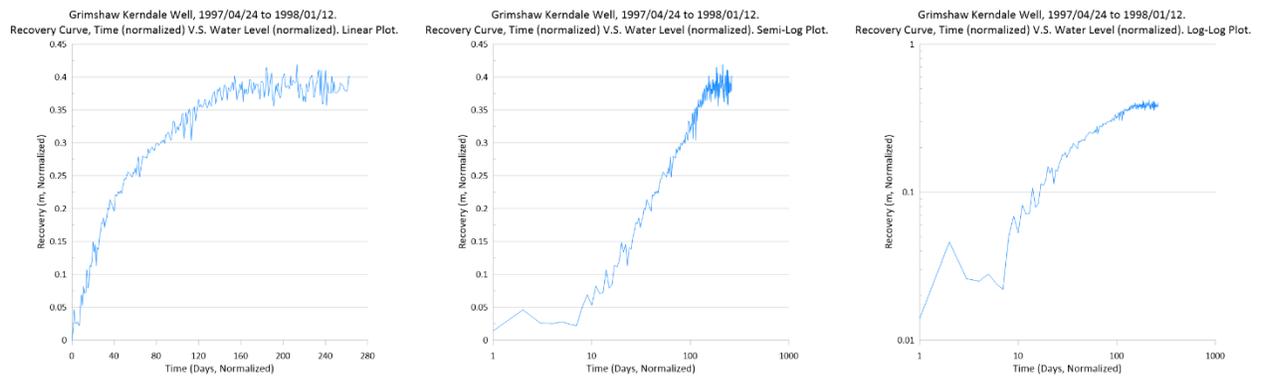


Figure 357: Recovery curve plots for Kerndale_0339 well, 1997/04/24 to 1998/01/12. Grimshaw Gravels aquifer.

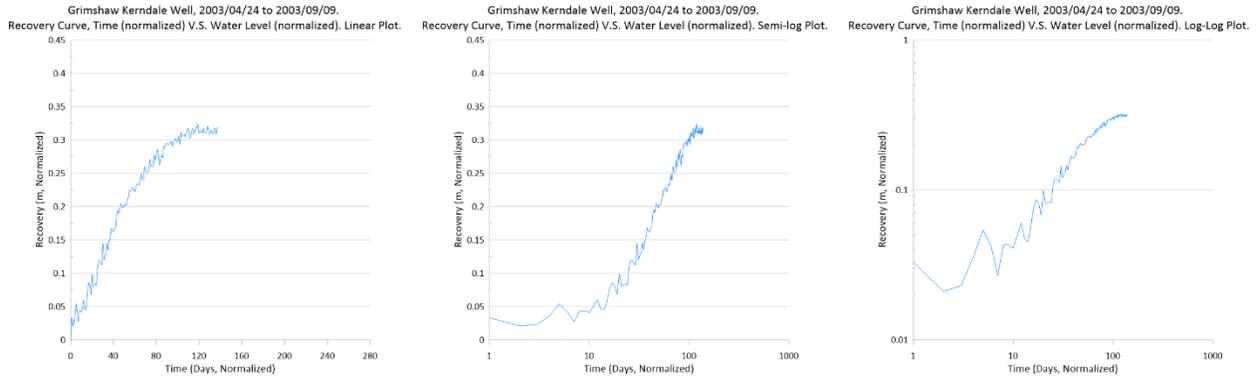


Figure 358: Recovery curve plots for Kerndale_0339 well, 2003/04/24 to 2003/09/09. Grimshaw Gravels aquifer.

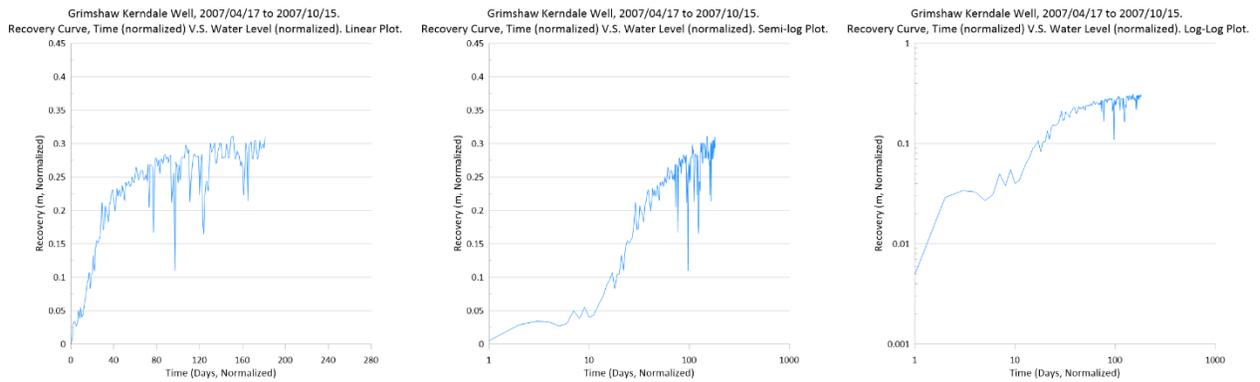


Figure 359: Recovery curve plots for Kerndale_0339 well, 2007/04/17 to 2007/10/15. Grimshaw Gravels aquifer.

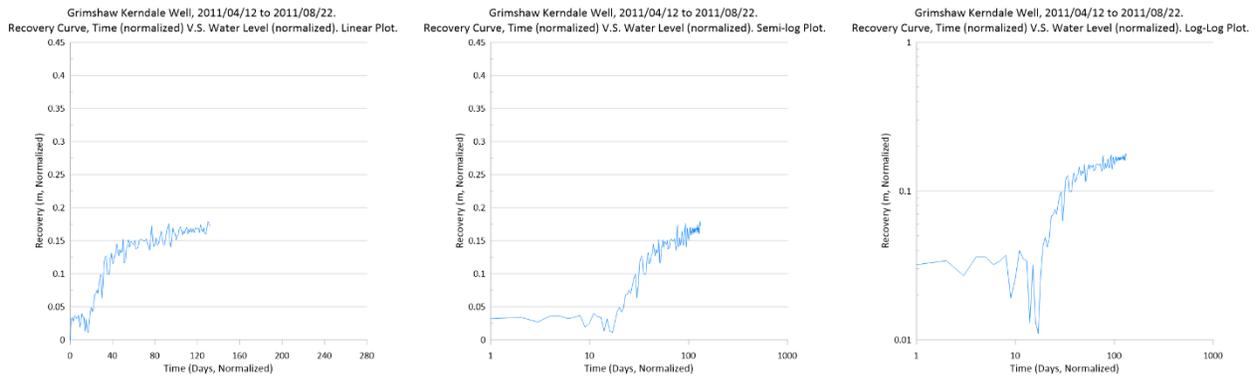


Figure 360: Recovery curve plots for Kerndale_0339 well, 2011/04/12 to 2011/08/22. Grimshaw Gravels aquifer.

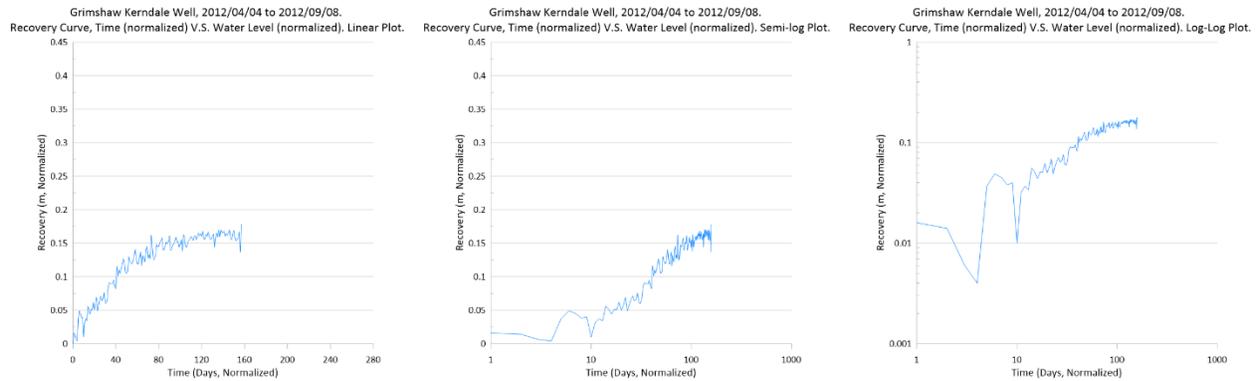


Figure 361: Recovery curve plots for Kerdale_0339 well, 2012/04/04 to 2012/09/08. Grimshaw Gravels aquifer.

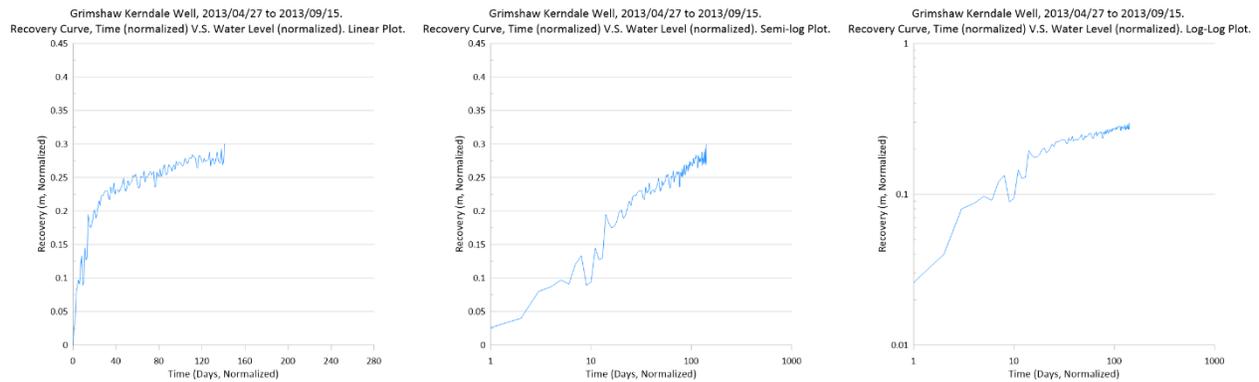


Figure 362: Recovery curve plots for Kerdale_0339 well, 2013/04/27 to 2013/09/15. Grimshaw Gravels aquifer.

Appendix G3: GOWN Monitoring Well Recovery Curve Plots for Grimshaw Mercier_0338 Well

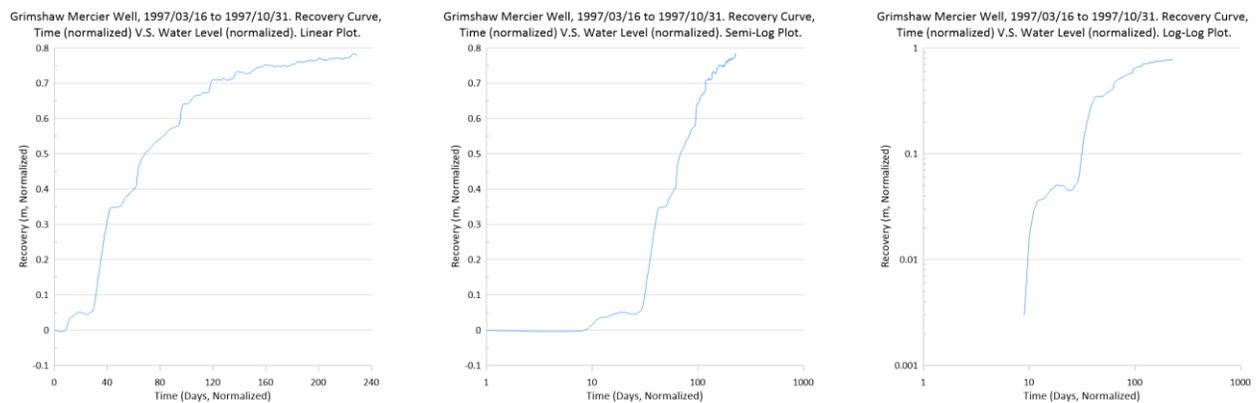


Figure 363: Recovery curve plots for Grimshaw Mercier_0338 well, 1997/03/16 to 1997/10/31. Grimshaw Gravels aquifer.

Appendix G4: GOWN Monitoring Well Recovery Curve Plots for Grimshaw Nissan 66-1_0379 Well

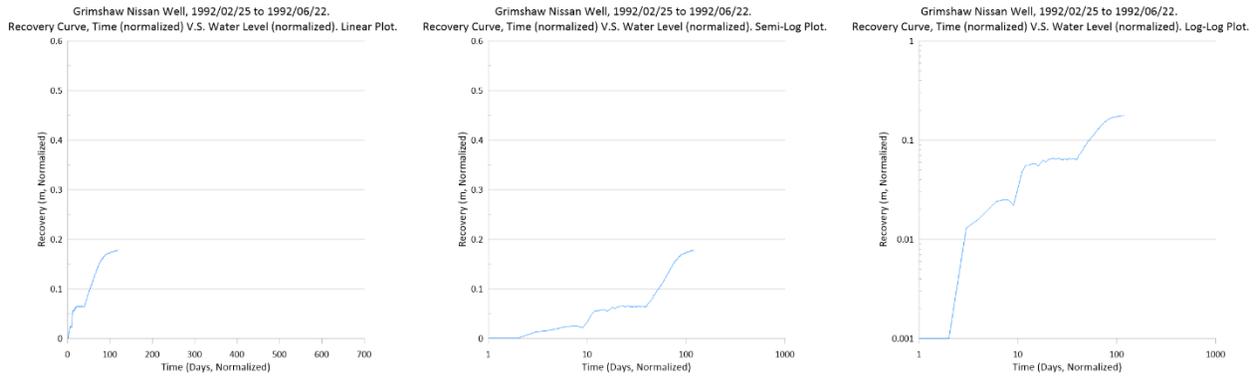


Figure 364: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 1992/02/25 to 1992/06/22. Grimshaw Gravels aquifer.

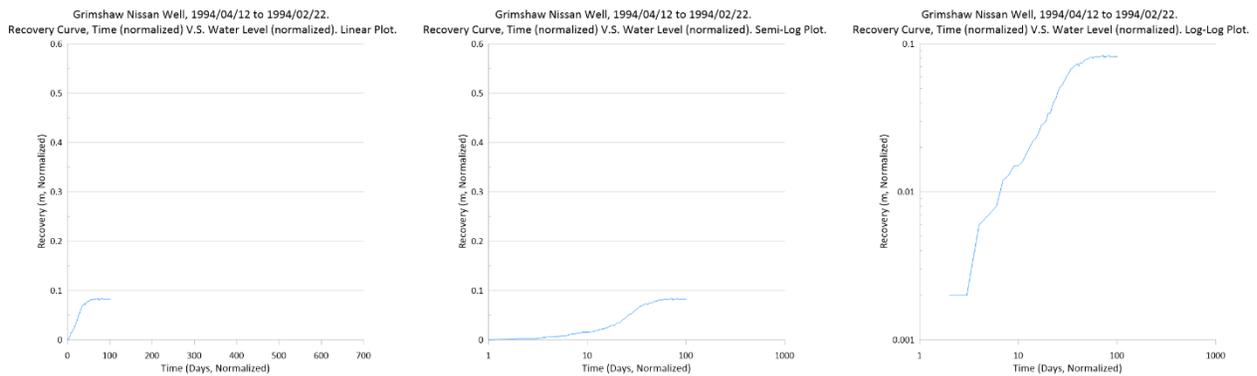


Figure 365: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 1994/02/22 to 1994/04/12. Grimshaw Gravels aquifer.

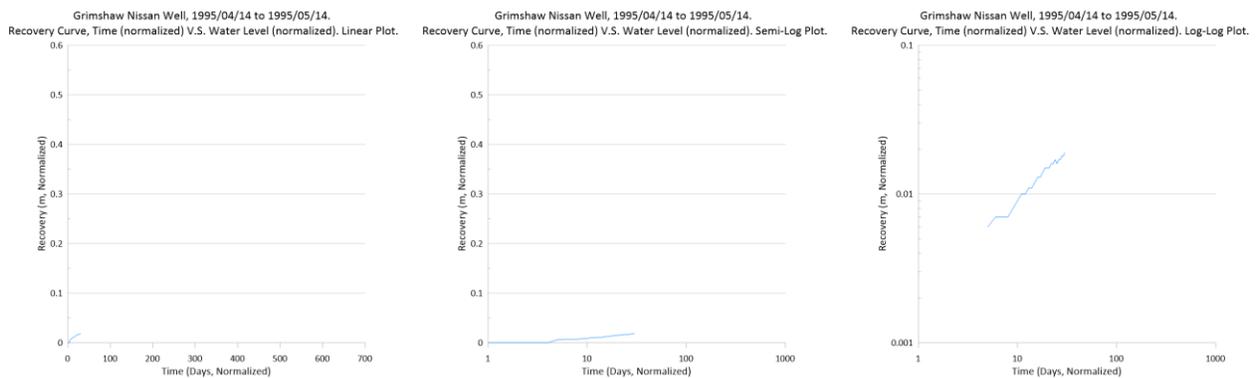


Figure 366: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 1995/04/14 to 1995/05/14. Grimshaw Gravels aquifer.

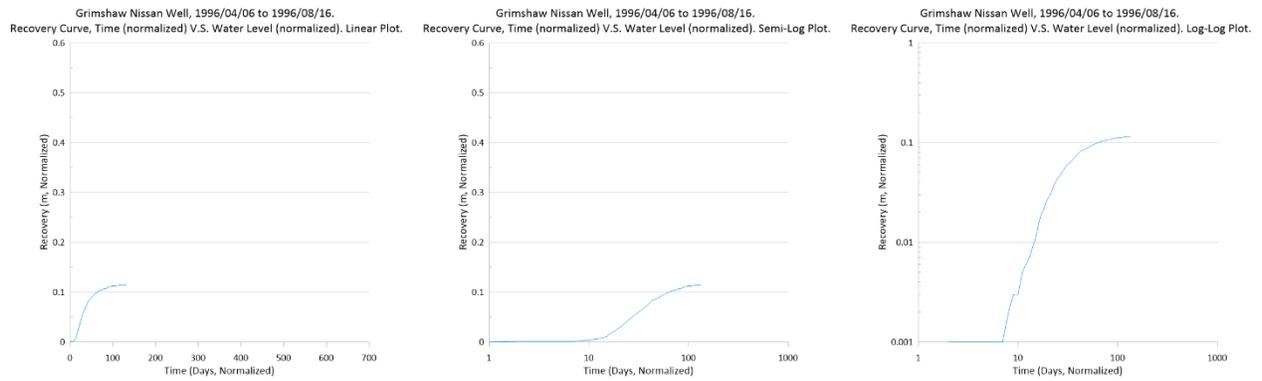


Figure 367: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 1996/04/06 to 1996/08/16. Grimshaw Gravels aquifer.

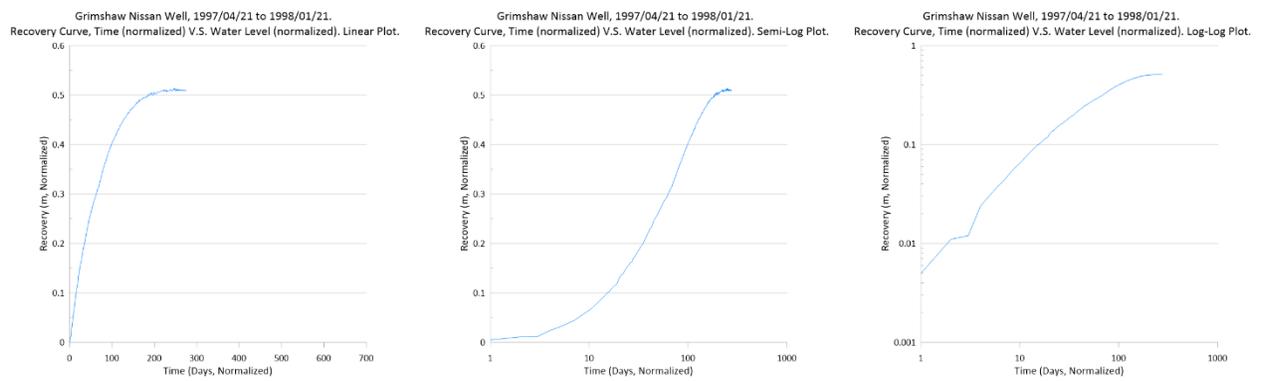


Figure 368: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 1997/04/21 to 1998/01/21. Grimshaw Gravels aquifer.

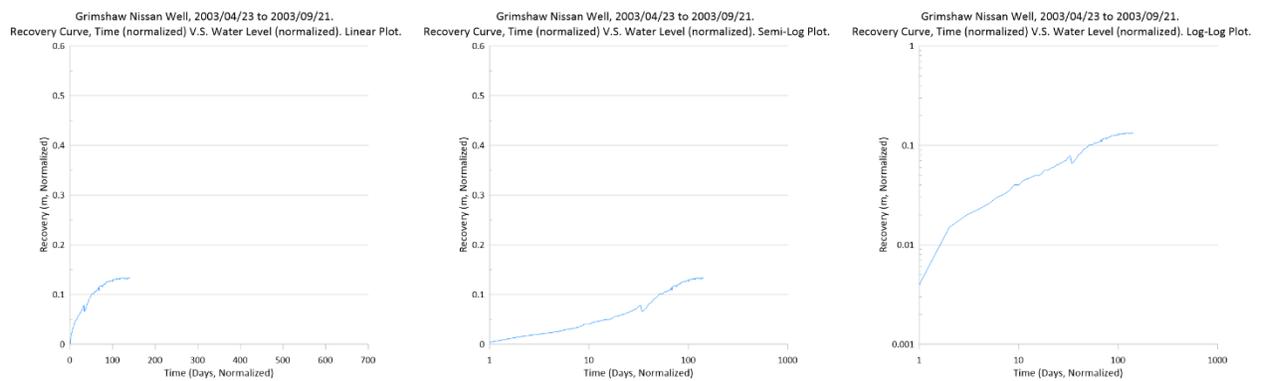


Figure 369: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2003/04/23 to 2003/09/21. Grimshaw Gravels aquifer.

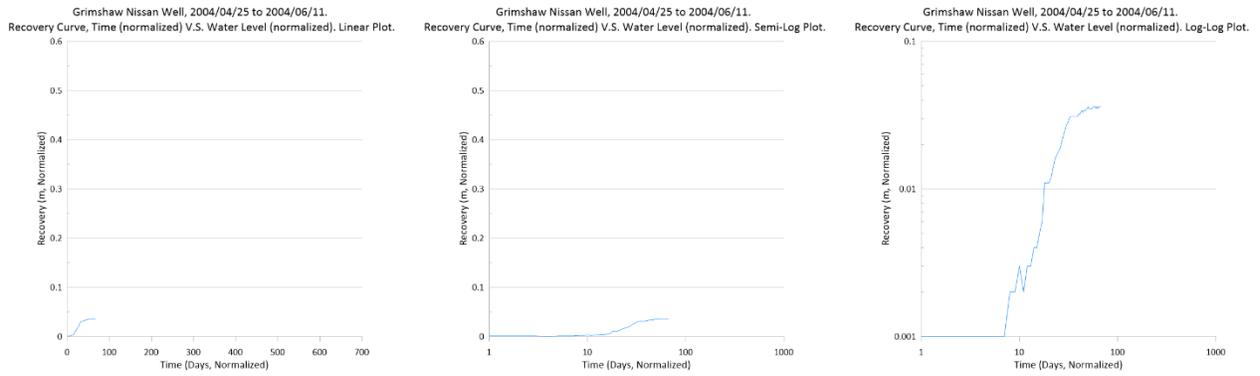


Figure 370: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2004/04/25 to 2004/06/11. Grimshaw Gravels aquifer.

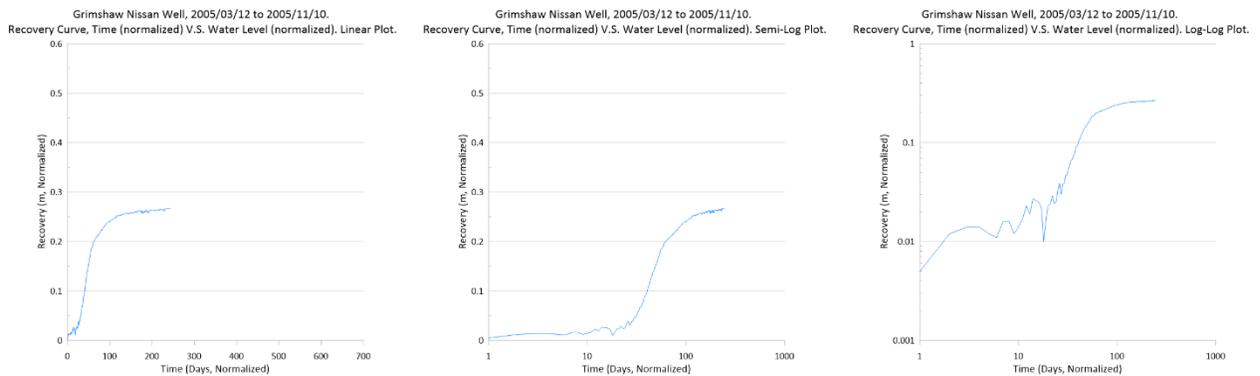


Figure 371: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2005/03/12 to 2005/11/10. Grimshaw Gravels aquifer.

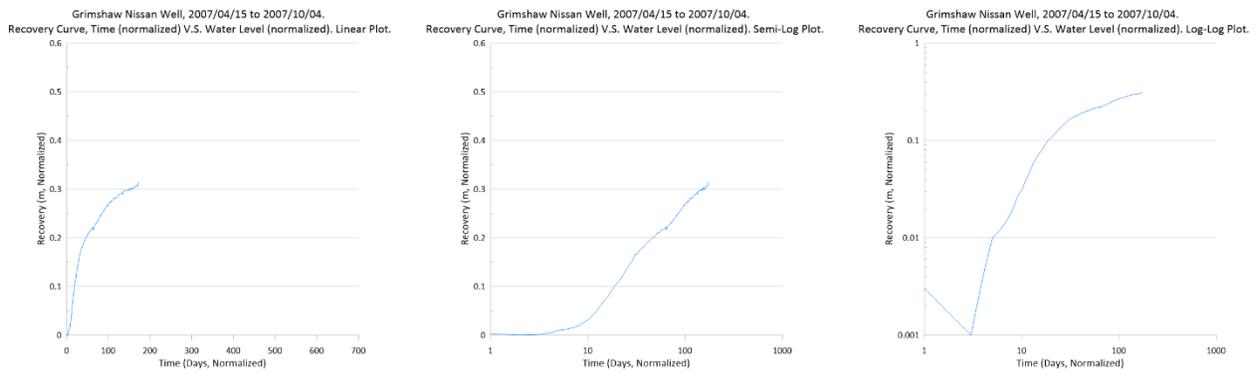


Figure 372: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2007/04/15 to 2007/10/04. Grimshaw Gravels aquifer.

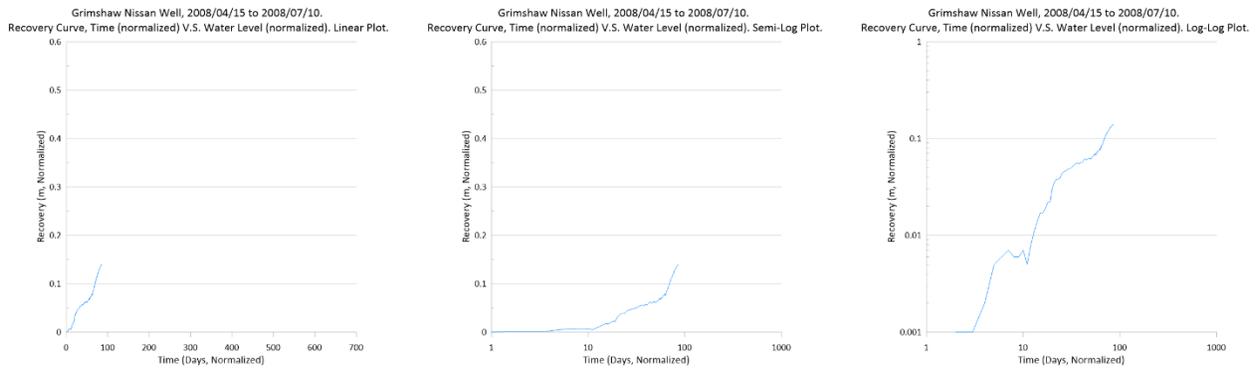


Figure 373: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2008/04/15 to 2008/07/10. Grimshaw Gravels aquifer.

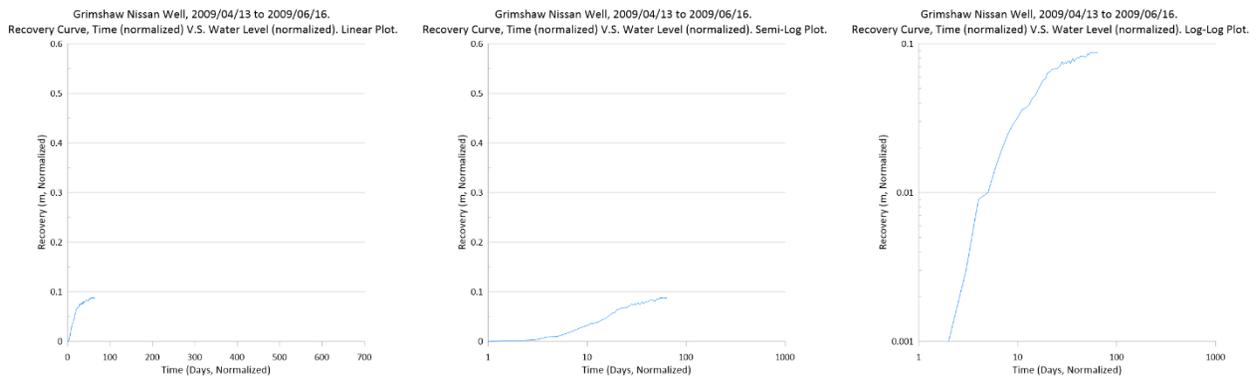


Figure 374: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2009/04/13 to 2009/06/16. Grimshaw Gravels aquifer.

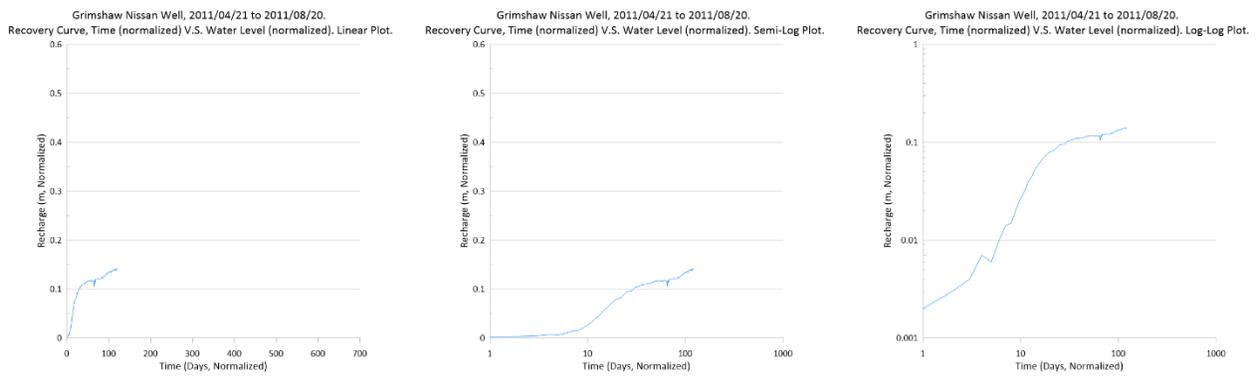


Figure 375: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2011/04/21 to 2011/08/20. Grimshaw Gravels aquifer.

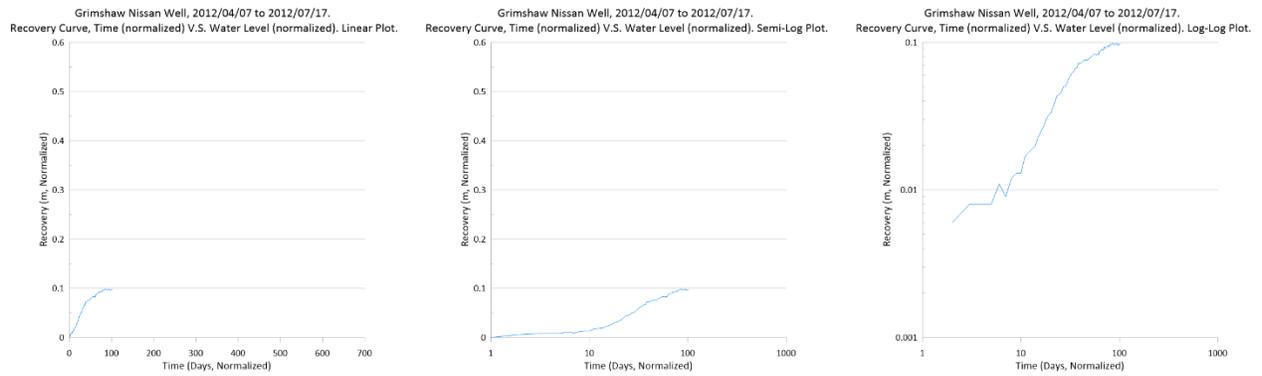


Figure 376: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2012/04/07 to 2012/07/17. Grimshaw Gravels aquifer.

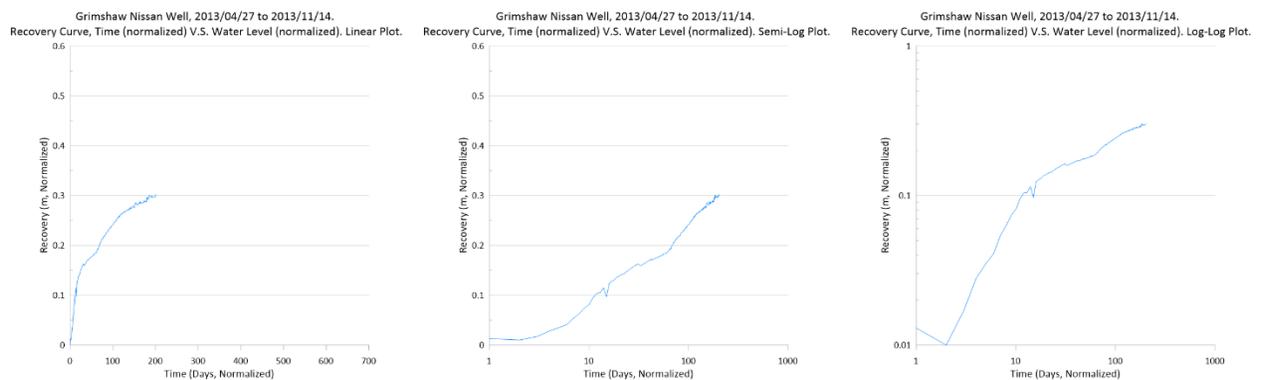


Figure 377: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2013/04/27 to 2013/11/14. Grimshaw Gravels aquifer.

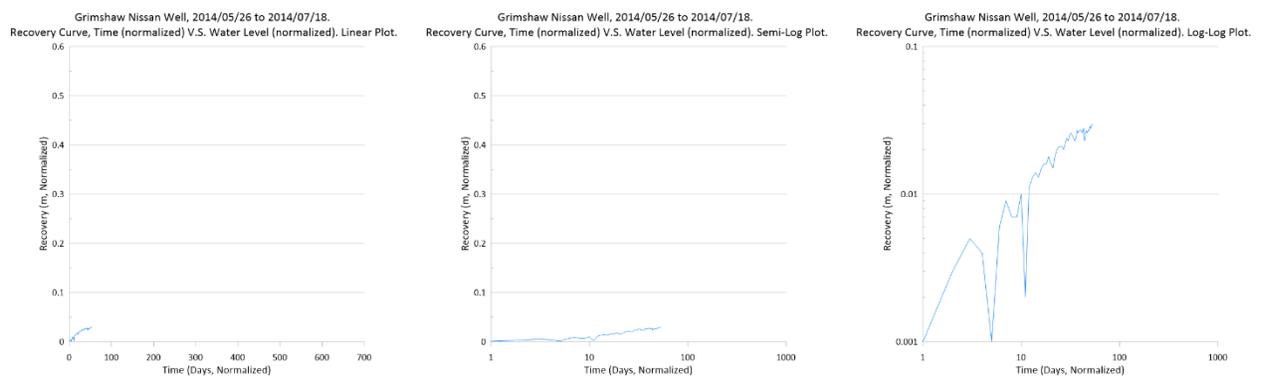


Figure 378: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2014/05/26 to 2014/07/18. Grimshaw Gravels aquifer.

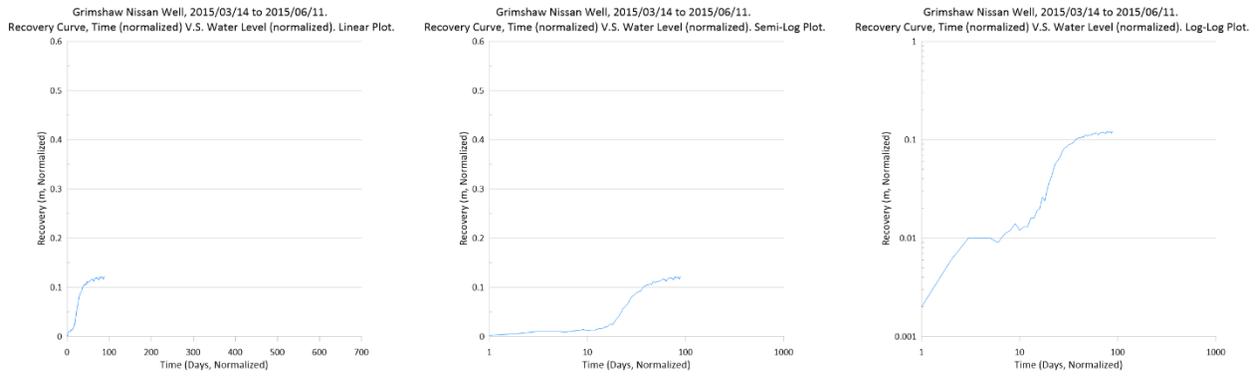


Figure 379: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2015/03/14 to 2015/06/11. Grimshaw Gravels aquifer.

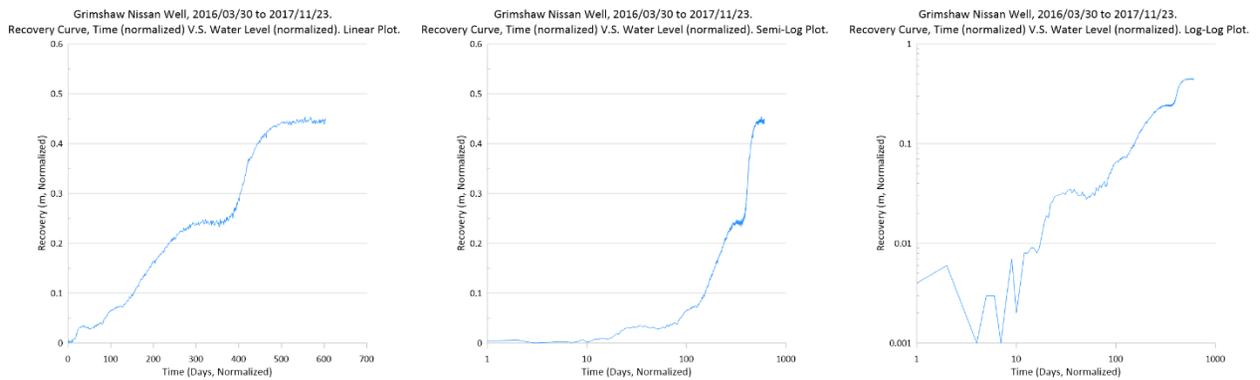


Figure 380: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2016/03/30 to 2017/11/23. Grimshaw Gravels aquifer.

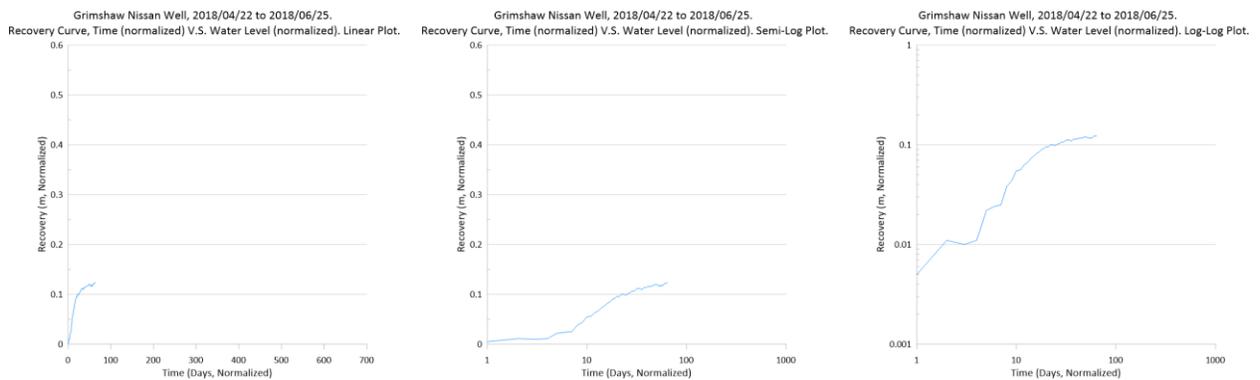


Figure 381: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2018/04/22 to 2018/06/25. Grimshaw Gravels aquifer.

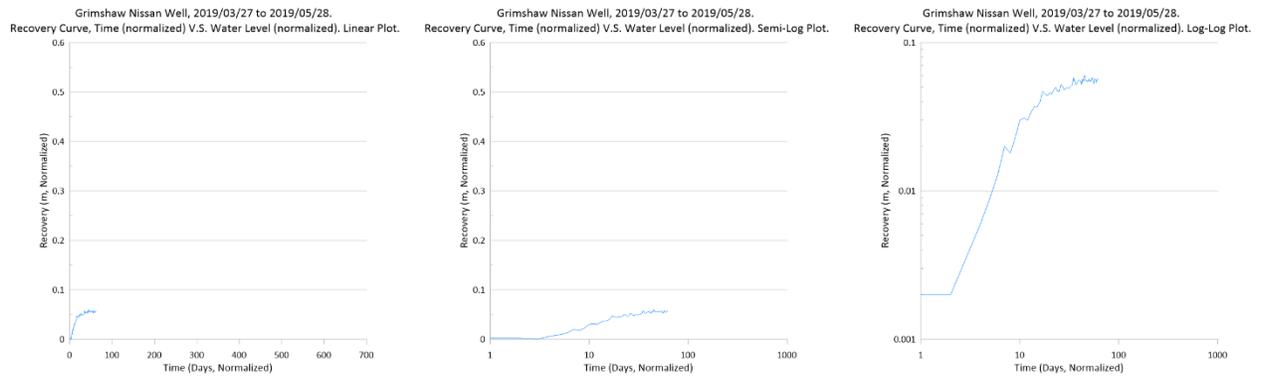


Figure 382: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2019/03/27 to 2019/05/28. Grimshaw Gravels aquifer.

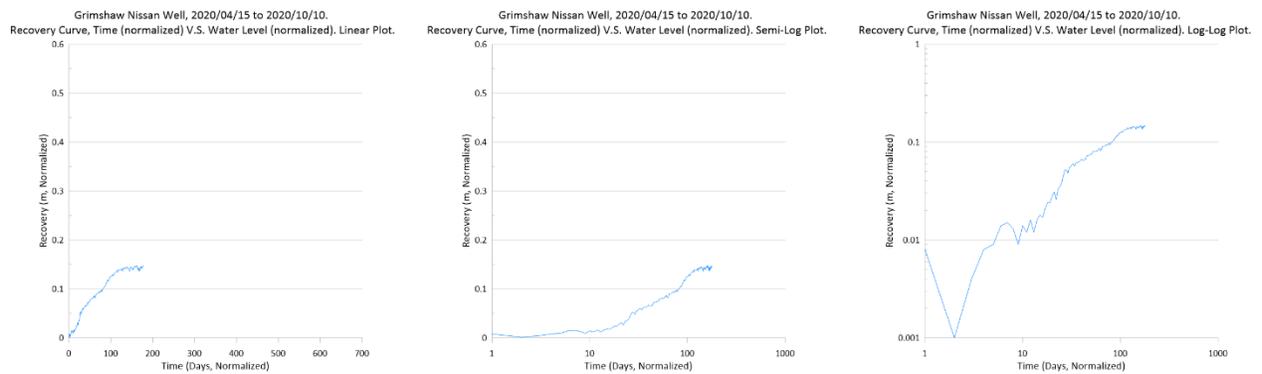


Figure 383: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2020/04/15 to 2020/10/10. Grimshaw Gravels aquifer.

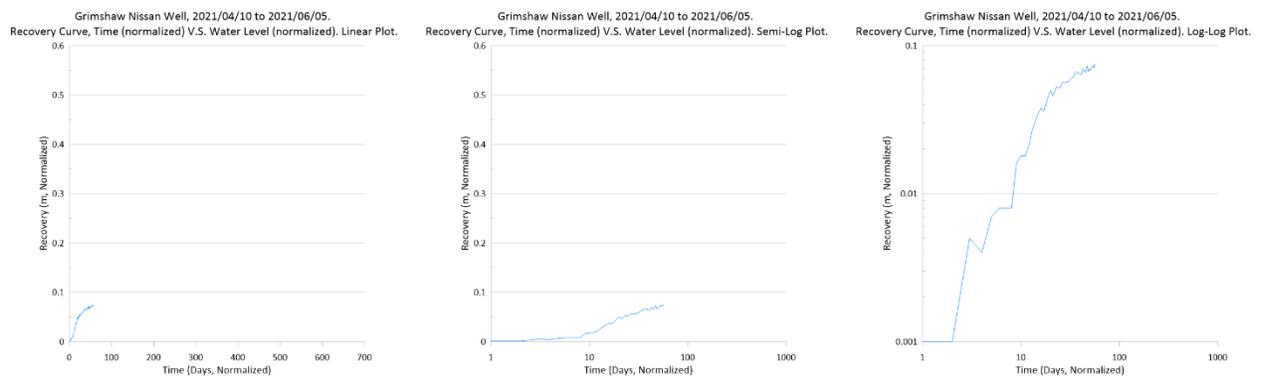


Figure 384: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2021/04/10 to 2021/06/05. Grimshaw Gravels aquifer.

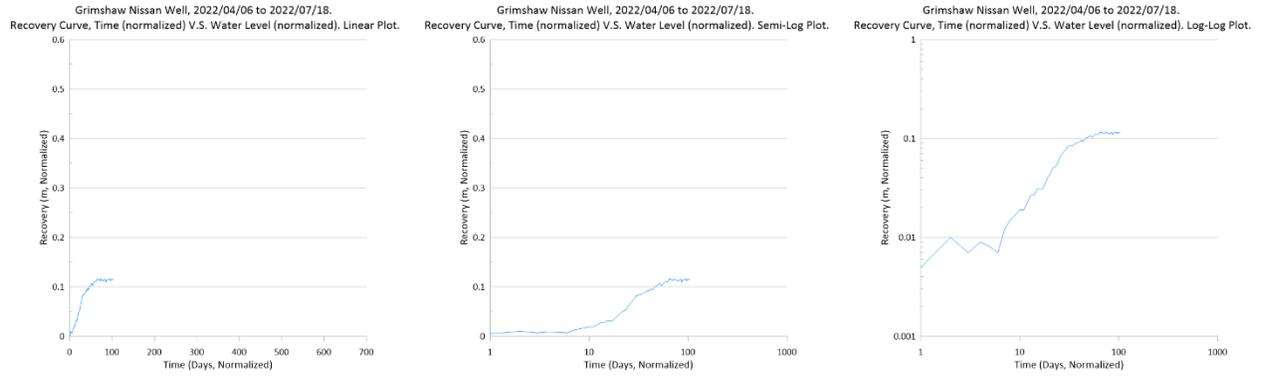


Figure 385: Recovery curve plots for Grimshaw Nissan 66-1_0379 well, 2022/04/06 to 2022/07/18. Grimshaw Gravels aquifer.

Appendix H: GOWN Monitoring Well Recovery Curve Plots for Calgary Valley Aquifer Wells

Appendix H1: GOWN Monitoring Well Recovery Curve Plots for Canmore Tourist Info_0760 Well

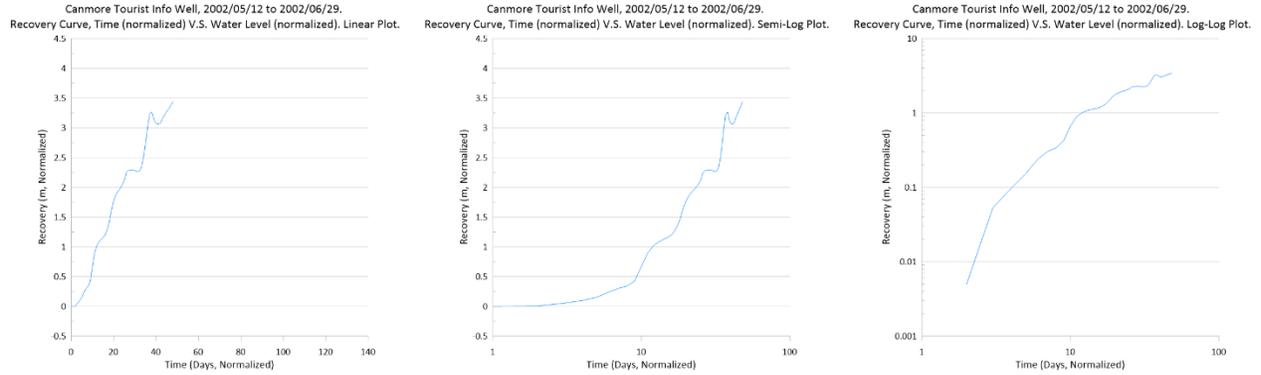


Figure 386: Recovery curve plots for Canmore Tourist Info_0760 well, 2002/05/12 to 2002/06/29. Calgary Valley aquifer.

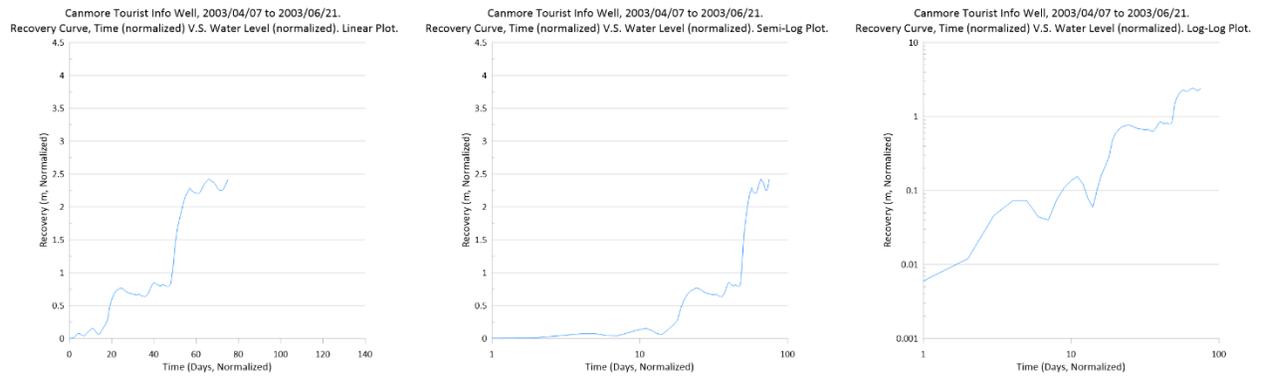


Figure 387: Recovery curve plots for Canmore Tourist Info_0760 well, 2003/04/07 to 2003/06/21. Calgary Valley aquifer.

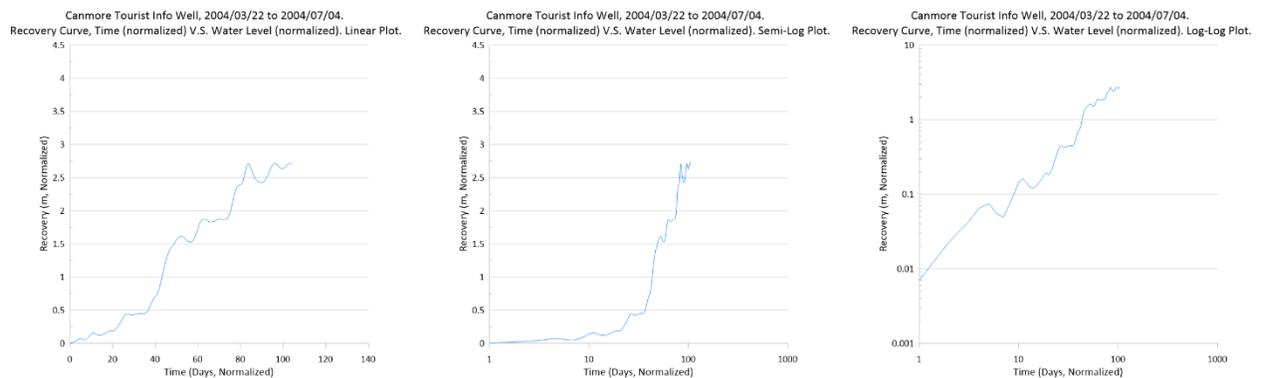


Figure 388: Recovery curve plots for Canmore Tourist Info_0760 well, 2004/02/22 to 2004/07/04. Calgary Valley aquifer.

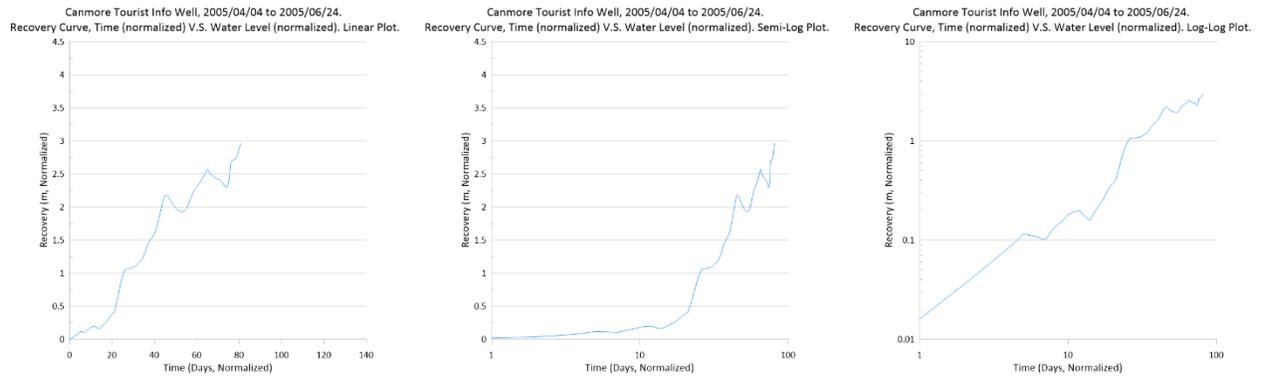


Figure 389: Recovery curve plots for Canmore Tourist Info_0760 well, 2005/04/04 to 2005/06/24. Calgary Valley aquifer.

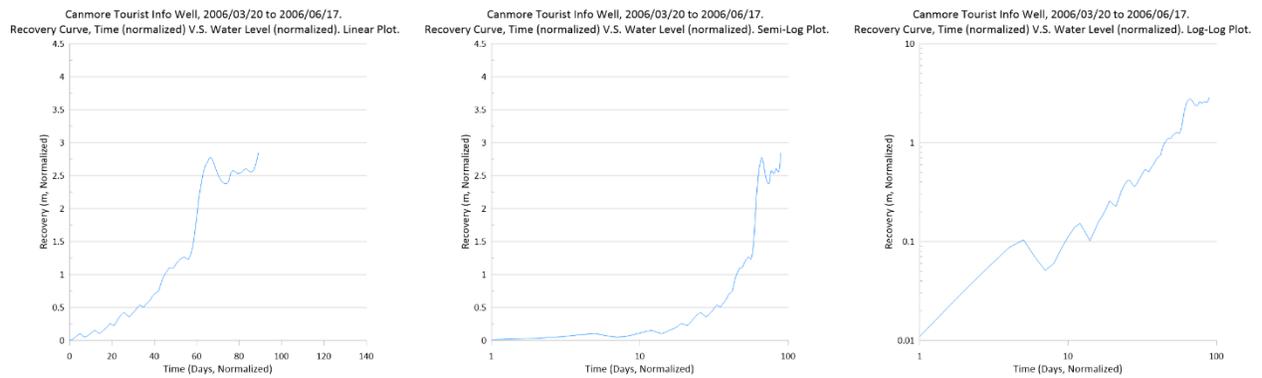


Figure 390: Recovery curve plots for Canmore Tourist Info_0760 well, 2006/03/20 to 2006/06/17. Calgary Valley aquifer.

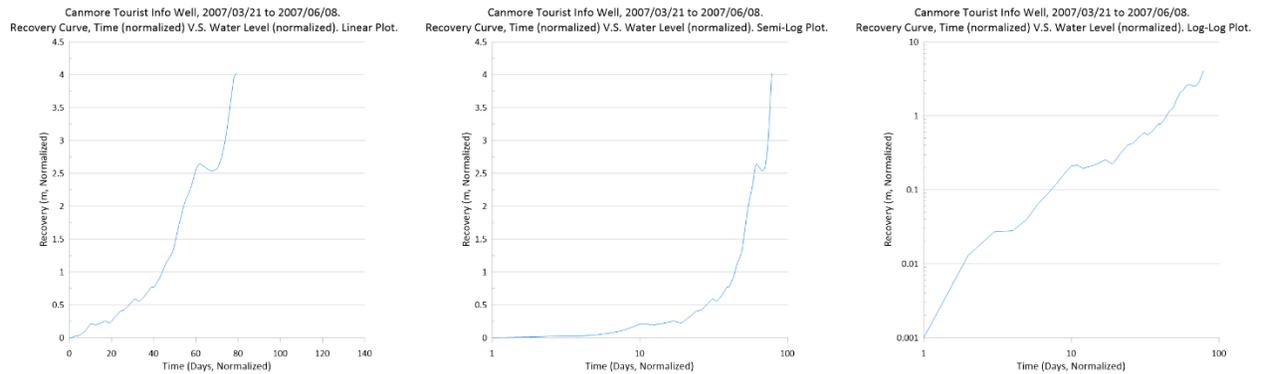


Figure 391: Recovery curve plots for Canmore Tourist Info_0760 well, 2007/03/21 to 2007/06/08. Calgary Valley aquifer.

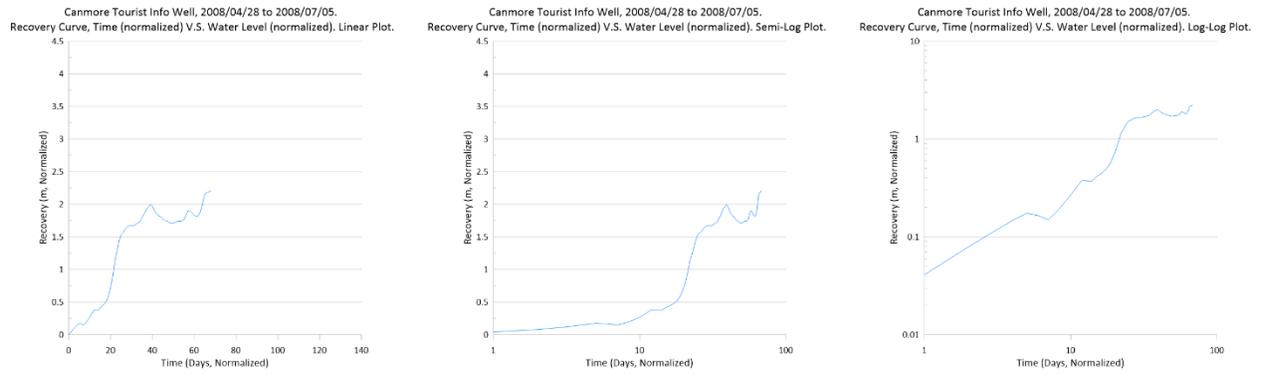


Figure 392: Recovery curve plots for Canmore Tourist Info_0760 well, 2008/04/28 to 2008/07/05. Calgary Valley aquifer.

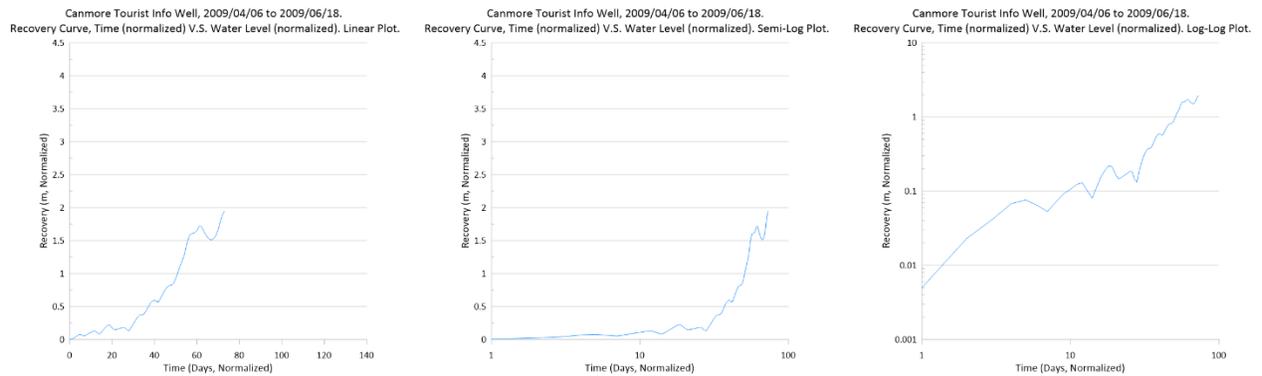


Figure 393: Recovery curve plots for Canmore Tourist Info_0760 well, 2009/04/06 to 2009/06/18. Calgary Valley aquifer.

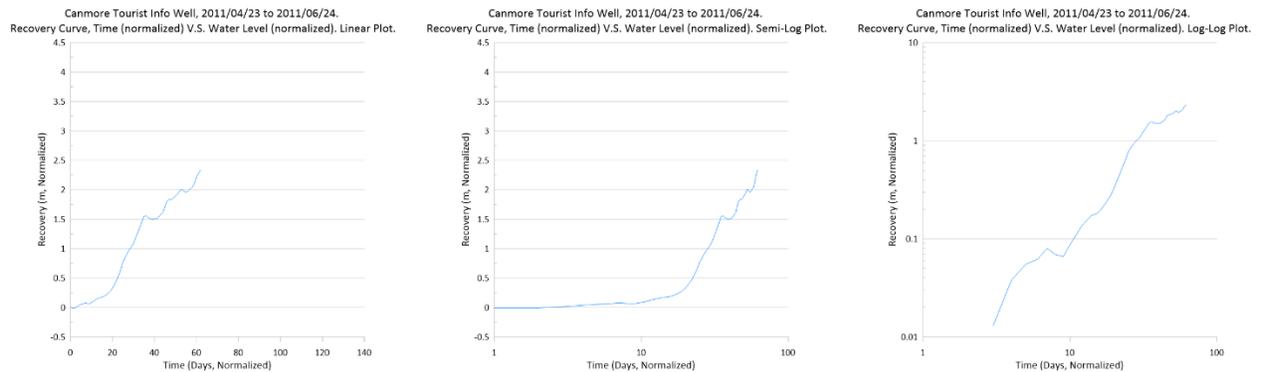


Figure 394: Recovery curve plots for Canmore Tourist Info_0760 well, 2011/04/23 to 2011/06/24. Calgary Valley aquifer.

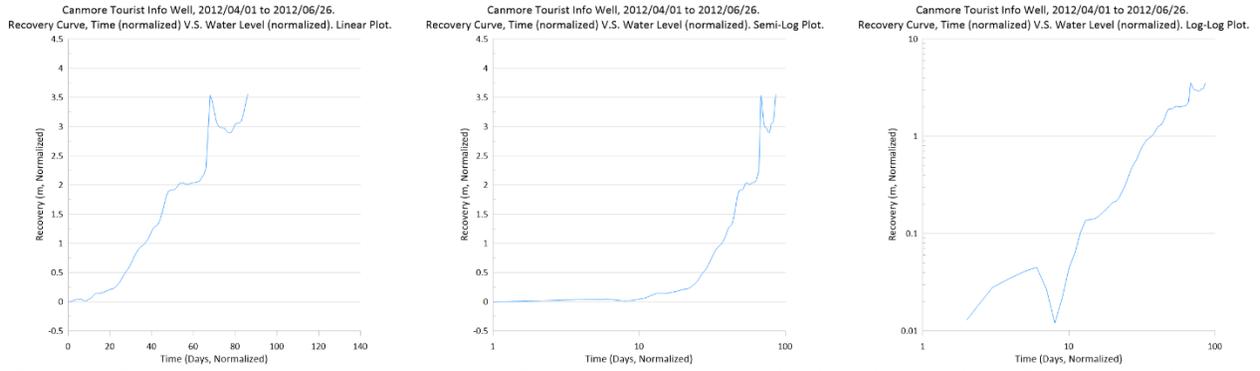


Figure 395: Recovery curve plots for Canmore Tourist Info_0760 well, 2012/04/01 to 2012/06/26. Calgary Valley aquifer.

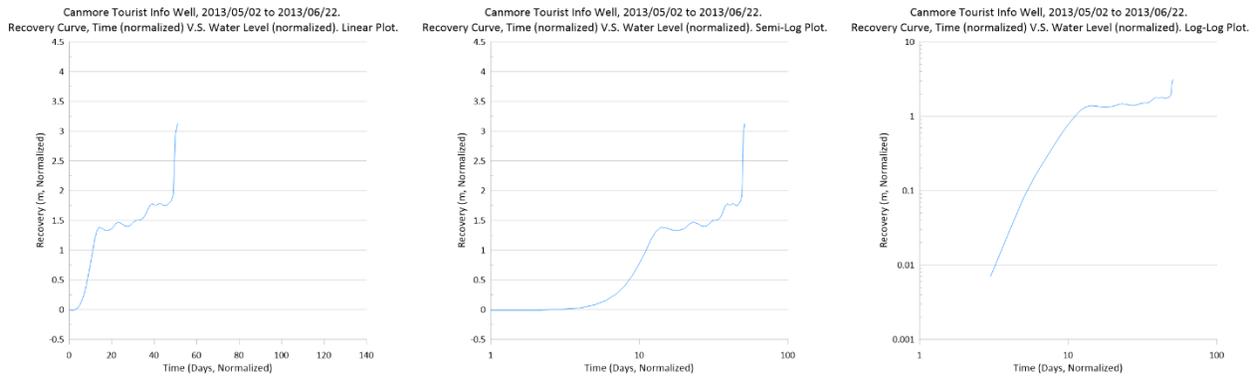


Figure 396: Recovery curve plots for Canmore Tourist Info_0760 well, 2013/05/02 to 2013/06/22. Calgary Valley aquifer.

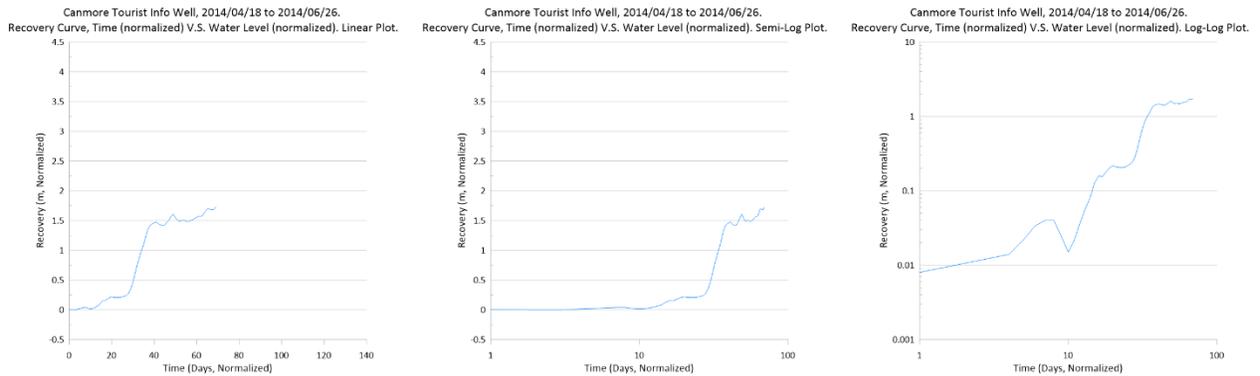


Figure 397: Recovery curve plots for Canmore Tourist Info_0760 well, 2014/04/18 to 2014/06/26. Calgary Valley aquifer.

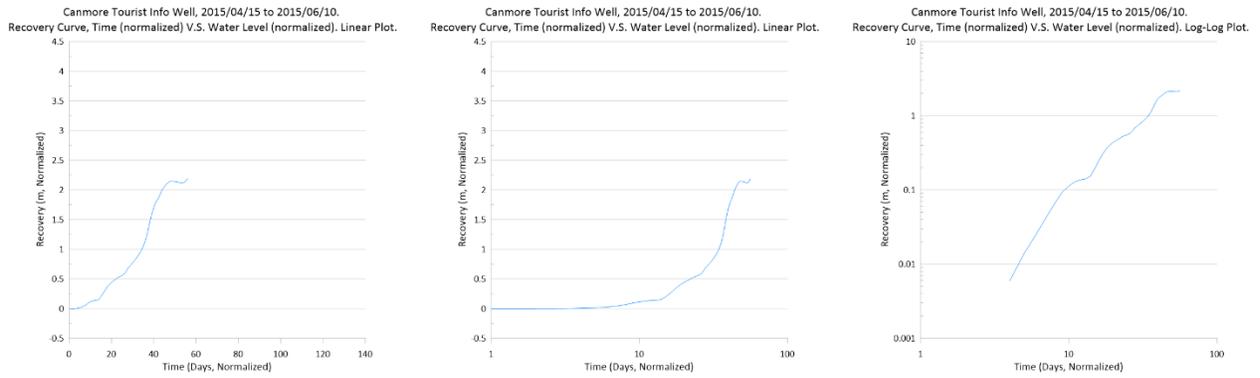


Figure 398: Recovery curve plots for Canmore Tourist Info_0760 well, 2015/04/15 to 2015/06/10. Calgary Valley aquifer.

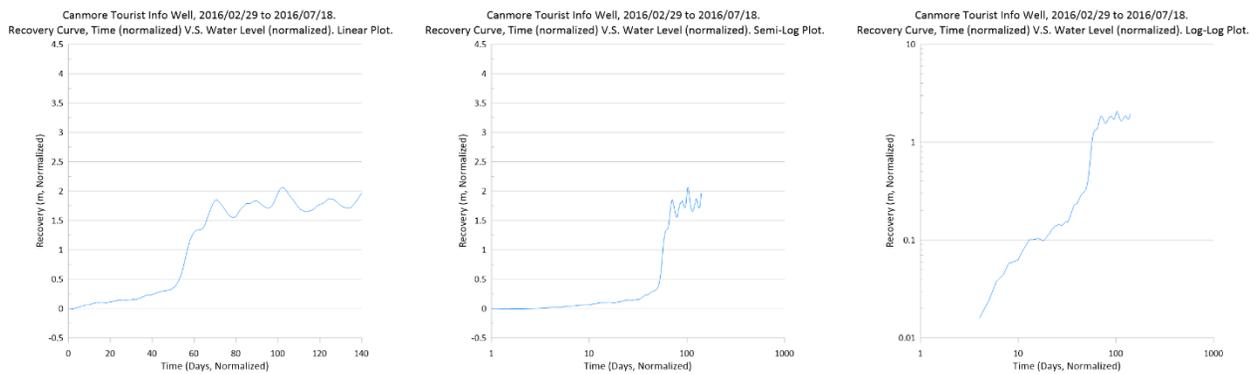


Figure 399: Recovery curve plots for Canmore Tourist Info_0760 well, 2016/02/29 to 2016/07/18. Calgary Valley aquifer.

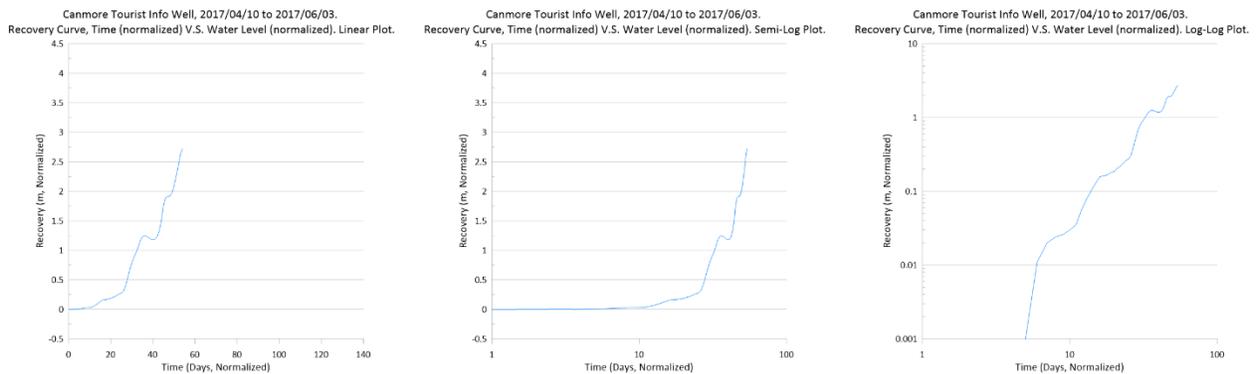


Figure 400: Recovery curve plots for Canmore Tourist Info_0760 well, 2017/04/10 to 2017/06/03. Calgary Valley aquifer.

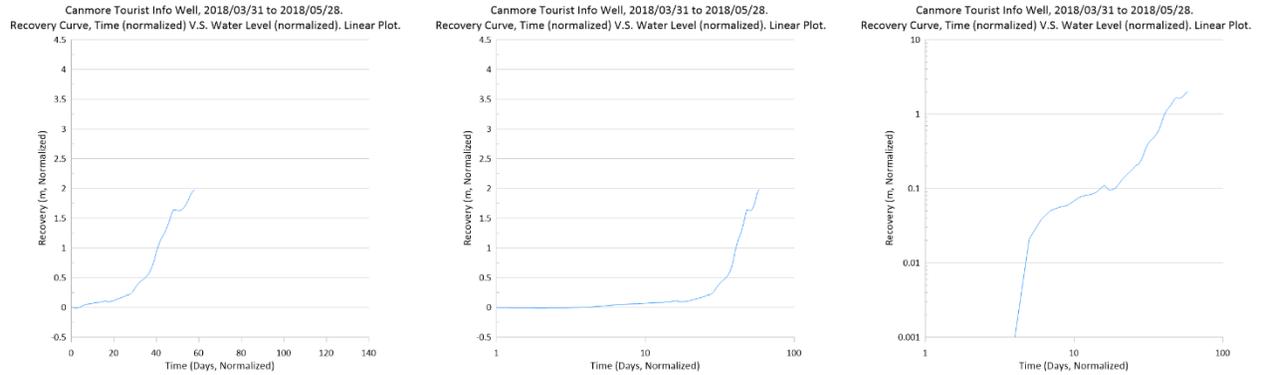


Figure 401: Recovery curve plots for Canmore Tourist Info_0760 well, 2018/03/31 to 2018/05/28. Calgary Valley aquifer.

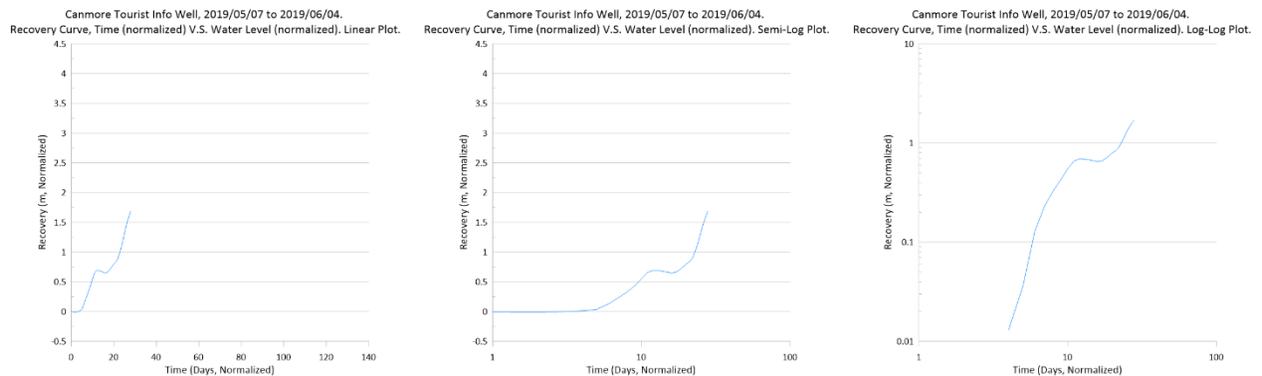


Figure 402: Recovery curve plots for Canmore Tourist Info_0760 well, 2019/05/07 to 2019/06/04. Calgary Valley aquifer.

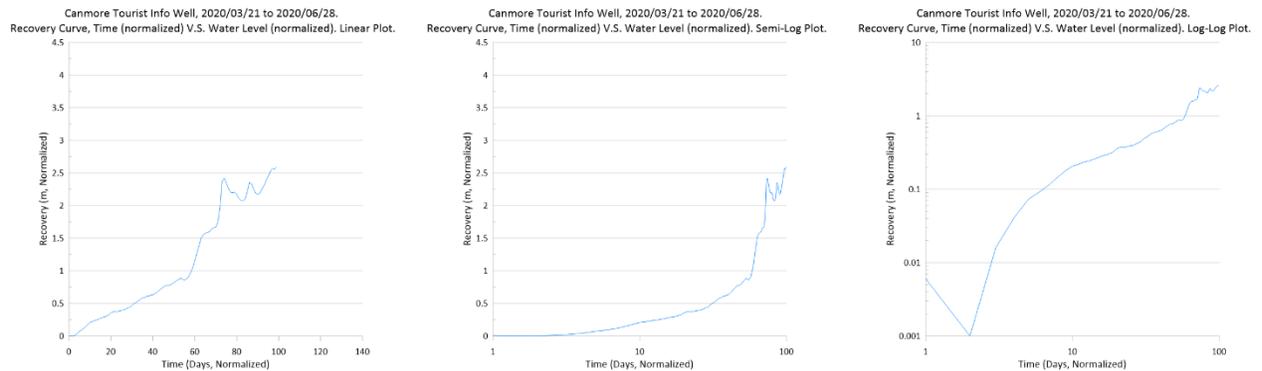


Figure 403: Recovery curve plots for Canmore Tourist Info_0760 well, 2020/03/21 to 2020/06/28. Calgary Valley aquifer.

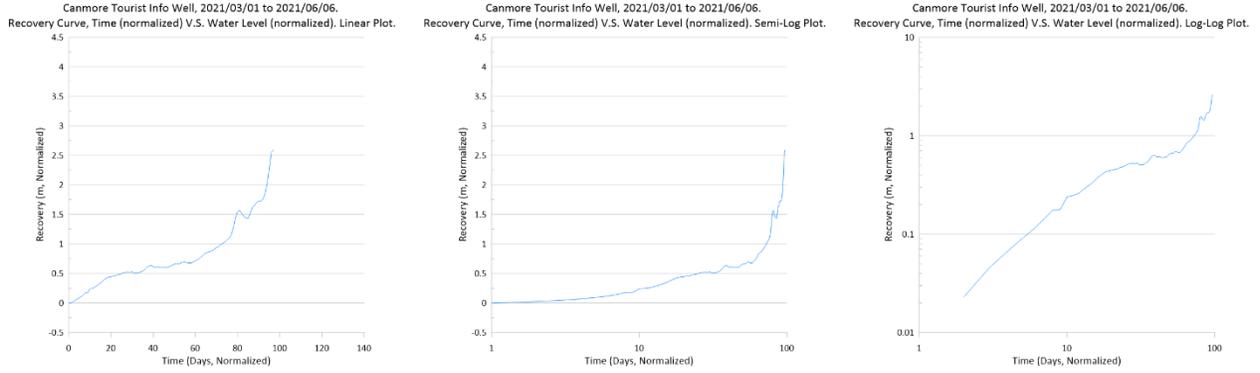


Figure 404: Recovery curve plots for Canmore Tourist Info_0760 well, 2021/03/01 to 2021/06/06. Calgary Valley aquifer.

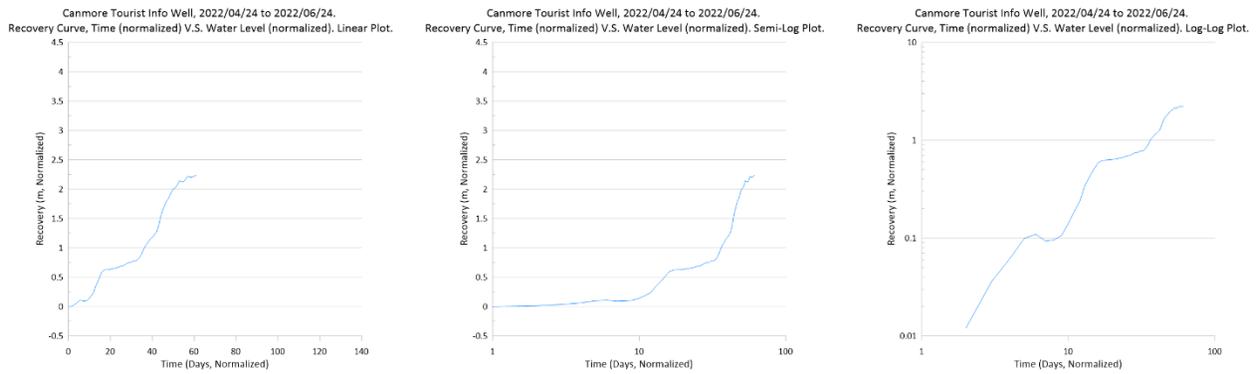


Figure 405: Recovery curve plots for Canmore Tourist Info_0760 well, 2022/04/24 to 2022/06/24. Calgary Valley aquifer.

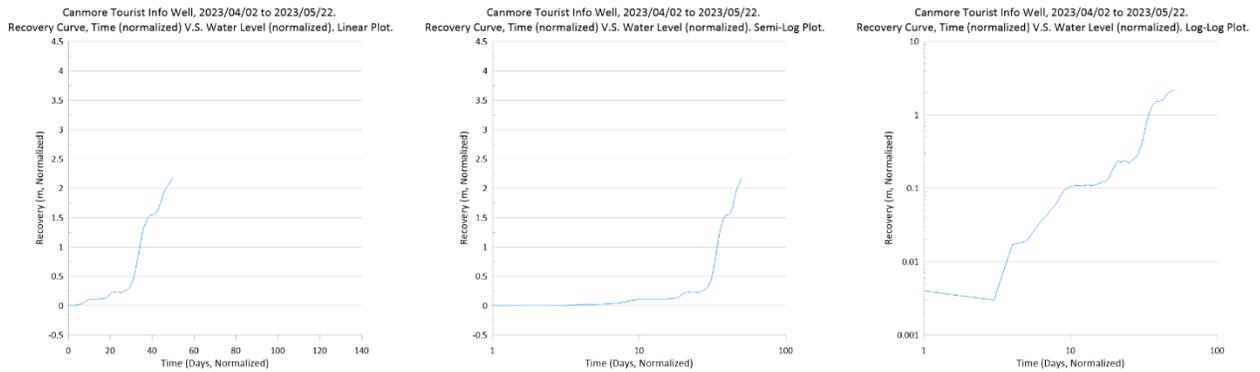


Figure 406: Recovery curve plots for Canmore Tourist Info_0760 well, 2023/04/02 to 2023/05/22. Calgary Valley aquifer.

Appendix H2: GOWN Monitoring Well Recovery Curve Plots for Carseland 85-1_0220 Well

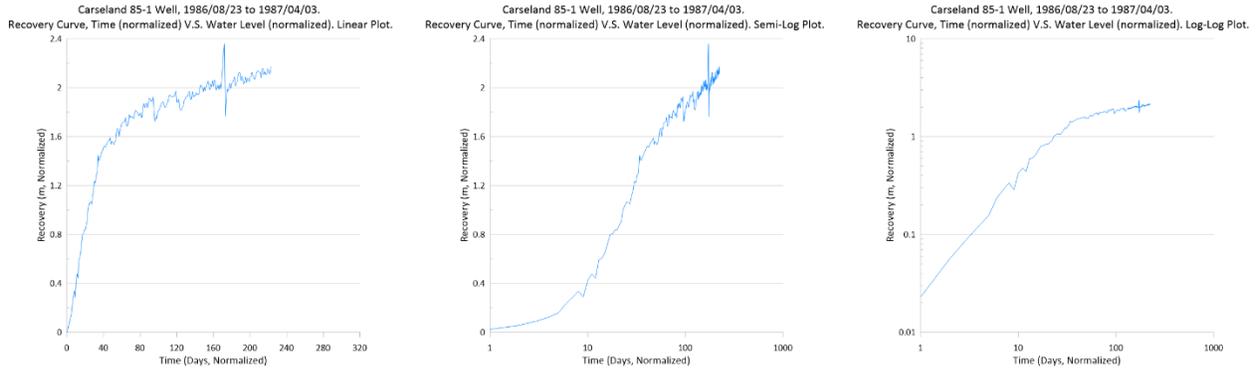


Figure 407: Recovery curve plots for Carseland 85-1_0220 well, 1986/08/23 to 1987/04/03. Calgary Valley aquifer.

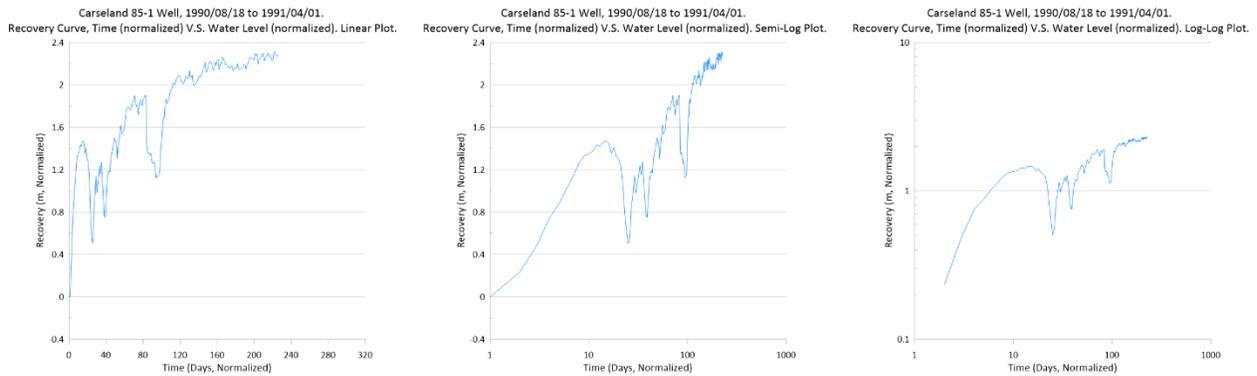


Figure 408: Recovery curve plots for Carseland 85-1_0220 well, 1990/08/18 to 1991/04/01. Calgary Valley aquifer.

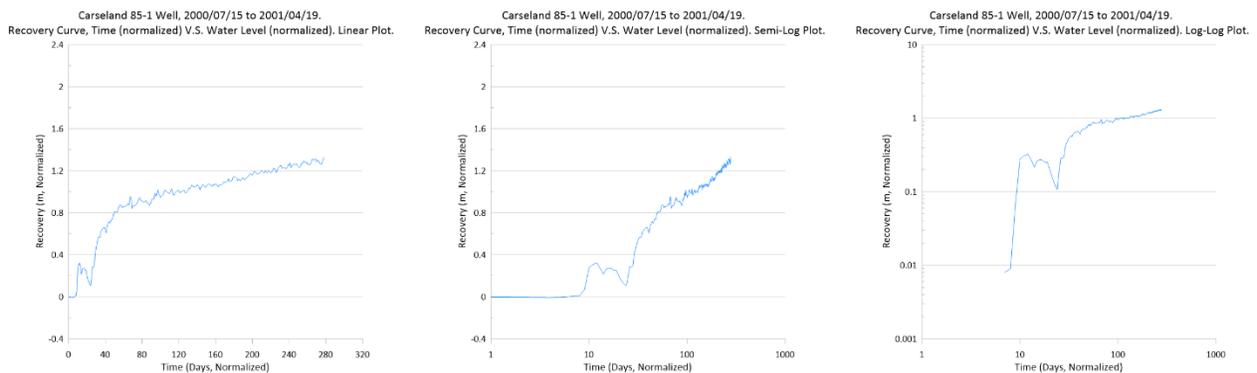


Figure 409: Recovery curve plots for Carseland 85-1_0220 well, 2000/07/15 to 2001/04/19. Calgary Valley aquifer.

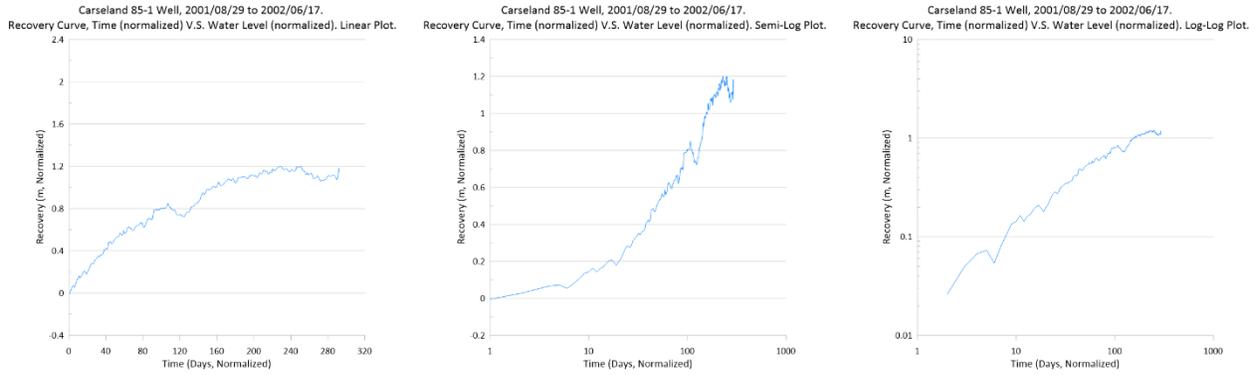


Figure 410: Recovery curve plots for Carseland 85-1_0220 well, 2001/08/29 to 2002/06/17. Calgary Valley aquifer.

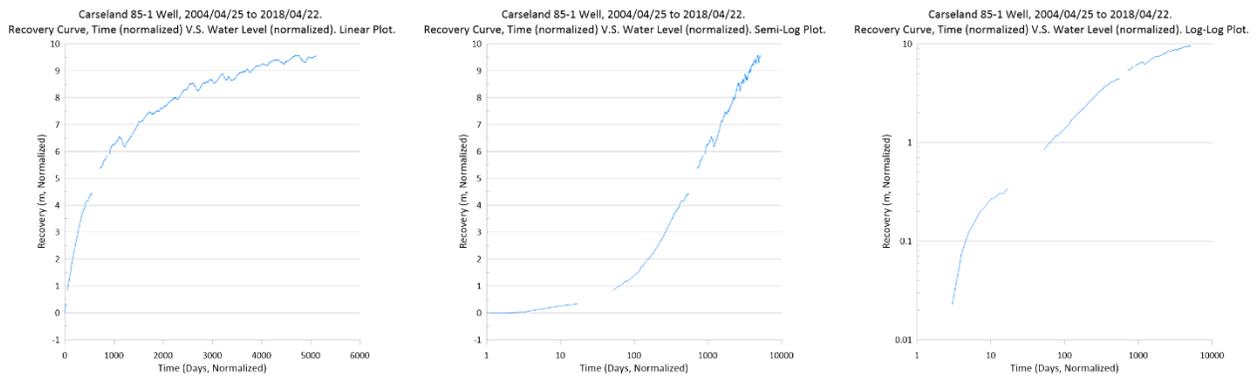


Figure 411: Recovery curve plots for Carseland 85-1_0220 well, 2004/04/25 to 2018/04/22. Calgary Valley aquifer.

Appendix H3: GOWN Monitoring Well Recovery Curve Plots for Cluny 85-2 South_0219 Well

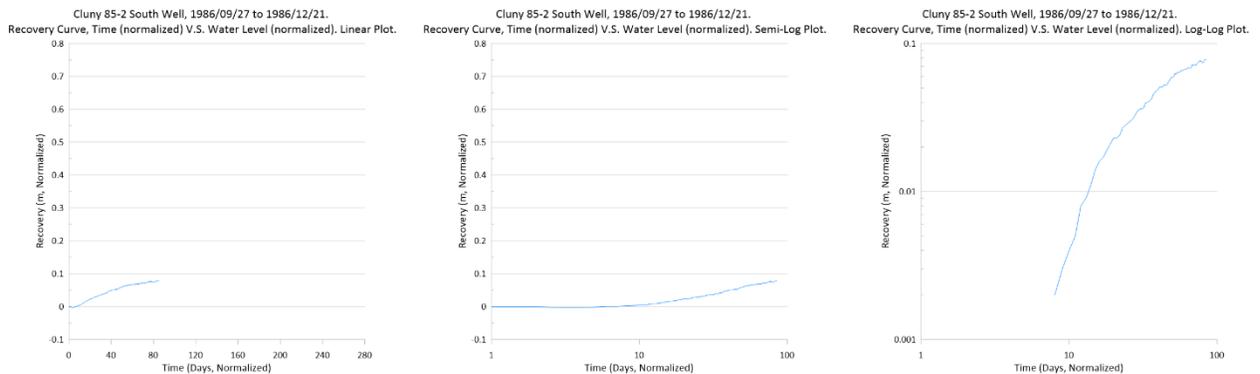


Figure 412: Recovery curve plots for Cluny 85-2 South_0219 well, 1986/09/27 to 1986/12/21. Calgary Valley aquifer.

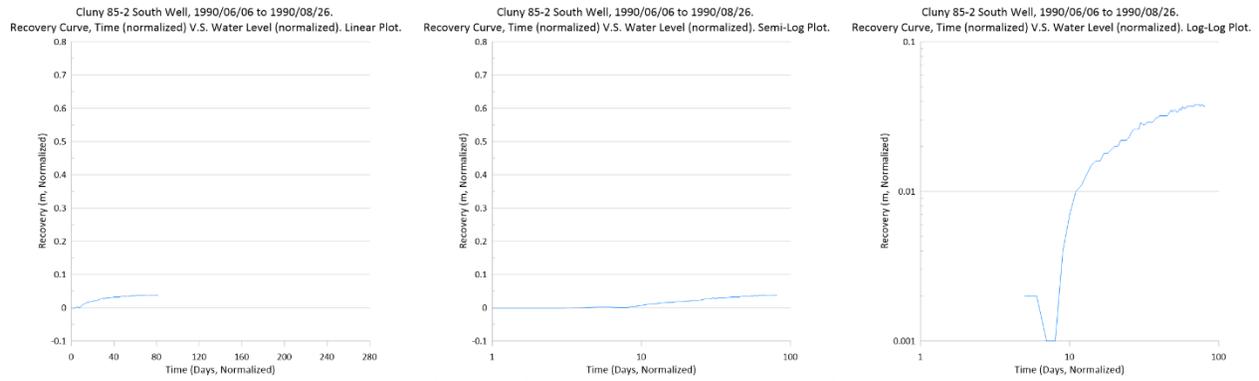


Figure 413: Recovery curve plots for Cluny 85-2 South_0219 well, 1990/06/06 to 1990/08/26. Calgary Valley aquifer.

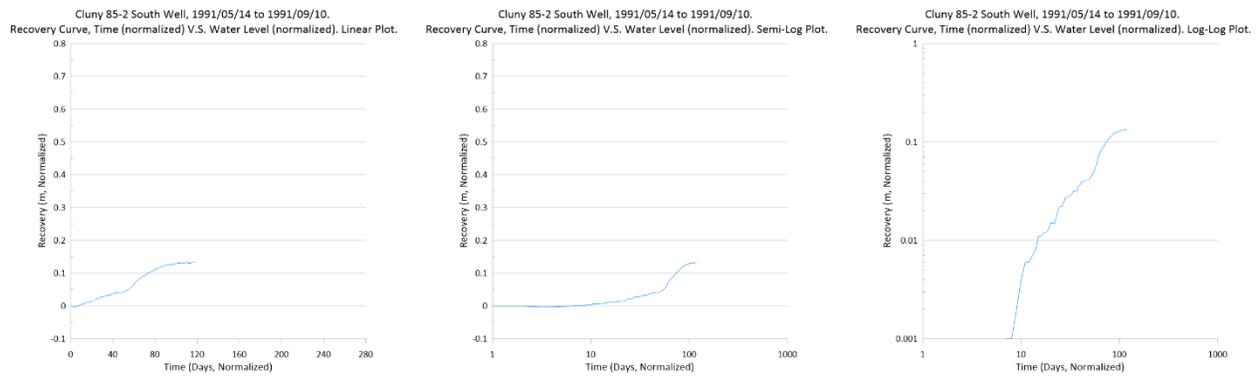


Figure 414: Recovery curve plots for Cluny 85-2 South_0219 well, 1991/05/14 to 1991/09/10. Calgary Valley aquifer.

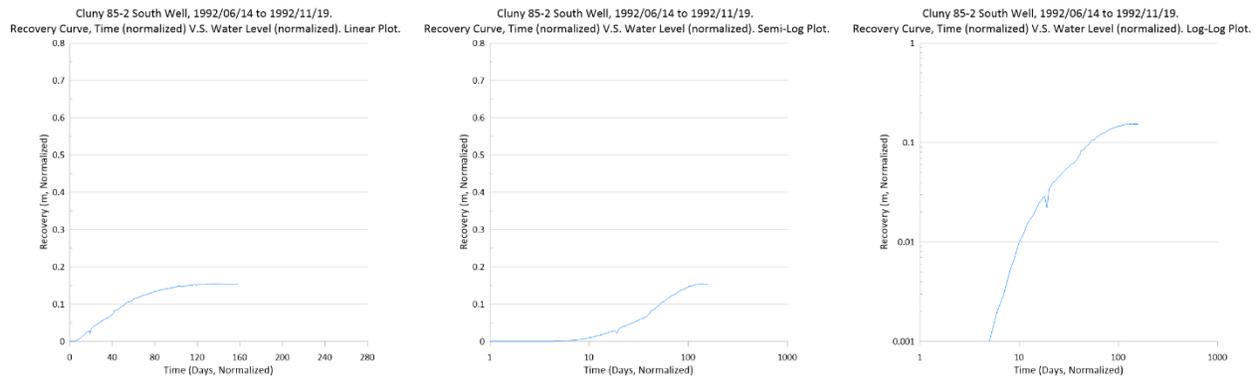


Figure 415: Recovery curve plots for Cluny 85-2 South_0219 well, 1992/06/14 to 1992/11/19. Calgary Valley aquifer.

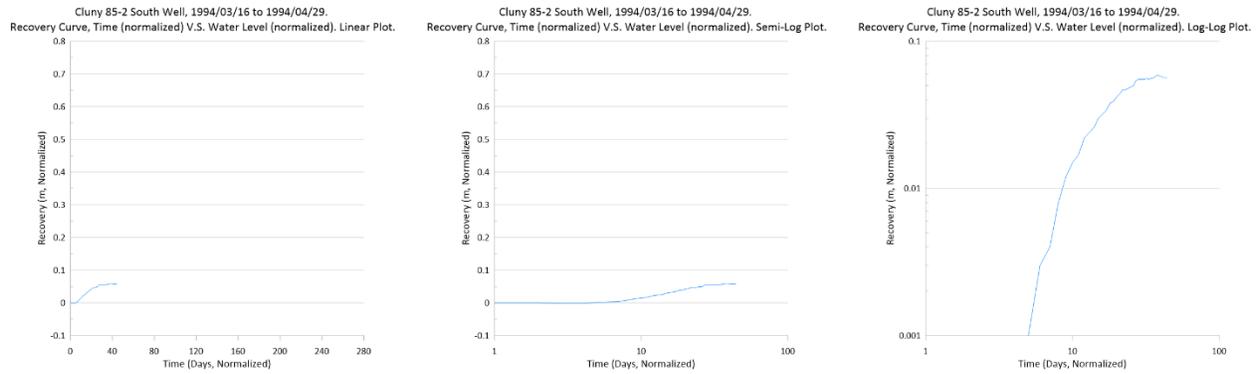


Figure 416: Recovery curve plots for Cluny 85-2 South_0219 well, 1994/03/16 to 1994/04/29. Calgary Valley aquifer.

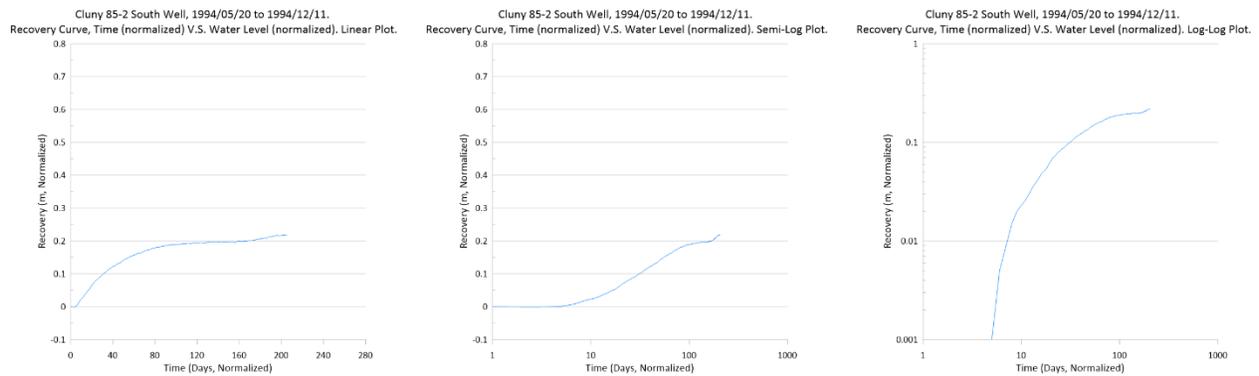


Figure 417: Recovery curve plots for Cluny 85-2 South_0219 well, 1994/05/20 to 1994/12/11. Calgary Valley aquifer.

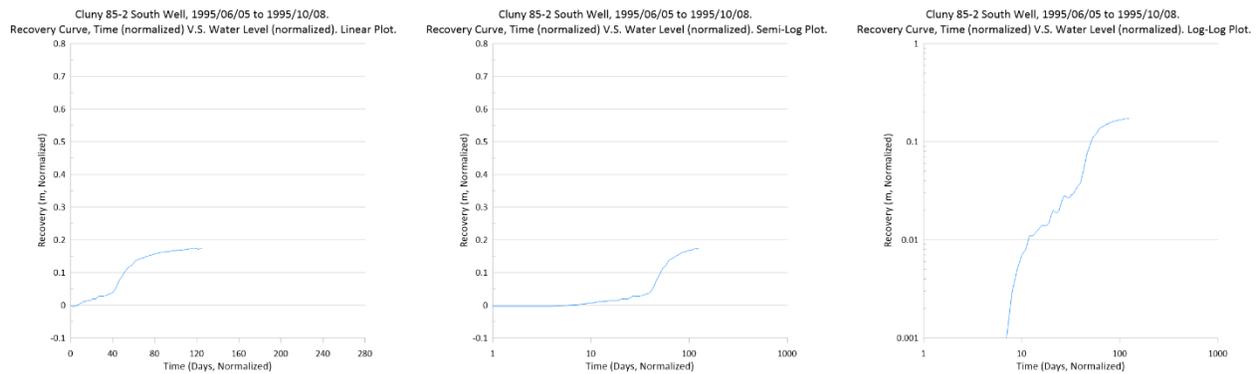


Figure 418: Recovery curve plots for Cluny 85-2 South_0219 well, 1995/06/05 to 1995/10/08. Calgary Valley aquifer.

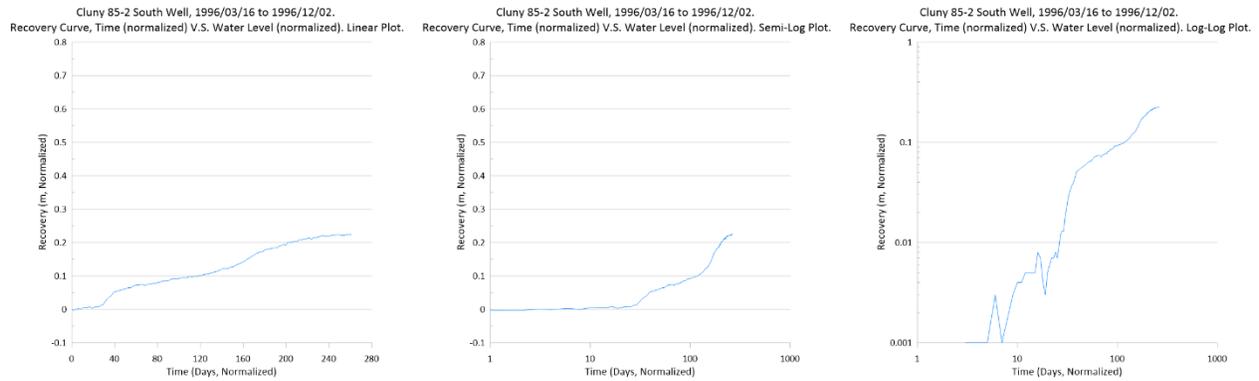


Figure 419: Recovery curve plots for Cluny 85-2 South_0219 well, 1996/03/16 to 1996/12/02. Calgary Valley aquifer.

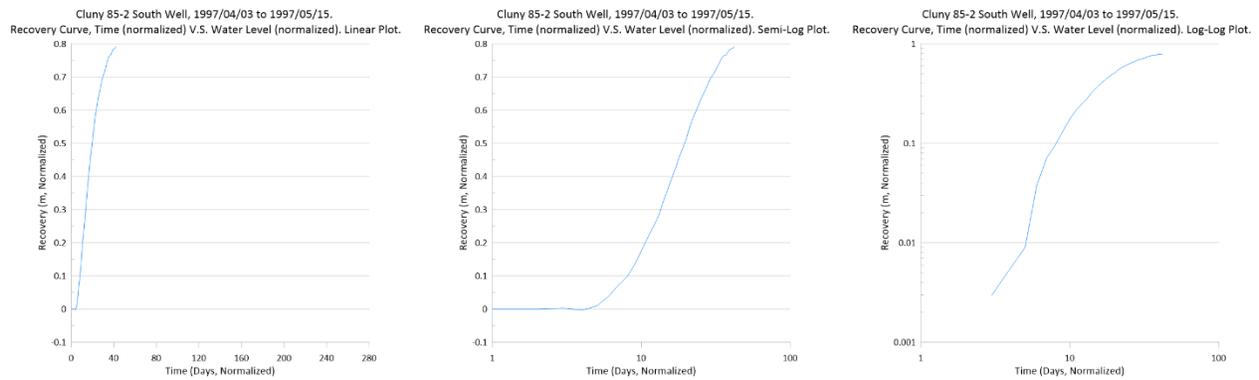


Figure 420: Recovery curve plots for Cluny 85-2 South_0219 well, 1997/04/03 to 1997/05/15. Calgary Valley aquifer.

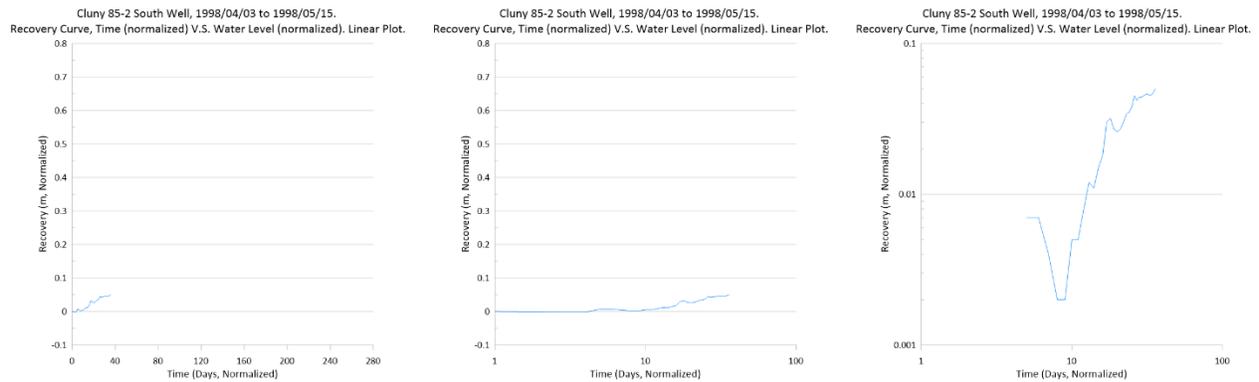


Figure 421: Recovery curve plots for Cluny 85-2 South_0219 well, 1998/04/03 to 1998/05/15. Calgary Valley aquifer.

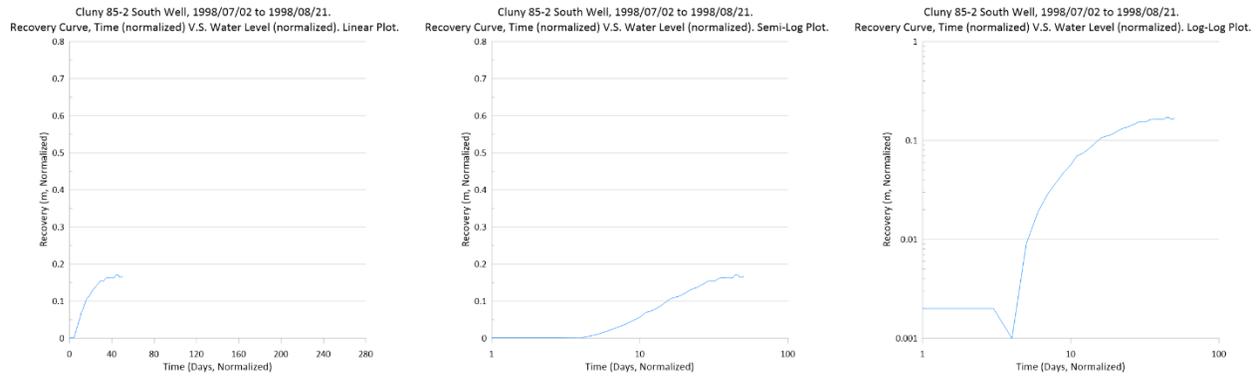


Figure 422: Recovery curve plots for Cluny 85-2 South_0219 well, 1998/07/02 to 1998/08/21. Calgary Valley aquifer.

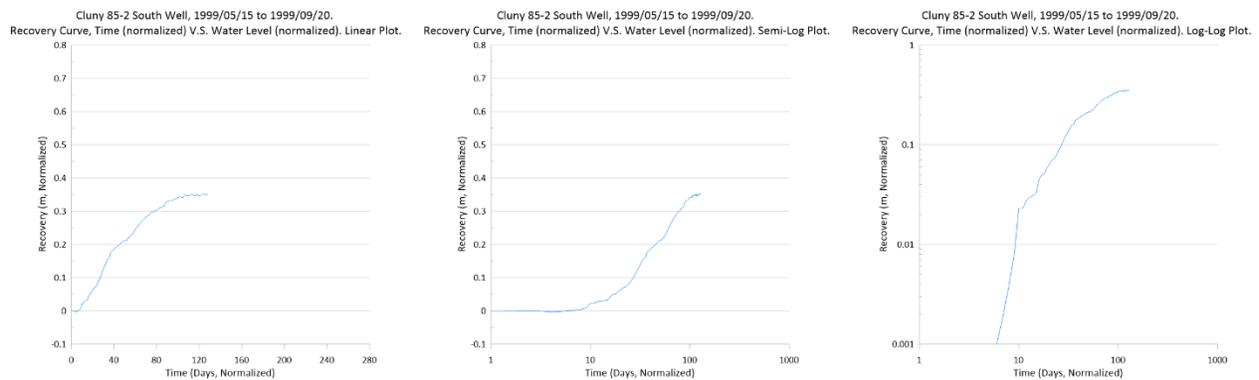


Figure 423: Recovery curve plots for Cluny 85-2 South_0219 well, 1999/05/15 to 1999/09/20. Calgary Valley aquifer.

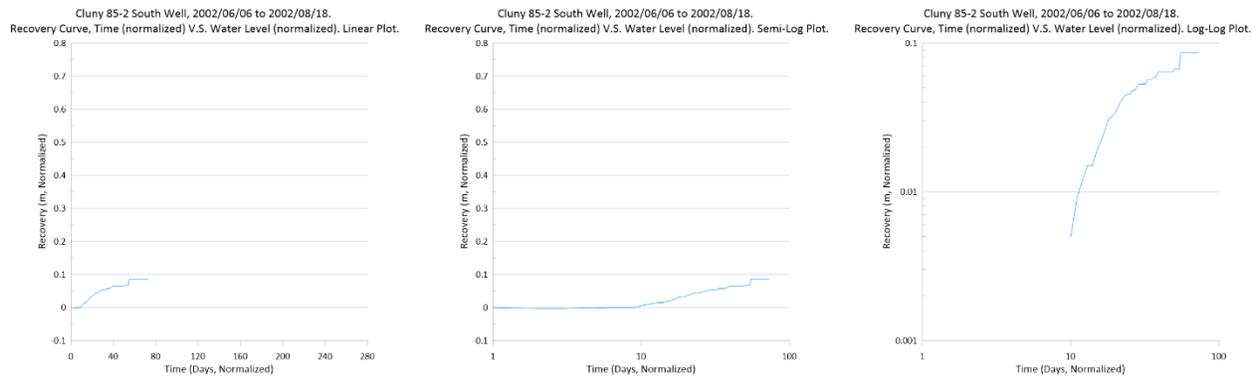


Figure 424: Recovery curve plots for Cluny 85-2 South_0219 well, 2002/06/06 to 2002/08/18. Calgary Valley aquifer.

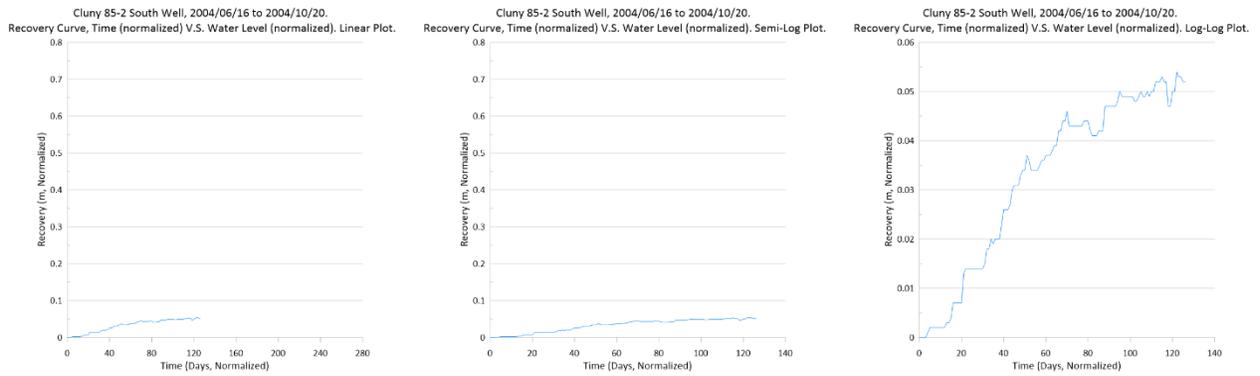


Figure 425: Recovery curve plots for Cluny 85-2 South_0219 well, 2004/06/16 to 2004/10/20. Calgary Valley aquifer.

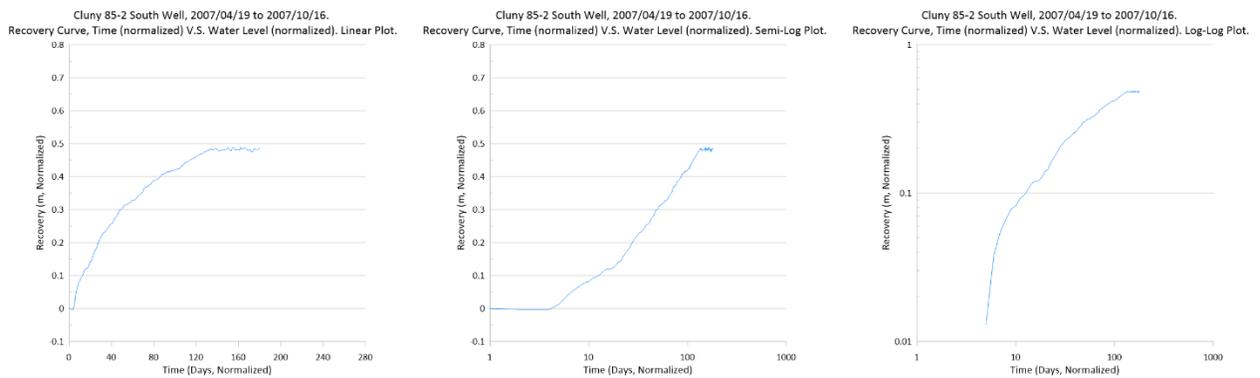


Figure 426: Recovery curve plots for Cluny 85-2 South_0219 well, 2007/04/19 to 2007/10/16. Calgary Valley aquifer.

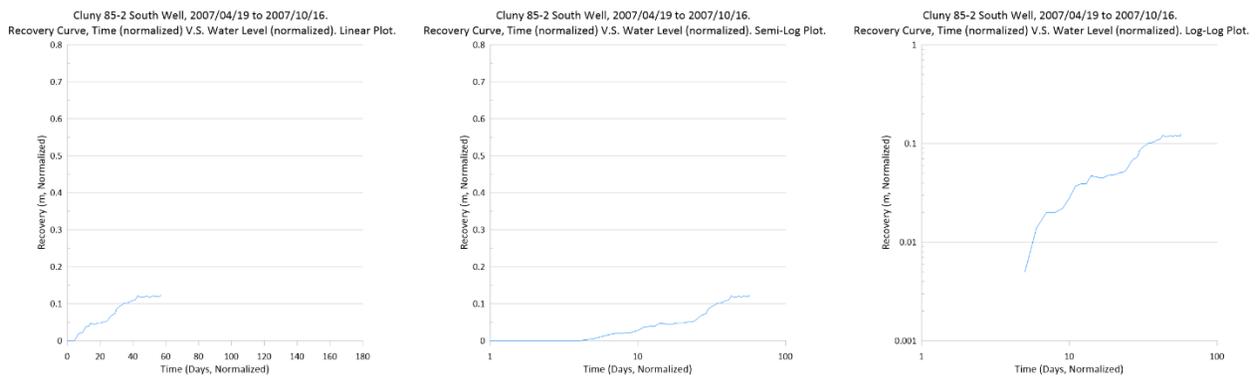


Figure 427: Recovery curve plots for Cluny 85-2 South_0219 well, 2007/04/19 to 2007/10/16. Calgary Valley aquifer.

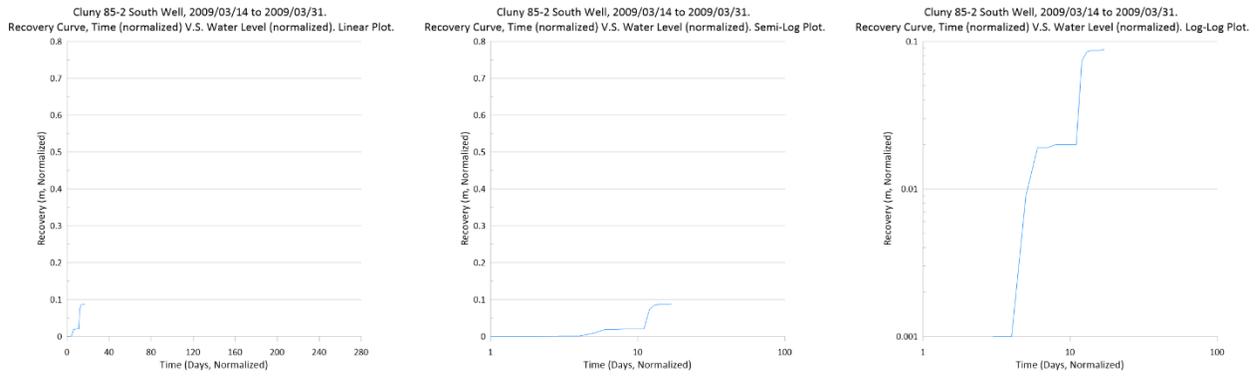


Figure 428: Recovery curve plots for Cluny 85-2 South_0219 well, 2009/03/14 to 2009/03/31. Calgary Valley aquifer.

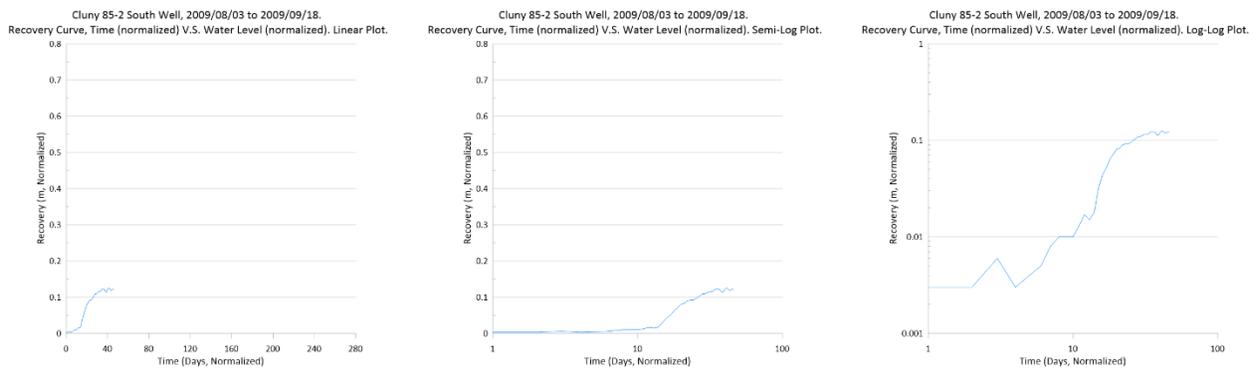


Figure 429: Recovery curve plots for Cluny 85-2 South_0219 well, 2009/08/03 to 2009/09/18. Calgary Valley aquifer.

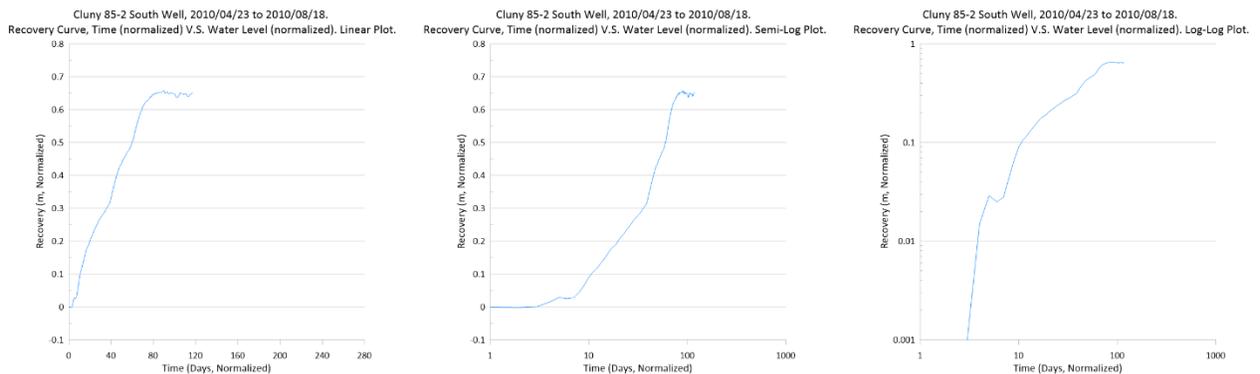


Figure 430: Recovery curve plots for Cluny 85-2 South_0219 well, 2010/04/23 to 2010/08/18. Calgary Valley aquifer.

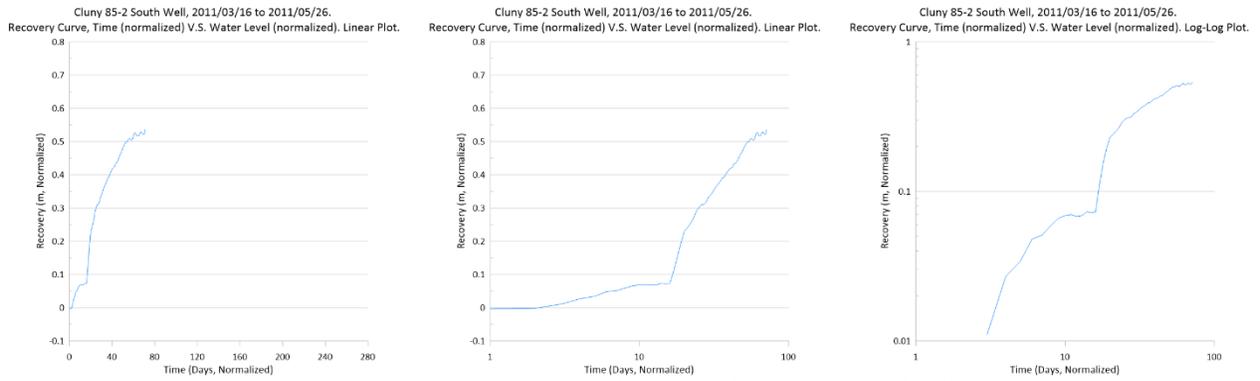


Figure 431: Recovery curve plots for Cluny 85-2 South_0219 well, 2011/03/16 to 2011/05/26. Calgary Valley aquifer.

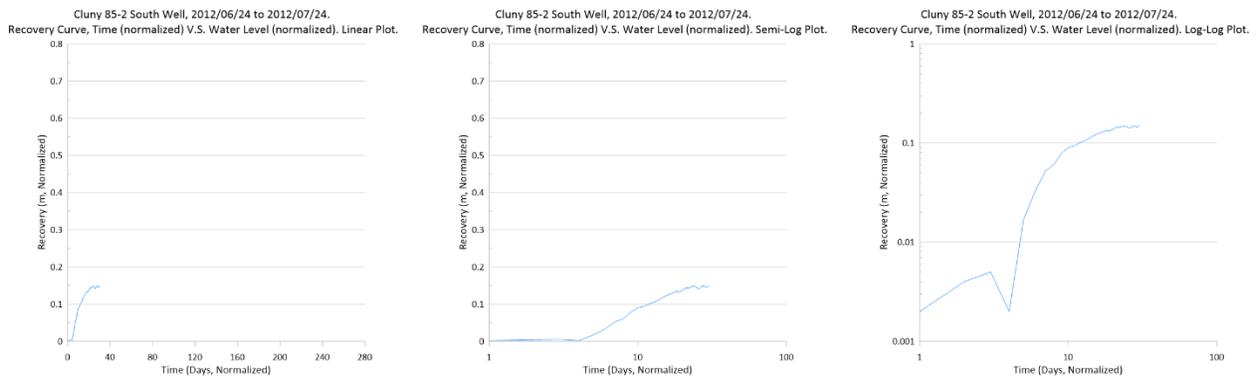


Figure 432: Recovery curve plots for Cluny 85-2 South_0219 well, 2012/06/24 to 2012/07/24. Calgary Valley aquifer.

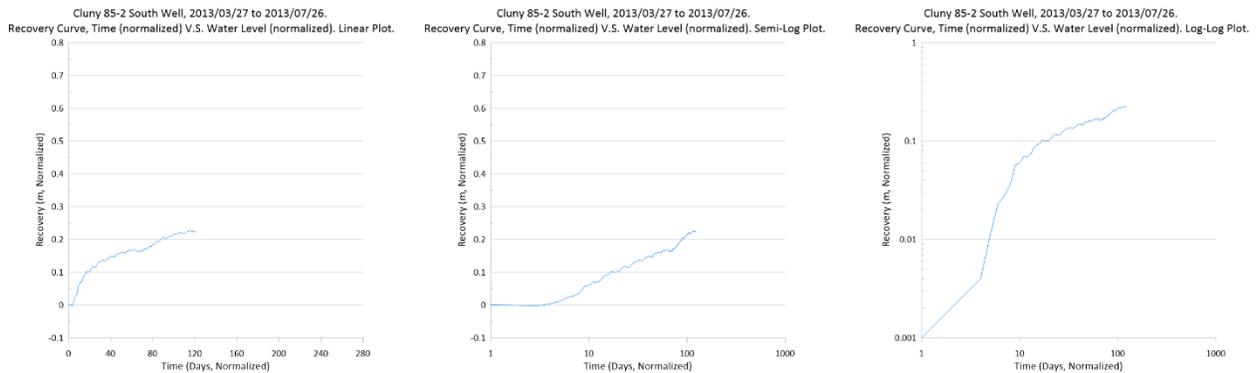


Figure 433: Recovery curve plots for Cluny 85-2 South_0219 well, 2013/03/27 to 2013/07/26. Calgary Valley aquifer.

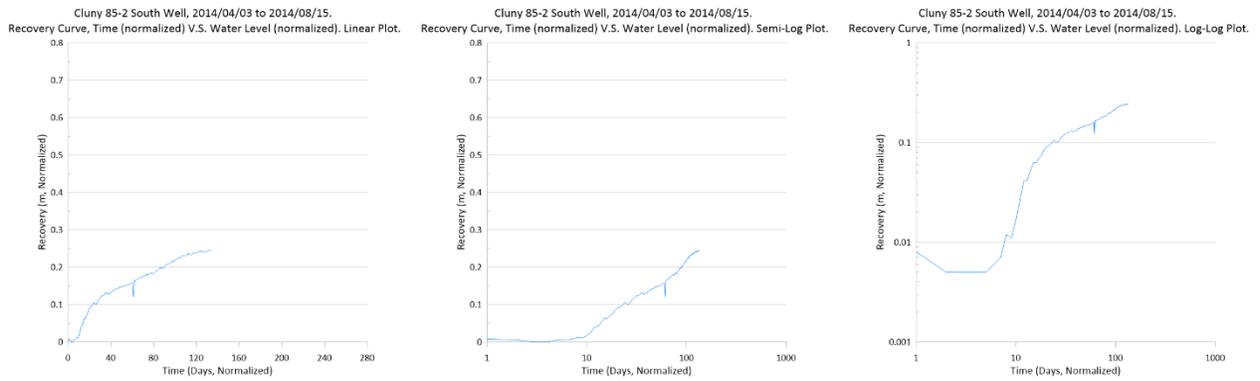


Figure 434: Recovery curve plots for Cluny 85-2 South_0219 well, 2014/04/03 to 2014/08/15. Calgary Valley aquifer.

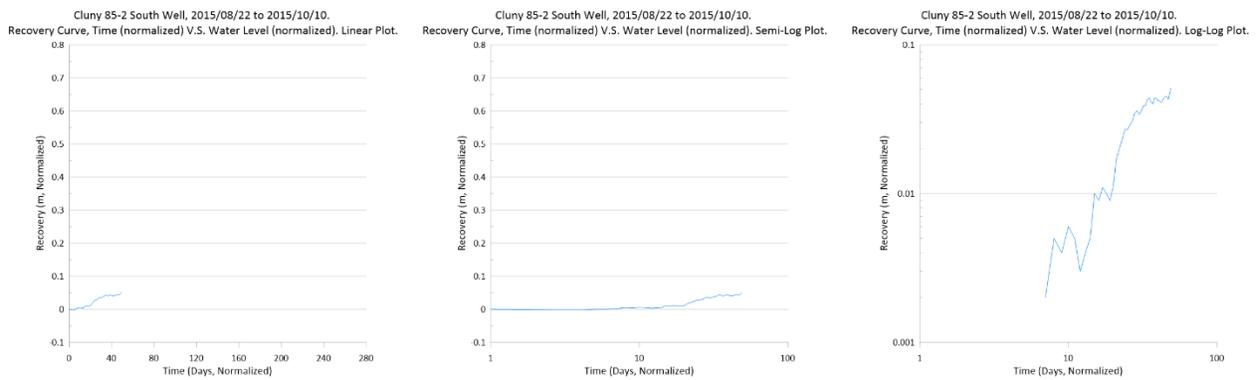


Figure 435: Recovery curve plots for Cluny 85-2 South_0219 well, 2015/08/22 to 2015/10/10. Calgary Valley aquifer.

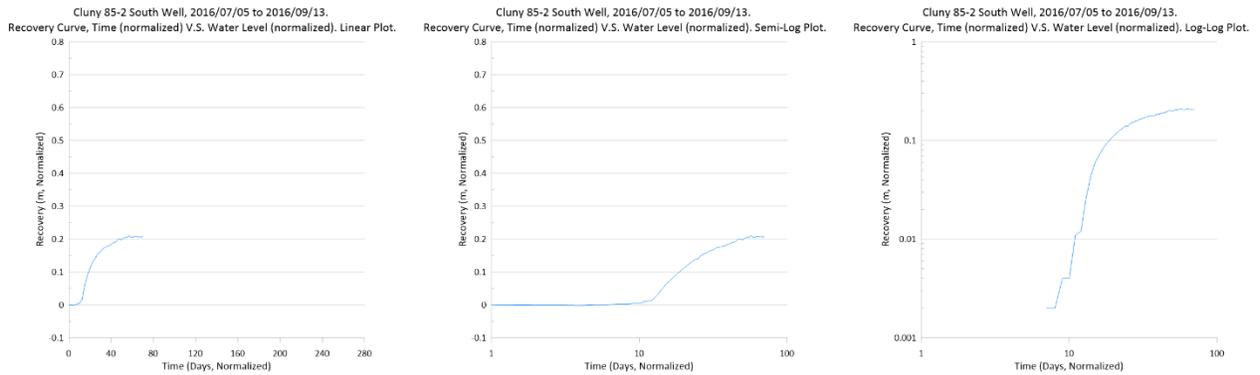


Figure 436: Recovery curve plots for Cluny 85-2 South_0219 well, 2016/07/05 to 2016/09/13. Calgary Valley aquifer.

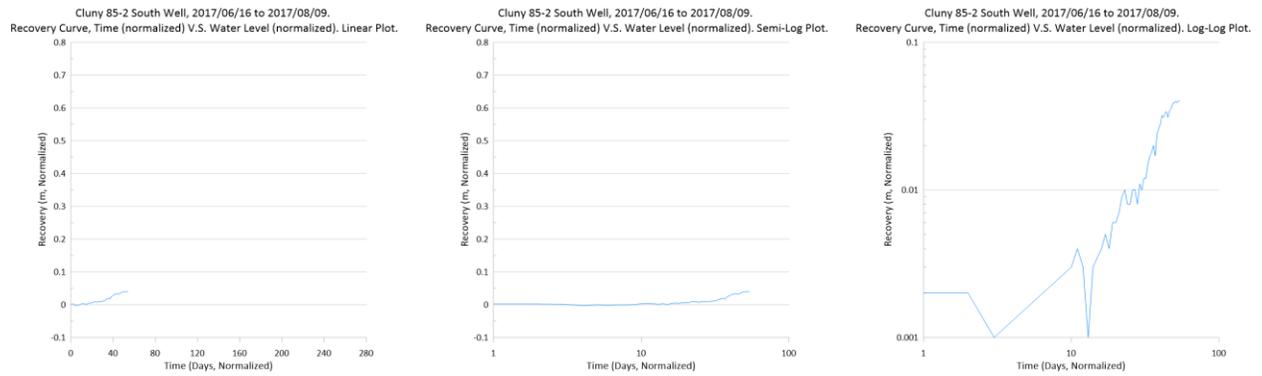


Figure 437: Recovery curve plots for Cluny 85-2 South_0219 well, 2017/06/16 to 2017/08/09. Calgary Valley aquifer.

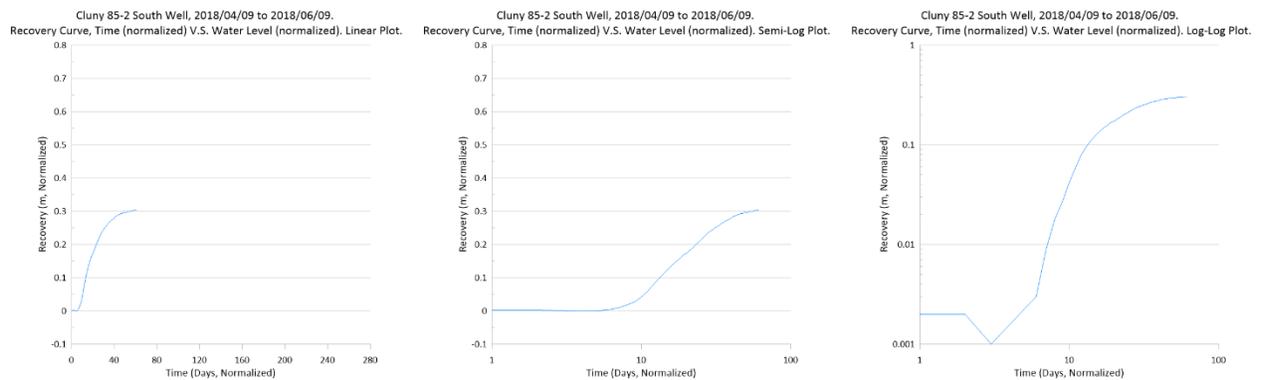


Figure 438: Recovery curve plots for Cluny 85-2 South_0219 well, 2018/04/09 to 2018/06/09. Calgary Valley aquifer.

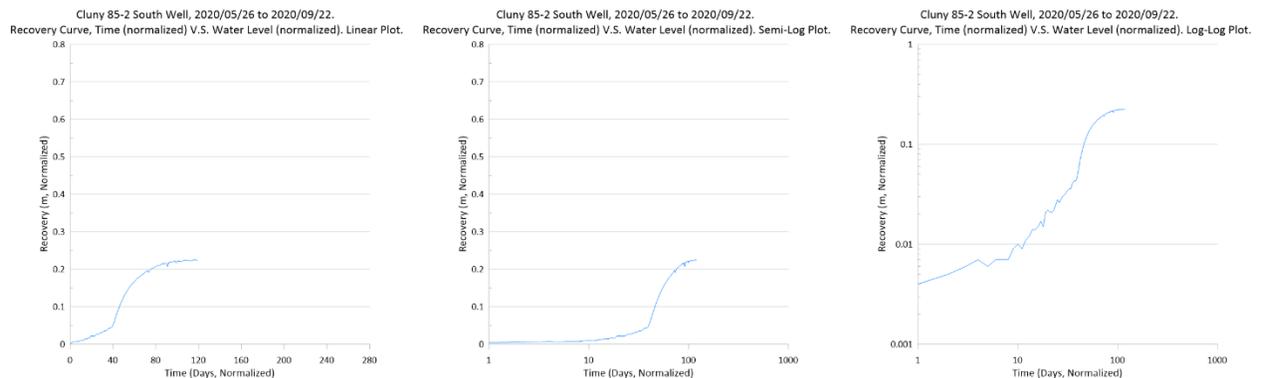


Figure 439: Recovery curve plots for Cluny 85-2 South_0219 well, 2020/05/26 to 2020/09/22. Calgary Valley aquifer.

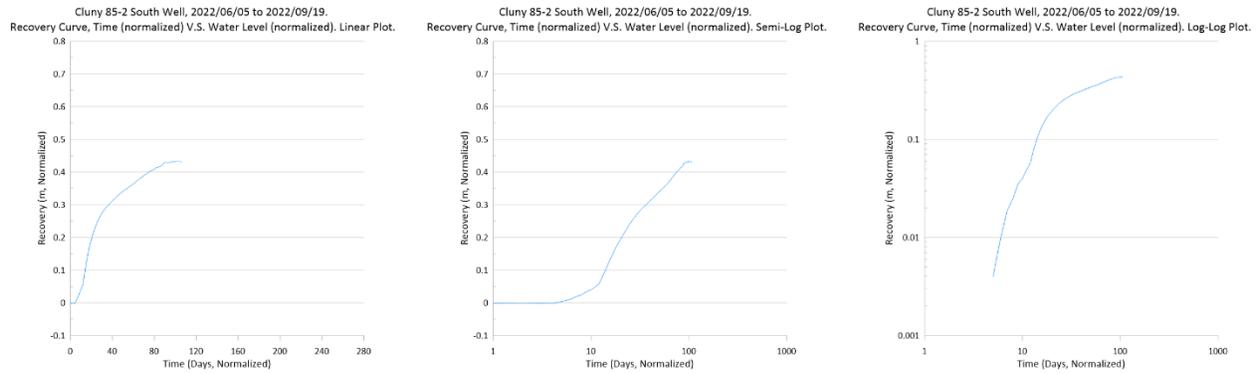


Figure 440: Recovery curve plots for Cluny 85-2 South_0219 well, 2022/06/05 to 2022/09/19. Calgary Valley aquifer.

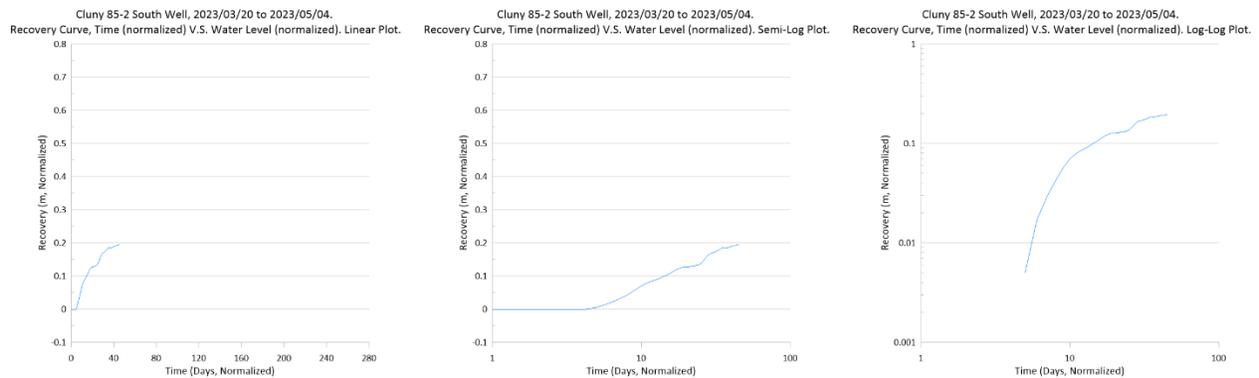


Figure 441: Recovery curve plots for Cluny 85-2 South_0219 well, 2023/03/20 to 2023/05/04. Calgary Valley aquifer.

Appendix H4: GOWN Monitoring Well Recovery Curve Plots for Exshaw_0759 Well

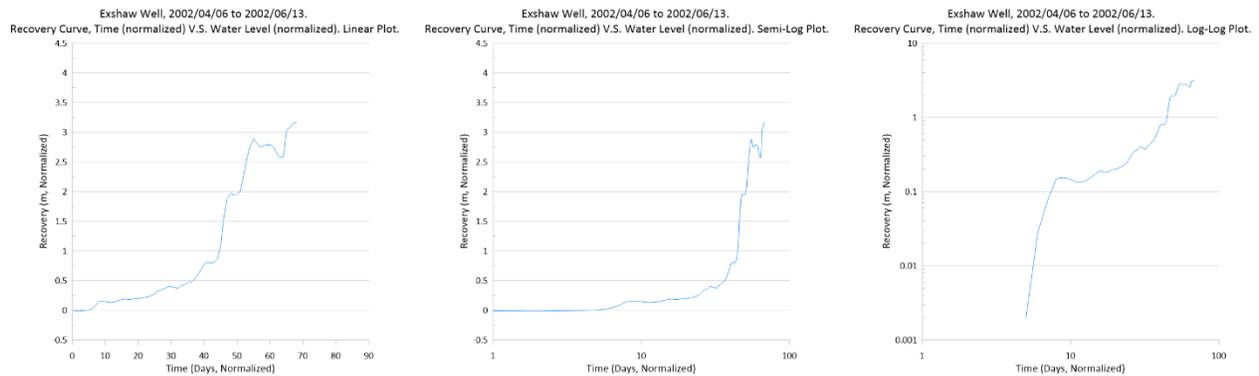


Figure 442: Recovery curve plots for Exshaw_0759 well, 2002/04/06 to 2002/06/13. Calgary Valley aquifer.

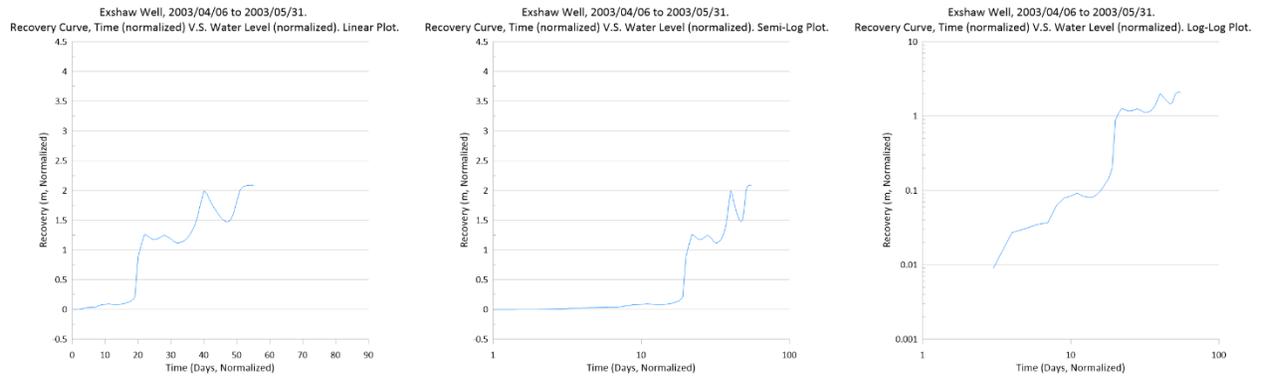


Figure 443: Recovery curve plots for Exshaw_0759 well, 2003/04/06 to 2003/05/31. Calgary Valley aquifer.

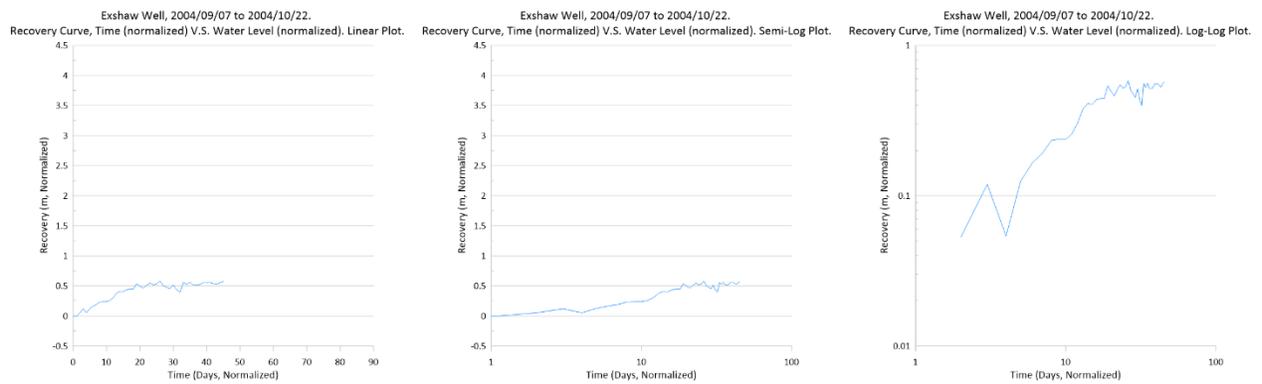


Figure 444: Recovery curve plots for Exshaw_0759 well, 2004/09/07 to 2004/10/22. Calgary Valley aquifer.

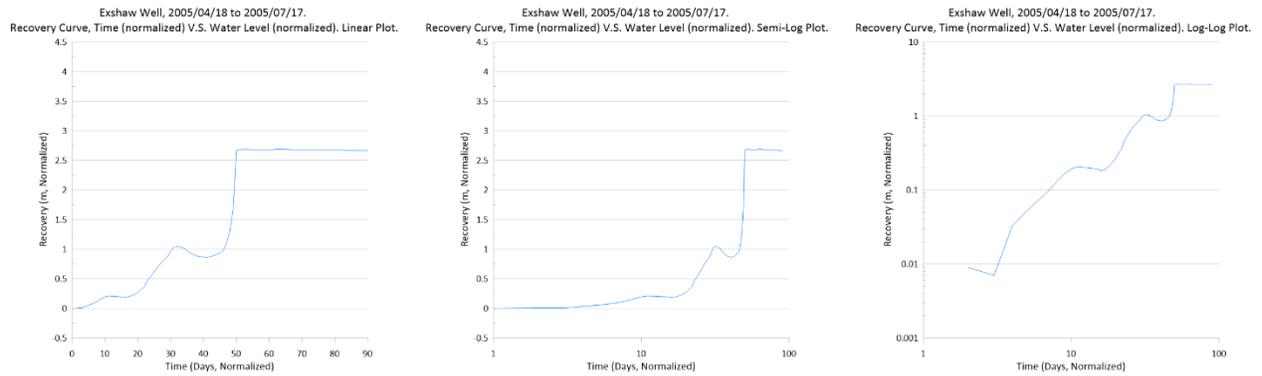


Figure 445: Recovery curve plots for Exshaw_0759 well, 2005/04/18 to 2005/07/17. Calgary Valley aquifer.

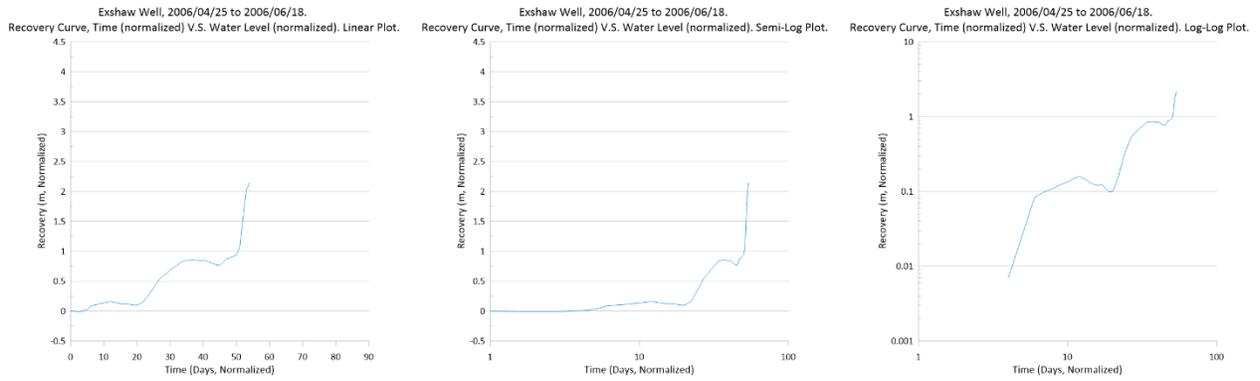


Figure 446: Recovery curve plots for Exshaw_0759 well, 2006/04/25 to 2006/06/18. Calgary Valley aquifer.

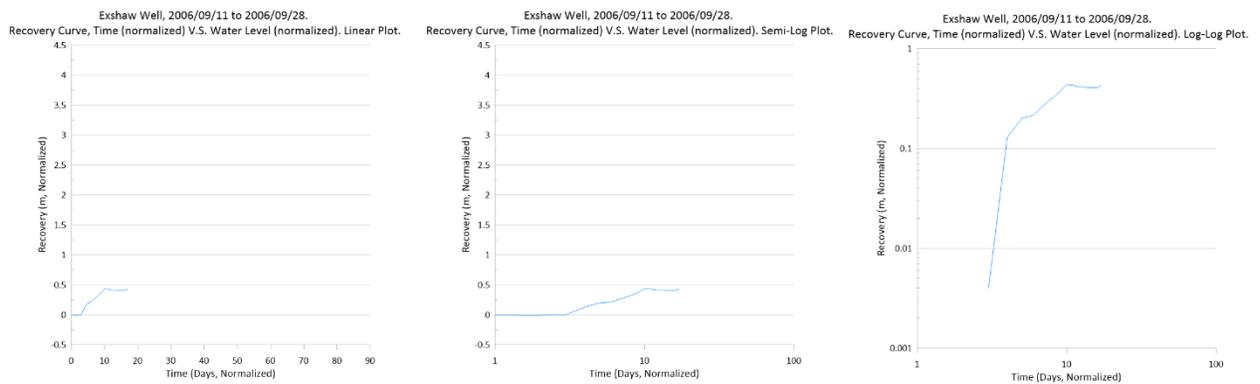


Figure 447: Recovery curve plots for Exshaw_0759 well, 2006/09/11 to 2006/09/28. Calgary Valley aquifer.

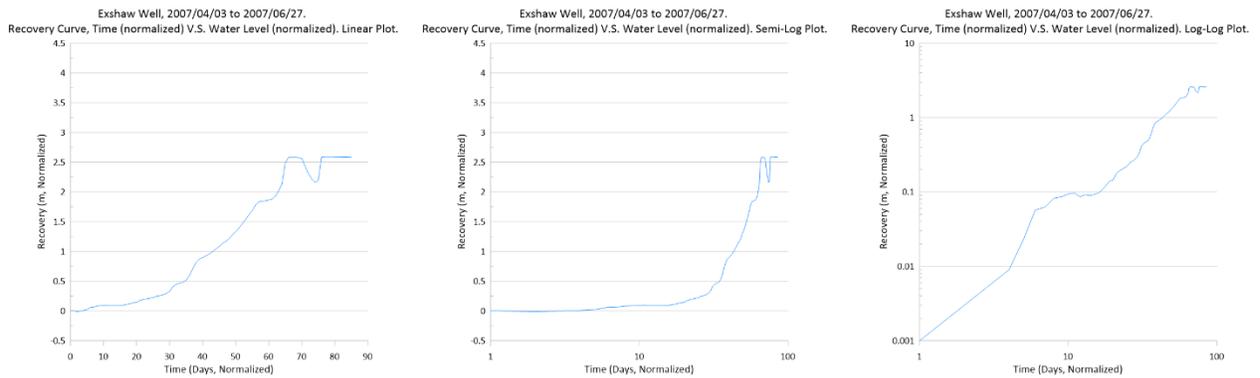


Figure 448: Recovery curve plots for Exshaw_0759 well, 2007/04/03 to 2007/06/27. Calgary Valley aquifer.

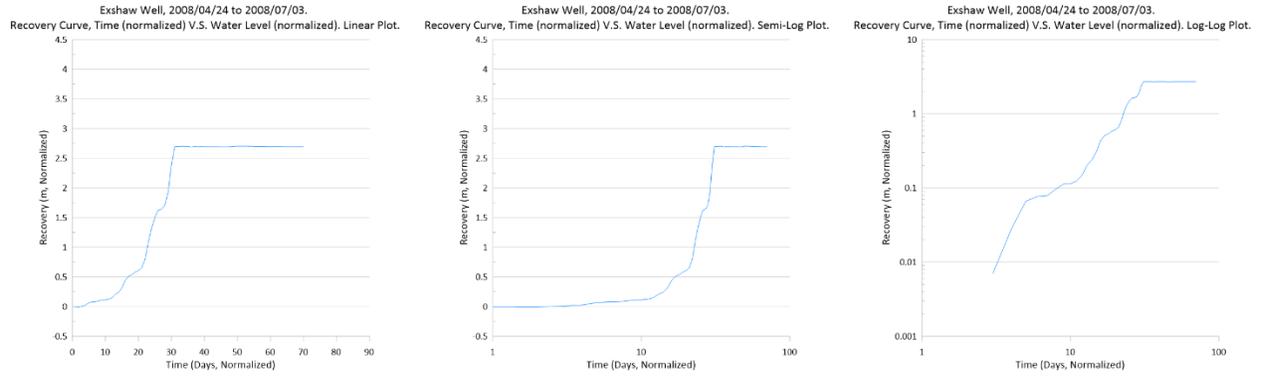


Figure 449: Recovery curve plots for Exshaw_0759 well, 2008/04/24 to 2008/07/03. Calgary Valley aquifer.

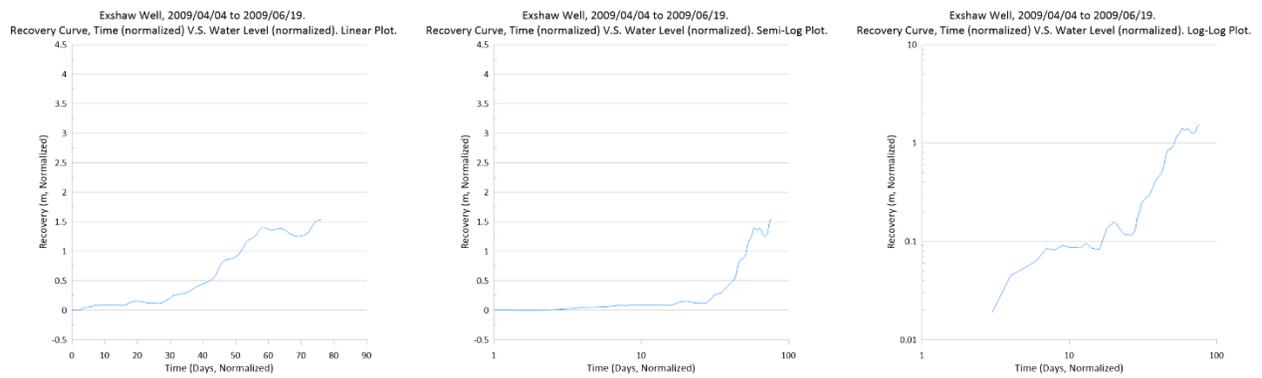


Figure 450: Recovery curve plots for Exshaw_0759 well, 2009/04/04 to 2009/06/19. Calgary Valley aquifer.

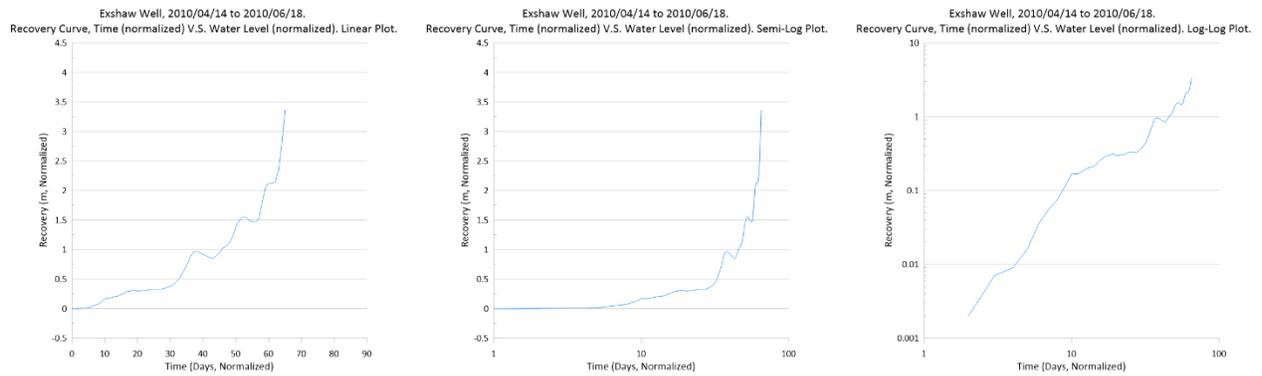


Figure 451: Recovery curve plots for Exshaw_0759 well, 2010/04/14 to 2010/06/18. Calgary Valley aquifer.

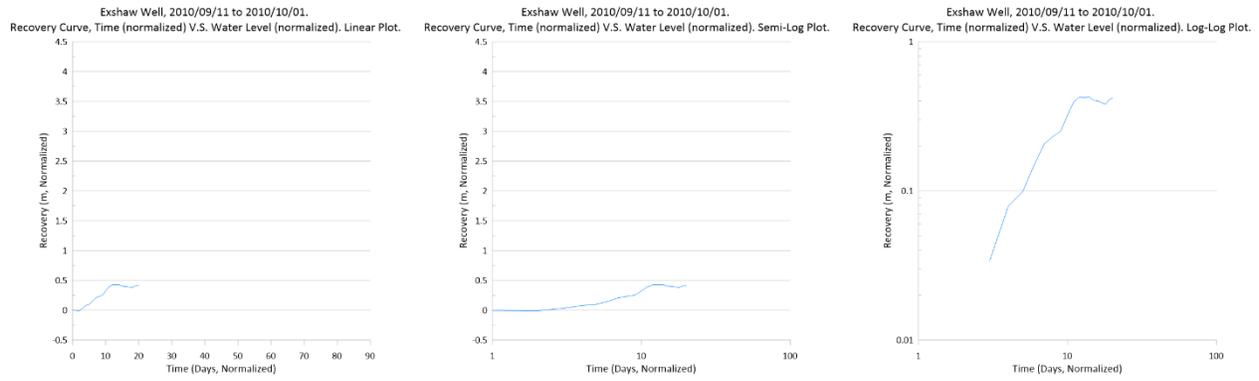


Figure 452: Recovery curve plots for Exshaw_0759 well, 2010/09/11 to 2010/10/01. Calgary Valley aquifer.

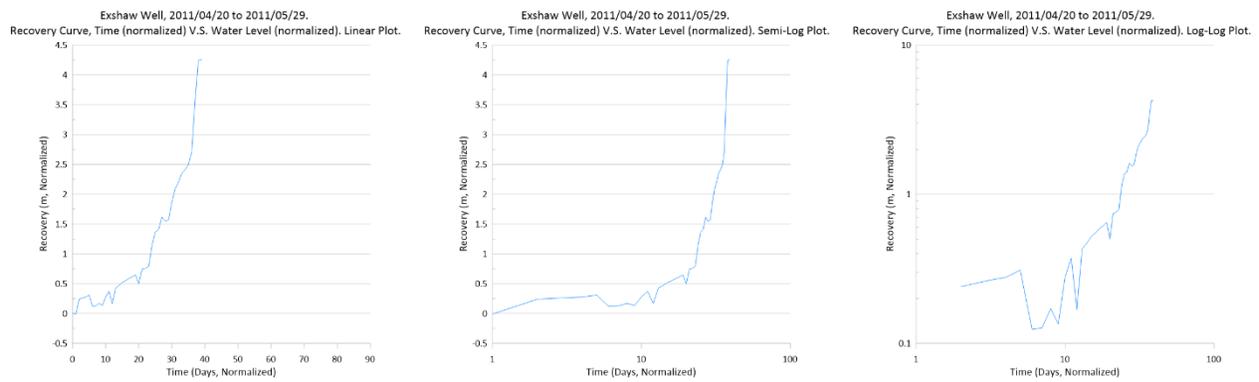


Figure 453: Recovery curve plots for Exshaw_0759 well, 2011/04/20 to 2011/05/29. Calgary Valley aquifer.

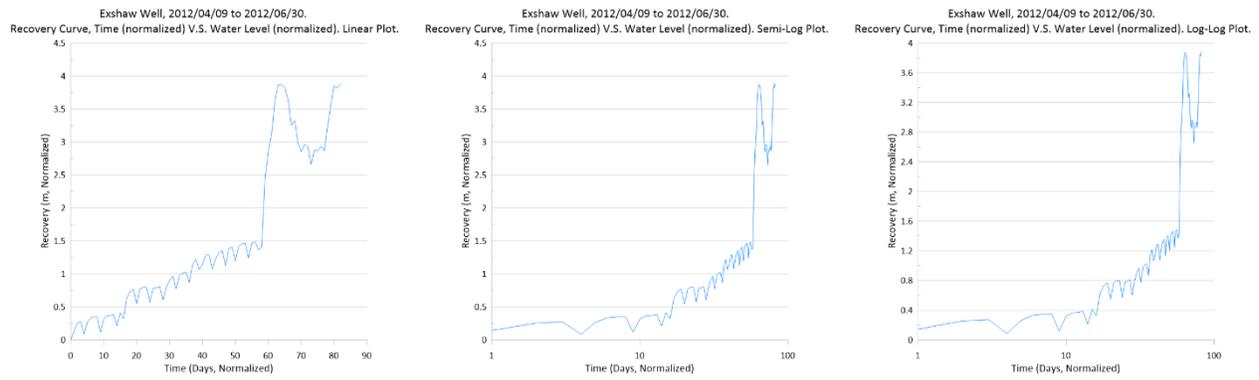


Figure 454: Recovery curve plots for Exshaw_0759 well, 2012/04/09 to 2012/06/30. Calgary Valley aquifer.

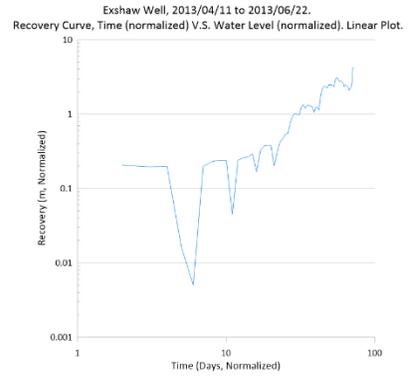
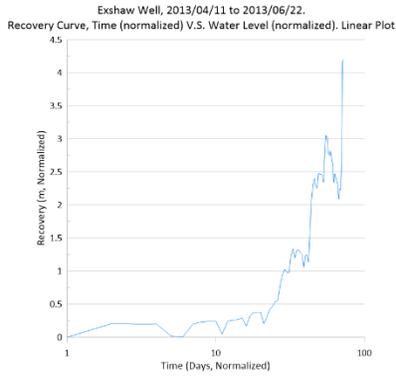
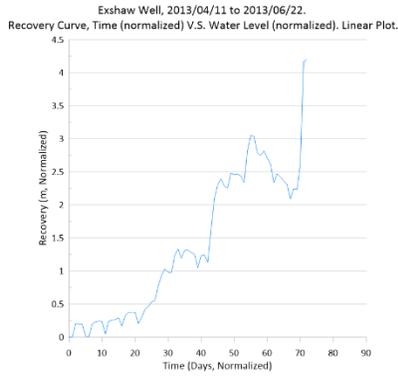


Figure 455: Recovery curve plots for Exshaw_0759 well, 2013/04/11 to 2013/06/22. Calgary Valley aquifer.

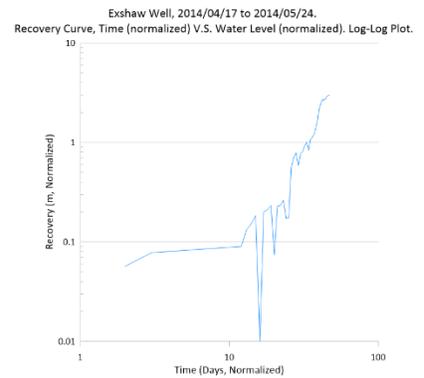
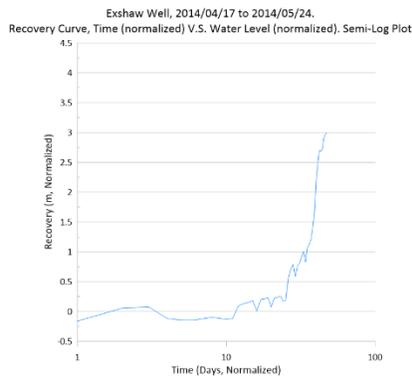
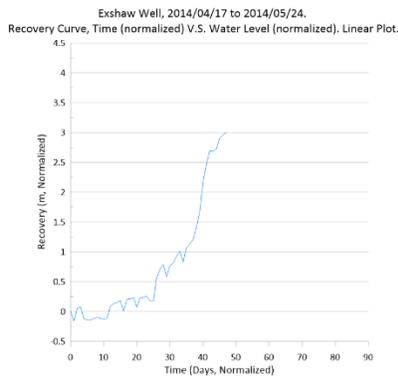


Figure 456: Recovery curve plots for Exshaw_0759 well, 2014/04/17 to 2014/05/24. Calgary Valley aquifer.

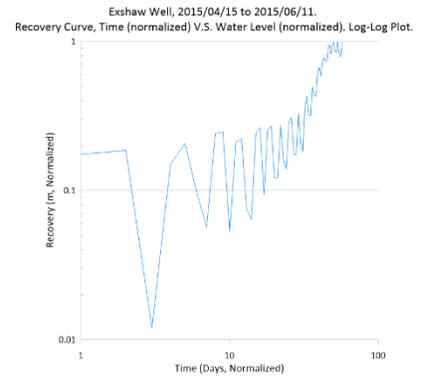
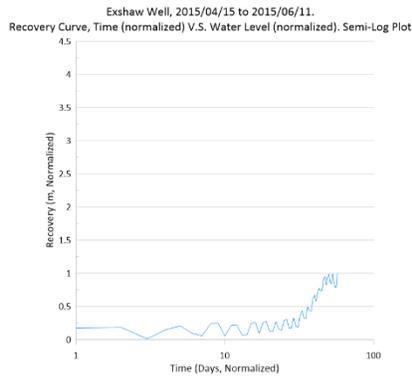
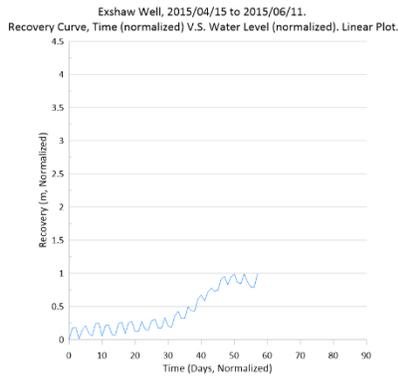


Figure 457: Recovery curve plots for Exshaw_0759 well, 2015/04/15 to 2015/06/11. Calgary Valley aquifer.

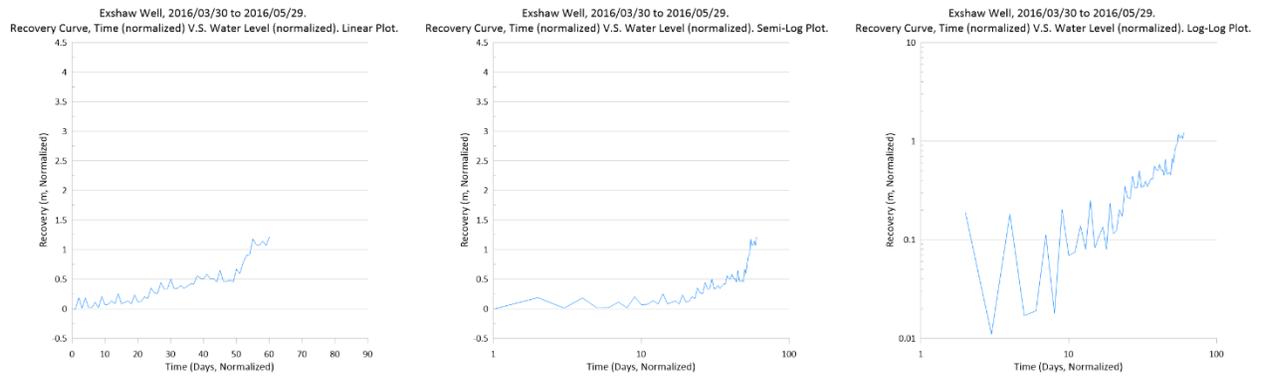


Figure 458: Recovery curve plots for Exshaw_0759 well, 2016/03/30 to 2016/05/29. Calgary Valley aquifer.

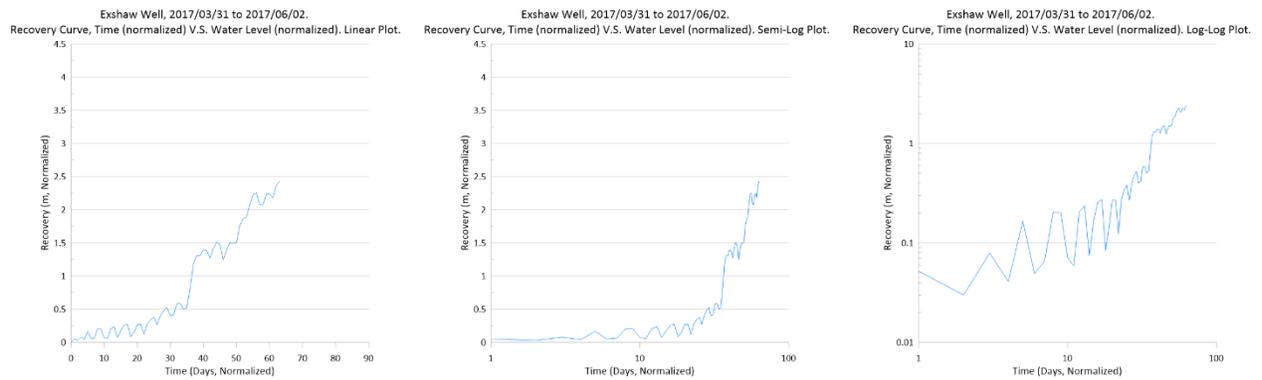


Figure 459: Recovery curve plots for Exshaw_0759 well, 2017/03/31 to 2017/06/02. Calgary Valley aquifer.

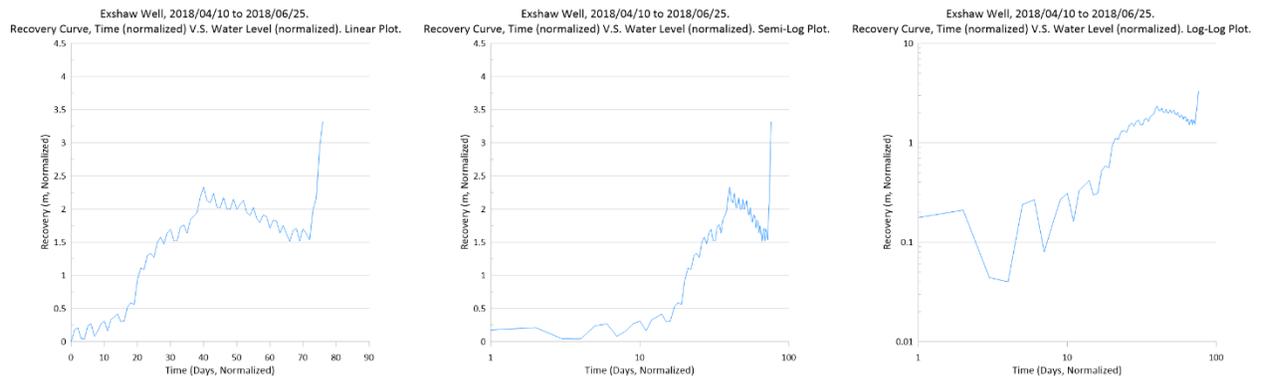


Figure 460: Recovery curve plots for Exshaw_0759 well, 2018/04/10 to 2018/06/25. Calgary Valley aquifer.

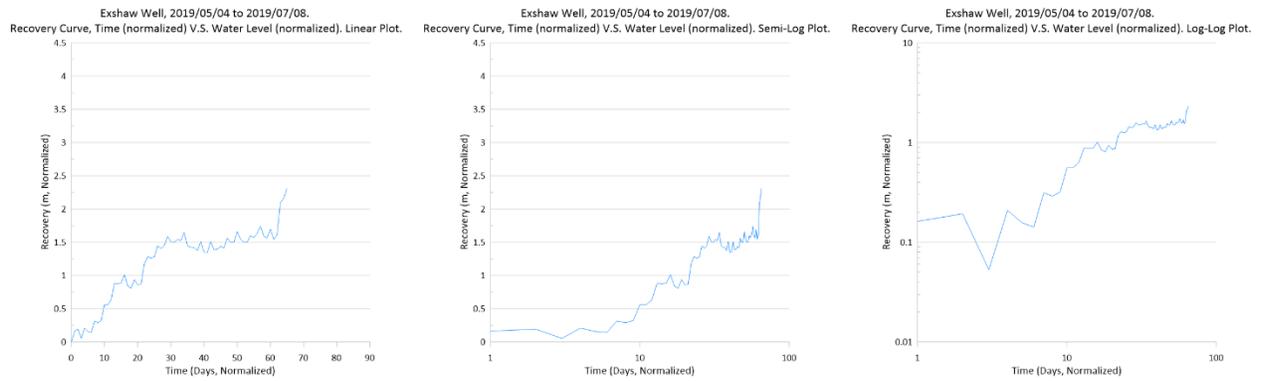


Figure 461: Recovery curve plots for Exshaw_0759 well, 2019/05/04 to 2019/07/08. Calgary Valley aquifer.

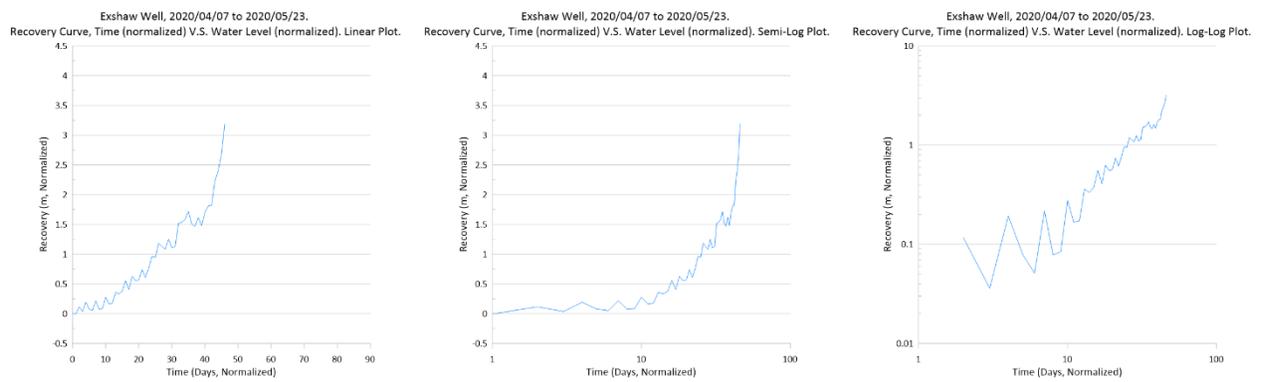


Figure 462: Recovery curve plots for Exshaw_0759 well, 2020/04/07 to 2020/05/23. Calgary Valley aquifer.

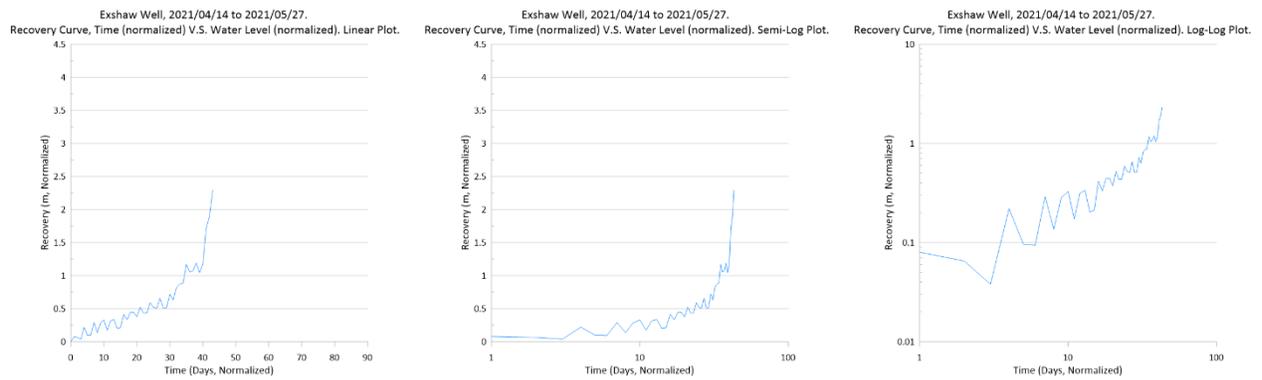


Figure 463: Recovery curve plots for Exshaw_0759 well, 2021/04/14 to 2021/05/27. Calgary Valley aquifer.

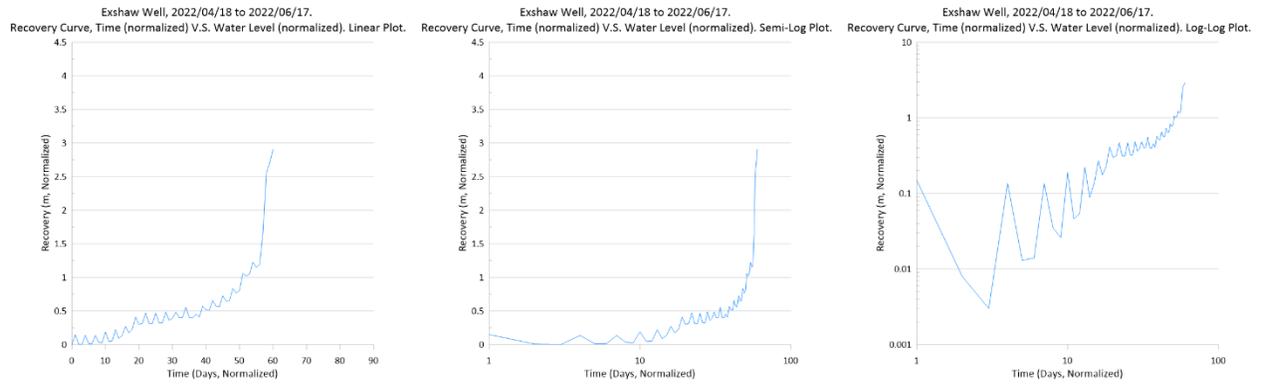


Figure 464: Recovery curve plots for Exshaw_0759 well, 2022/04/18 to 2022/06/17. Calgary Valley aquifer.

Appendix I: GOWN Monitoring Well Recovery Curve Plots for Surficial Aquifers Wells
Appendix II: GOWN Monitoring Well Recovery Curve Plots for Milk River 56-1_0103 Well

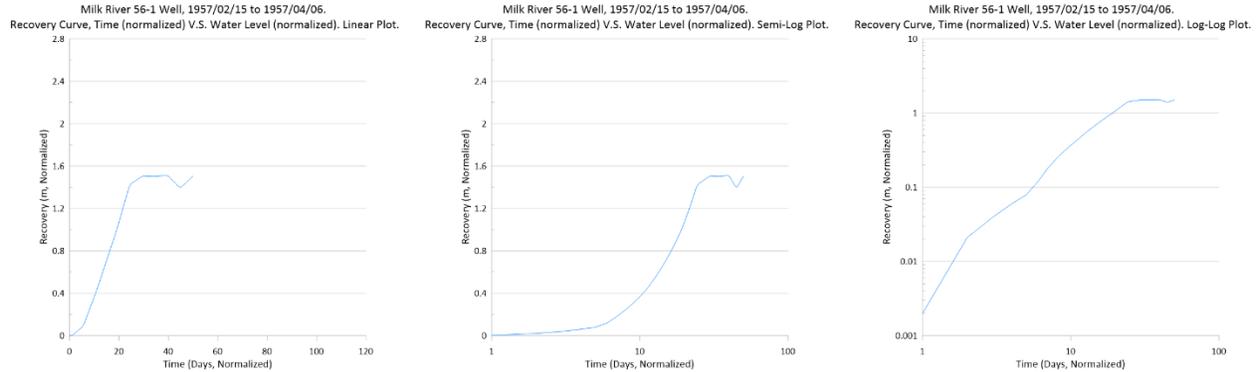


Figure 465: Recovery curve plots for Milk River 56-1_0103 well, 1957/02/15 to 1957/04/06. Surficial aquifer.

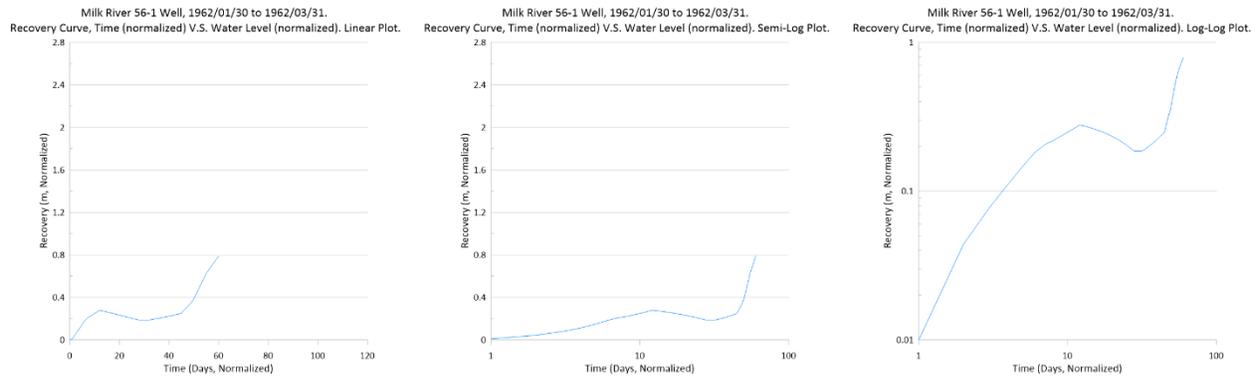


Figure 466: Recovery curve plots for Milk River 56-1_0103 well, 1962/01/30 to 1962/03/31. Surficial aquifer.

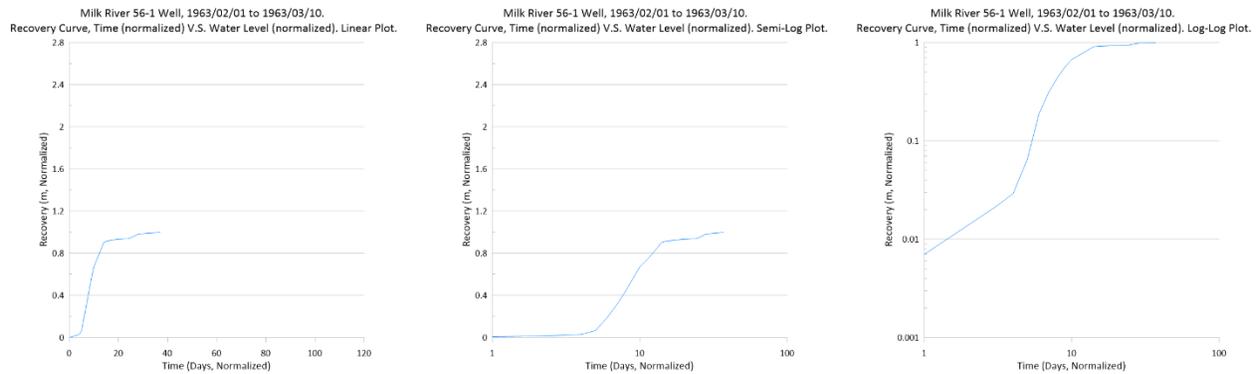


Figure 467: Recovery curve plots for Milk River 56-1_0103 well, 1963/02/01 to 1963/03/10. Surficial aquifer.

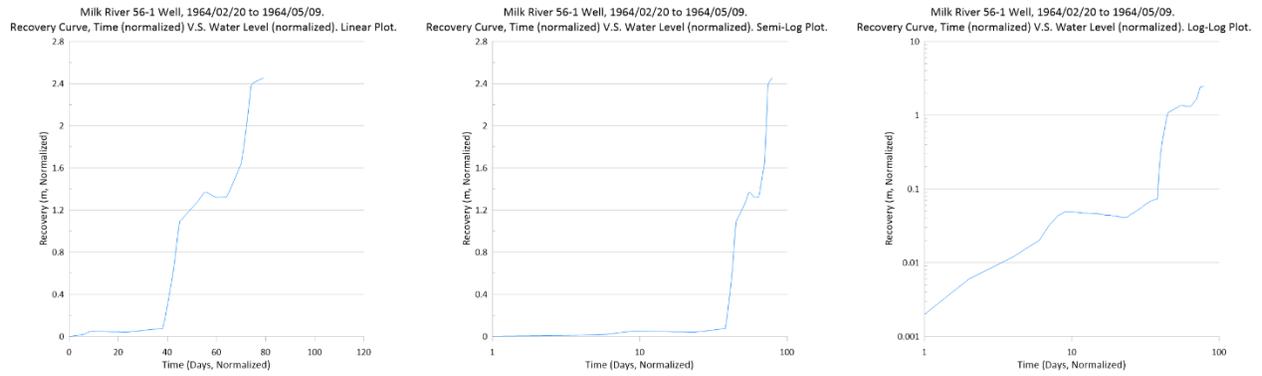


Figure 468: Recovery curve plots for Milk River 56-1_0103 well, 1964/02/20 to 1964/05/09. Surficial aquifer.

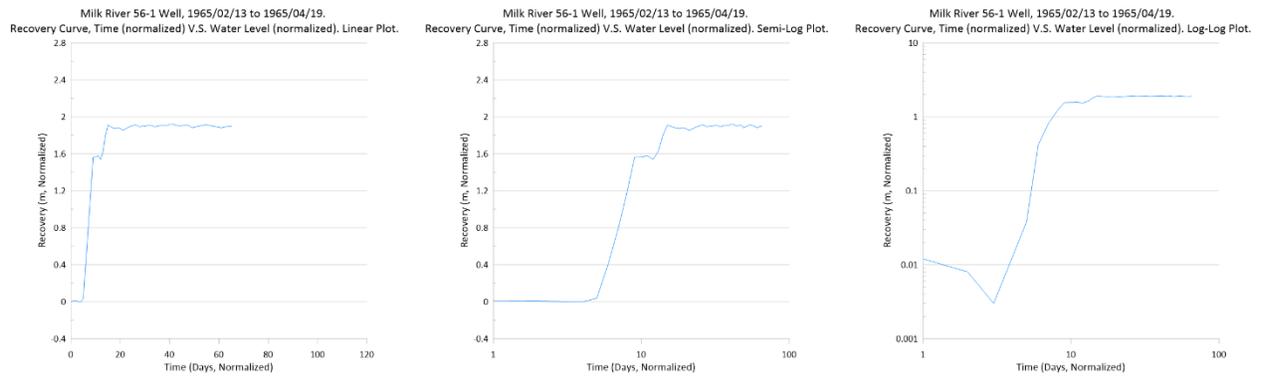


Figure 469: Recovery curve plots for Milk River 56-1_0103 well, 1965/02/13 to 1965/04/19. Surficial aquifer.

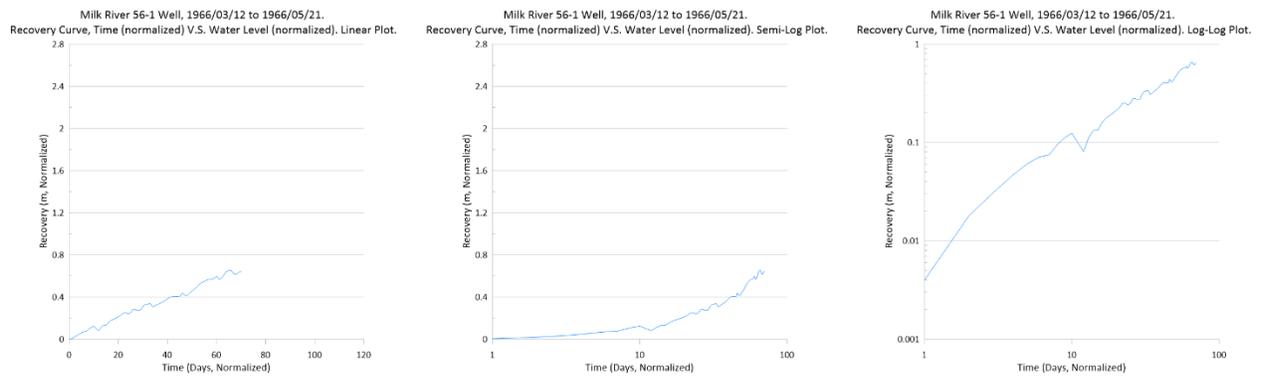


Figure 470: Recovery curve plots for Milk River 56-1_0103 well, 1966/03/12 to 1966/05/21. Surficial aquifer.

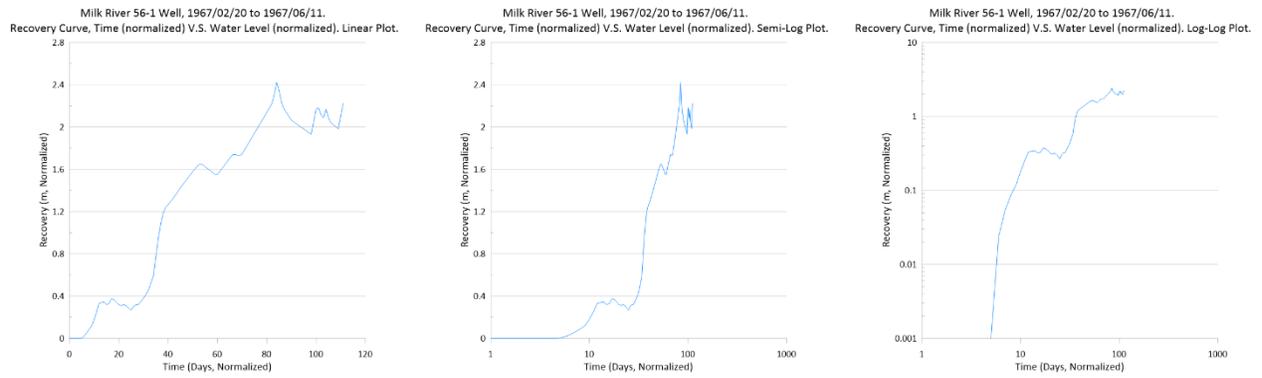


Figure 471: Recovery curve plots for Milk River 56-1_0103 well, 1967/02/20 to 1967/06/11. Surficial aquifer.

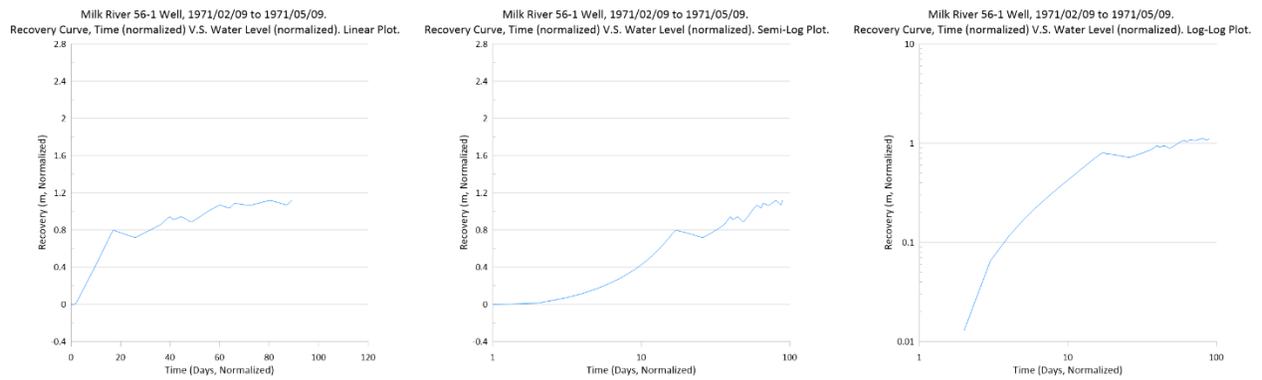


Figure 472: Recovery curve plots for Milk River 56-1_0103 well, 1971/02/09 to 1971/05/09. Surficial aquifer.

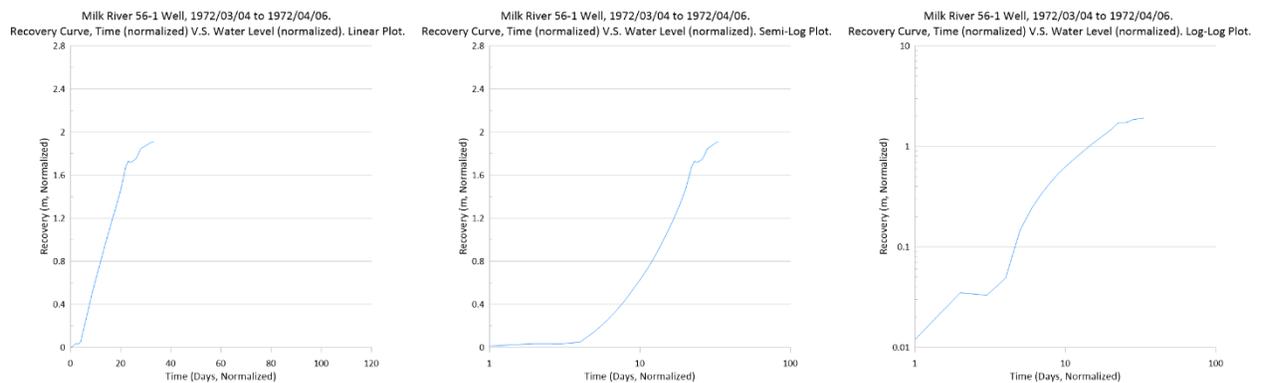


Figure 473: Recovery curve plots for Milk River 56-1_0103 well, 1972/03/04 to 1972/04/06. Surficial aquifer.

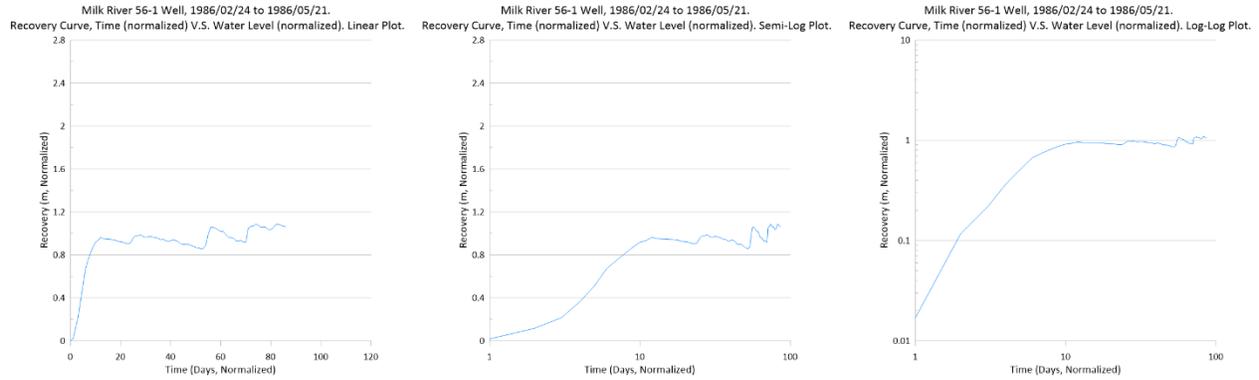


Figure 474: Recovery curve plots for Milk River 56-1_0103 well, 1986/02/24 to 1986/05/21. Surficial aquifer.

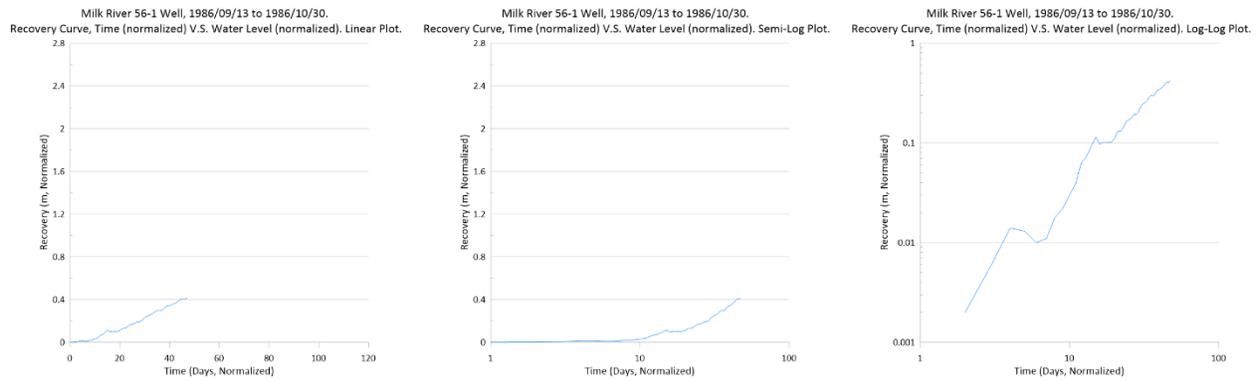


Figure 475: Recovery curve plots for Milk River 56-1_0103 well, 1986/09/13 to 1986/10/30. Surficial aquifer.

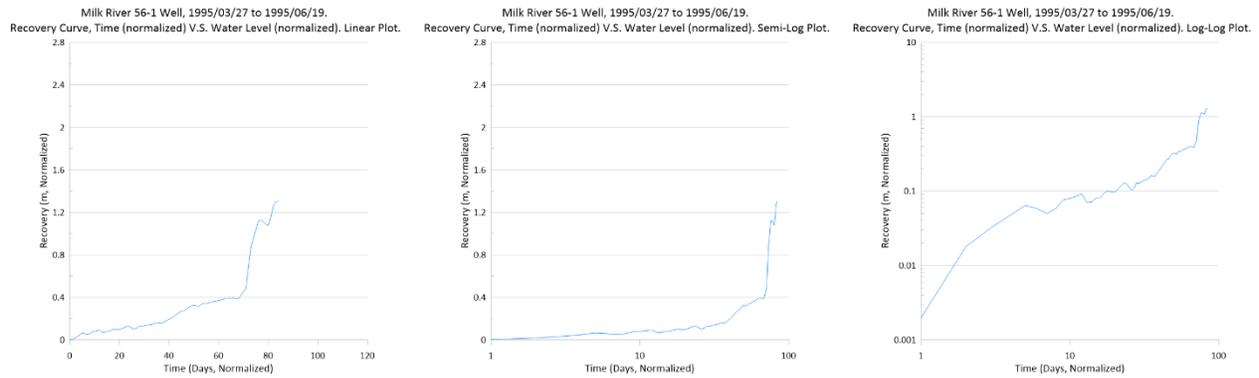


Figure 476: Recovery curve plots for Milk River 56-1_0103 well, 1995/03/27 to 1995/06/19. Surficial aquifer.

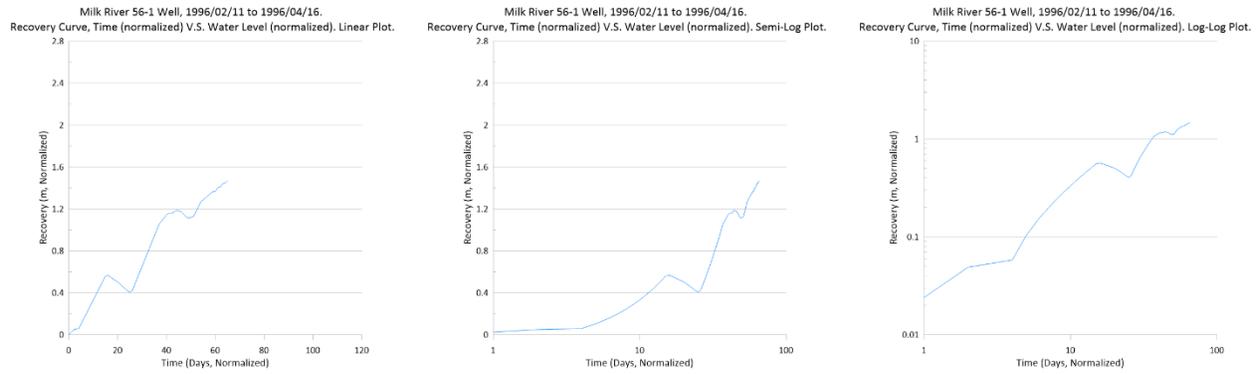


Figure 477: Recovery curve plots for Milk River 56-1_0103 well, 1996/02/11 to 1996/04/16. Surficial aquifer.

Appendix I2: GOWN Monitoring Well Recovery Curve Plots for Hays East_3053 Well

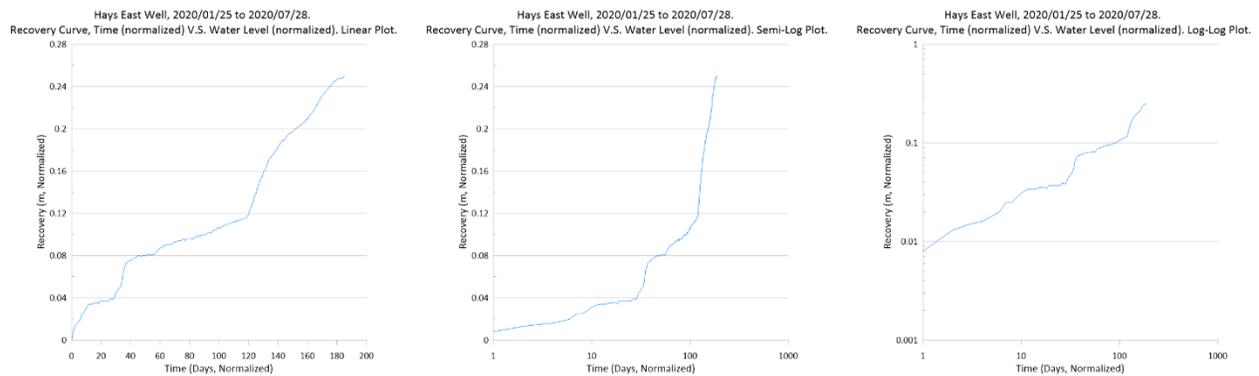


Figure 478: Recovery curve plots for Hays East_3053 well, 2020/01/25 to 2020/07/28. Surficial aquifer.

Appendix I3: GOWN Monitoring Well Recovery Curve Plots for Hays 2523E_0279 Well

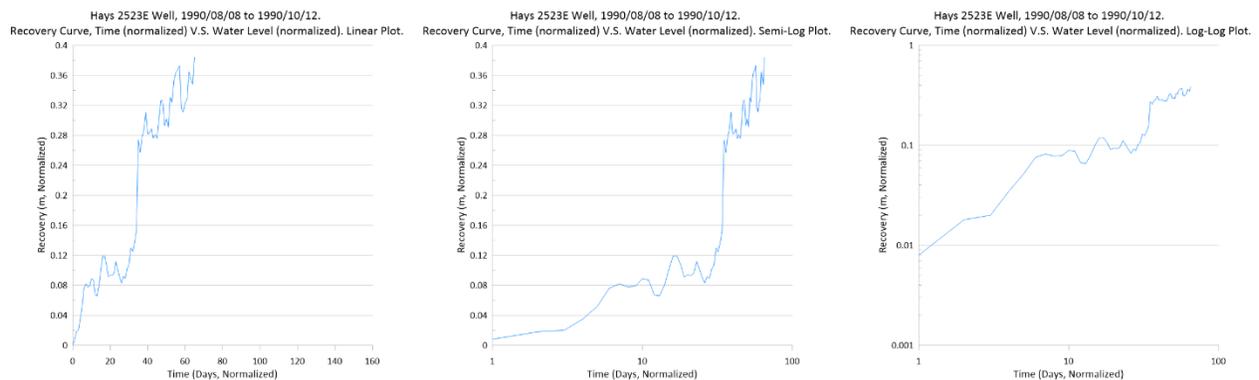


Figure 479: Recovery curve plots for Hays 2523E_0279 well, 1990/08/08 to 1990/10/12. Surficial aquifer.

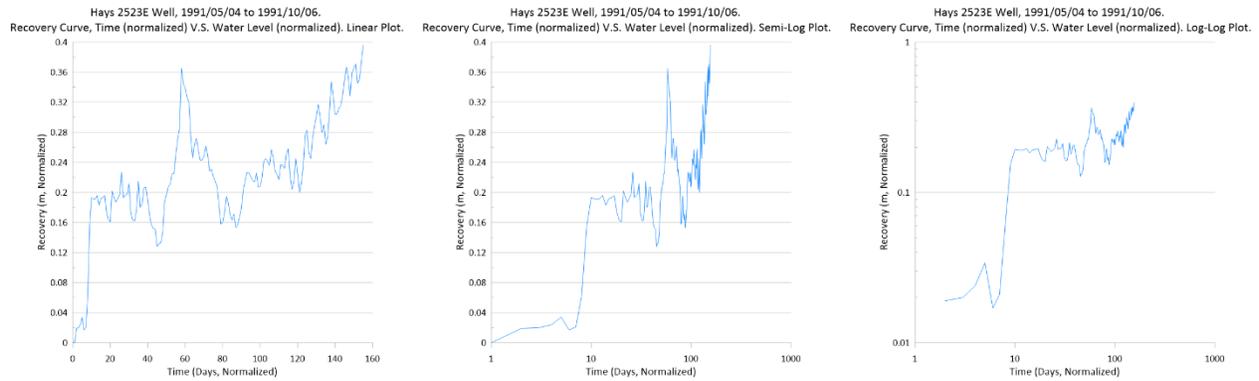


Figure 480: Recovery curve plots for Hays 2523E_0279 well, 1991/05/04 to 1991/10/06. Surficial aquifer.

Appendix I4: GOWN Monitoring Well Recovery Curve Plots for High River 2523E_0279 Well

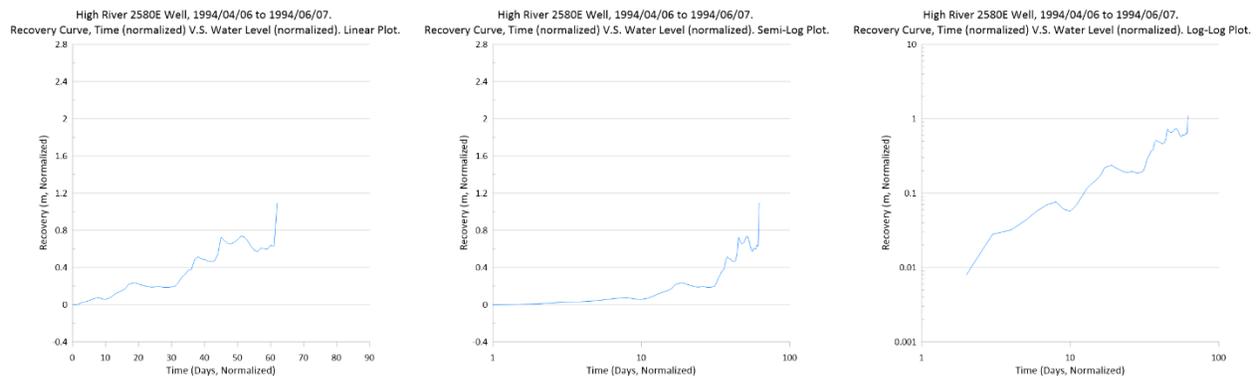


Figure 481: Recovery curve plots for High River 2523E_0279 well, 1994/04/06 to 1994/06/07. Surficial aquifer.

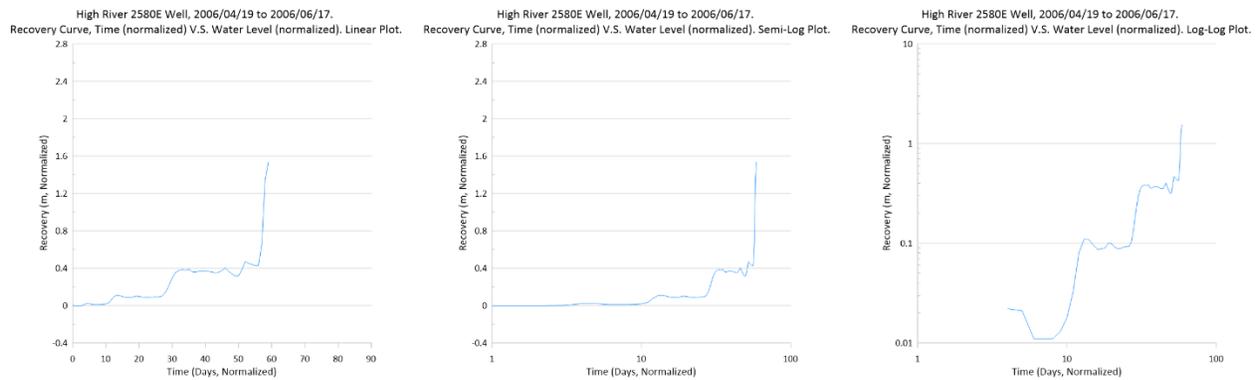


Figure 482: Recovery curve plots for High River 2523E_0279 well, 2006/04/19 to 2006/06/17. Surficial aquifer.

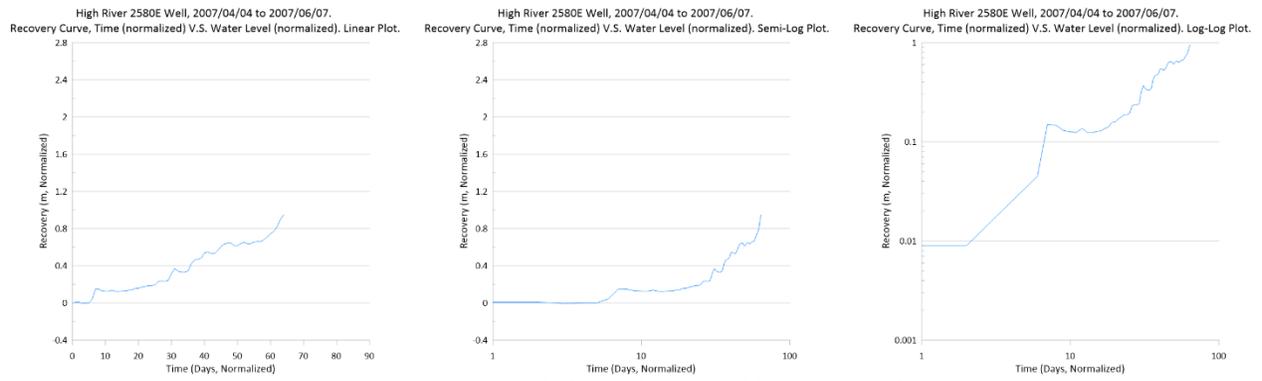


Figure 483: Recovery curve plots for High River 2523E_0279 well, 2007/04/04 to 2007/06/07. Surficial aquifer.

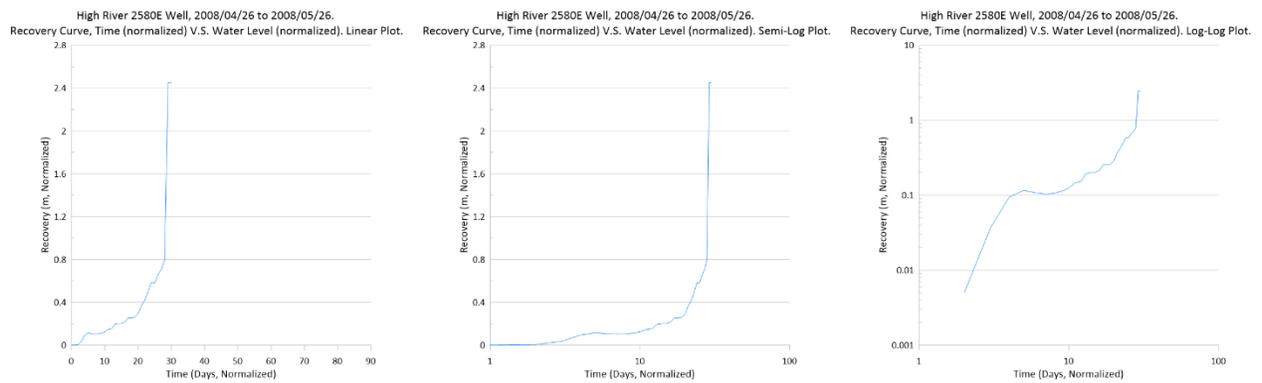


Figure 484: Recovery curve plots for High River 2523E_0279 well, 2008/04/26 to 2008/05/26. Surficial aquifer.

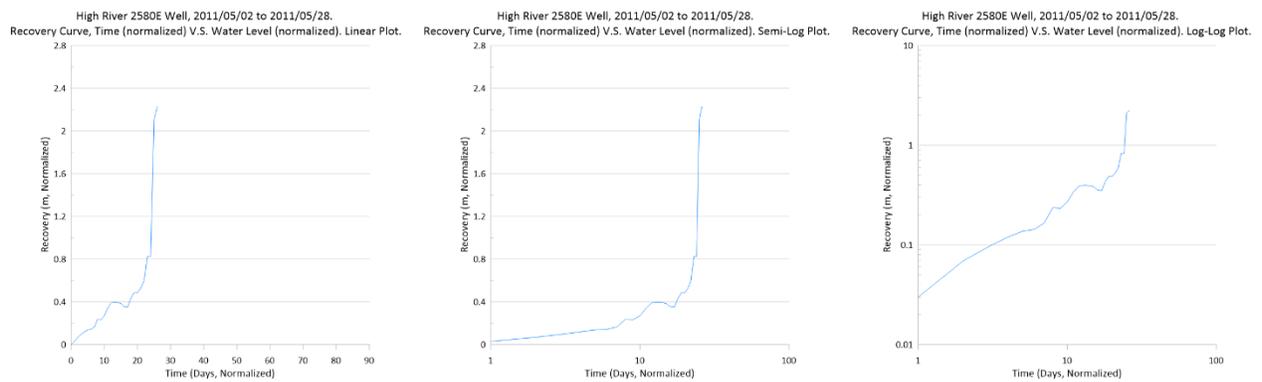


Figure 485: Recovery curve plots for High River 2523E_0279 well, 2011/05/02 to 2011/05/28. Surficial aquifer.

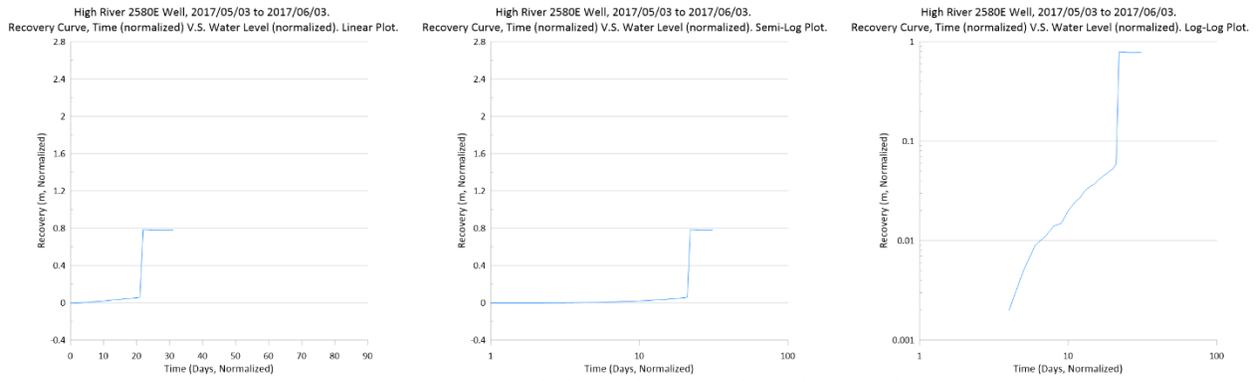


Figure 486: Recovery curve plots for High River 2523E_0279 well, 2017/05/03 to 2017/06/03. Surficial aquifer.

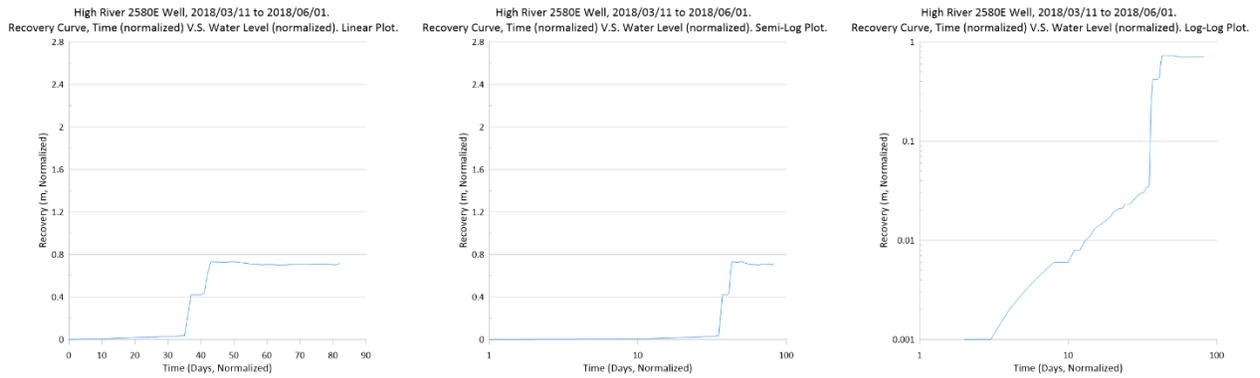


Figure 487: Recovery curve plots for High River 2523E_0279 well, 2018/03/11 to 2018/06/01. Surficial aquifer.

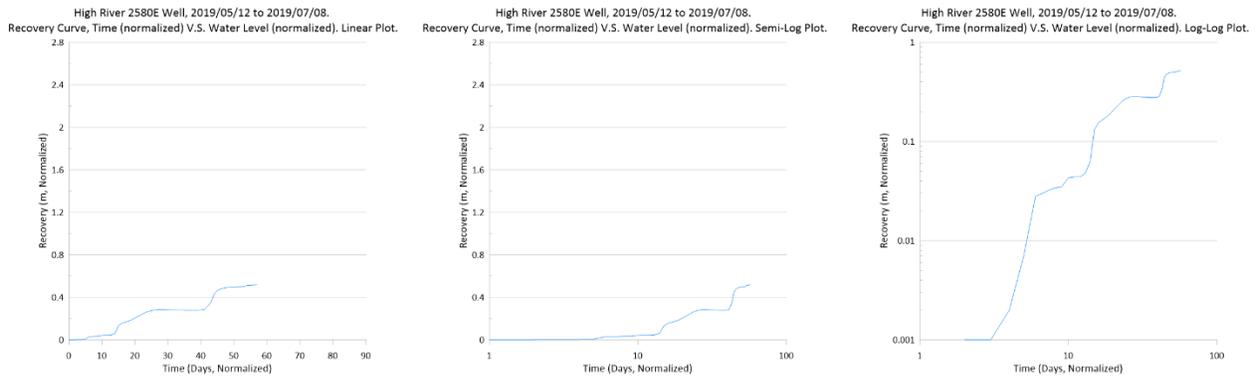


Figure 488: Recovery curve plots for High River 2523E_0279 well, 2019/05/12 to 2019/07/08. Surficial aquifer.

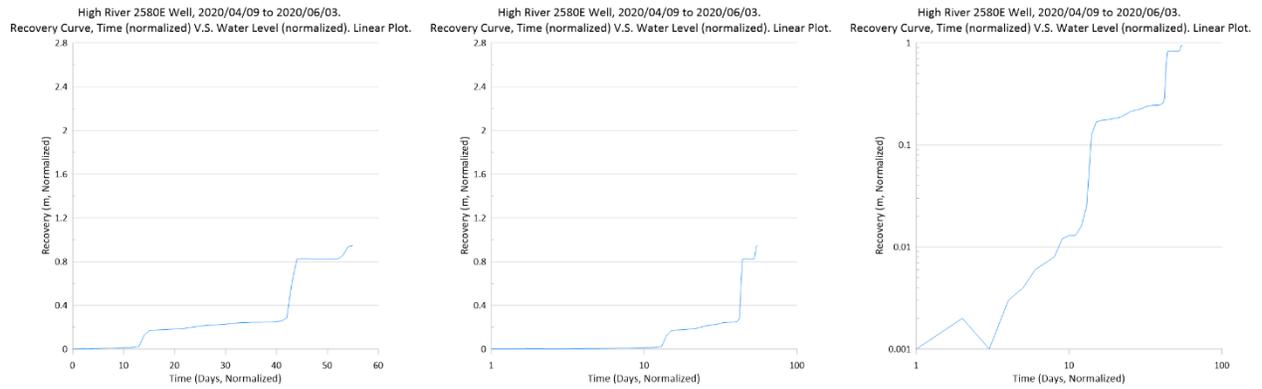


Figure 489: Recovery curve plots for High River 2523E_0279 well, 2020/04/09 to 2020/06/03. Surficial aquifer.

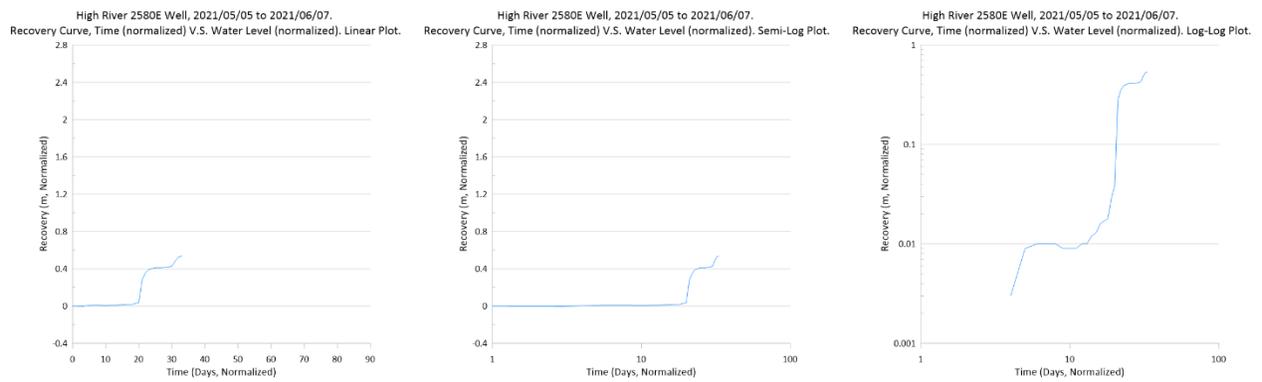


Figure 490: Recovery curve plots for High River 2523E_0279 well, 2021/05/05 to 2021/06/07. Surficial aquifer.

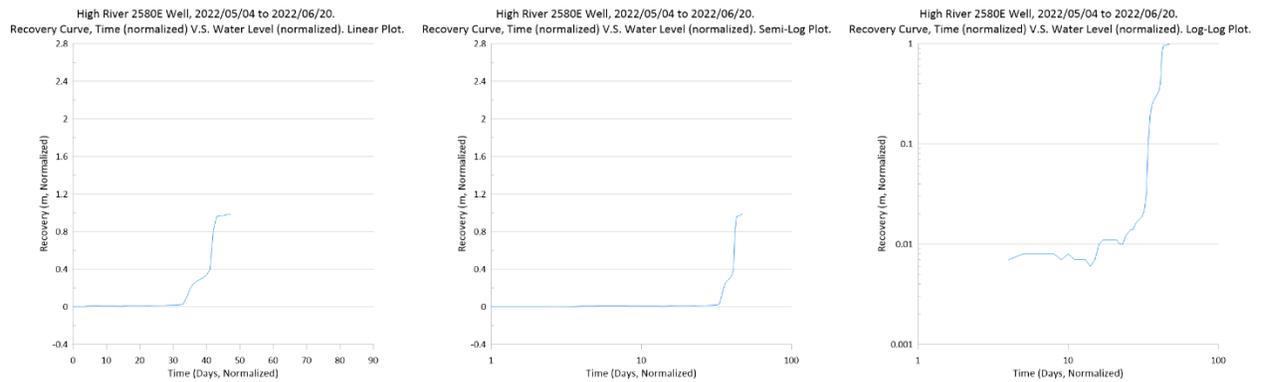


Figure 491: Recovery curve plots for High River 2523E_0279 well, 2022/05/04 to 2022/06/20. Surficial aquifer.

Appendix I5: GOWN Monitoring Well Recovery Curve Plots for Kirkpatrick Lake 86-3 East_0230 Well

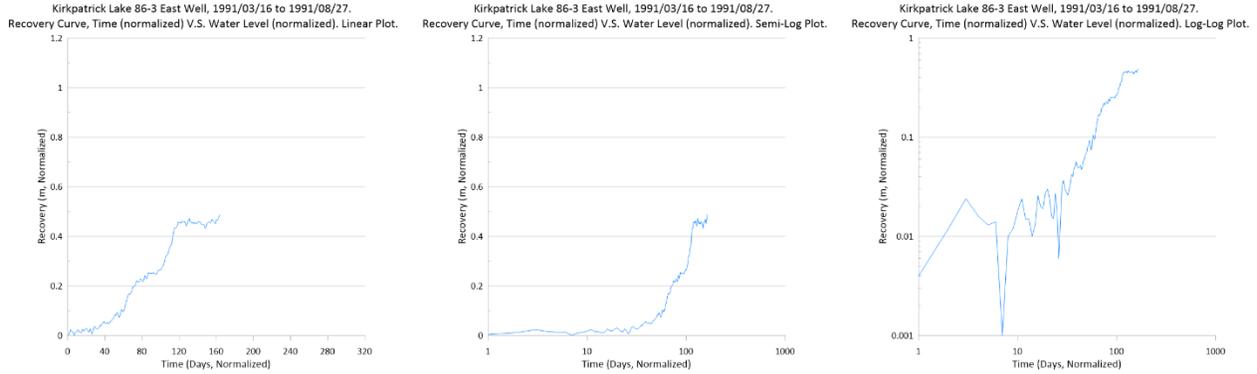


Figure 492: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1991/03/16 to 1991/08/27. Surficial aquifer.

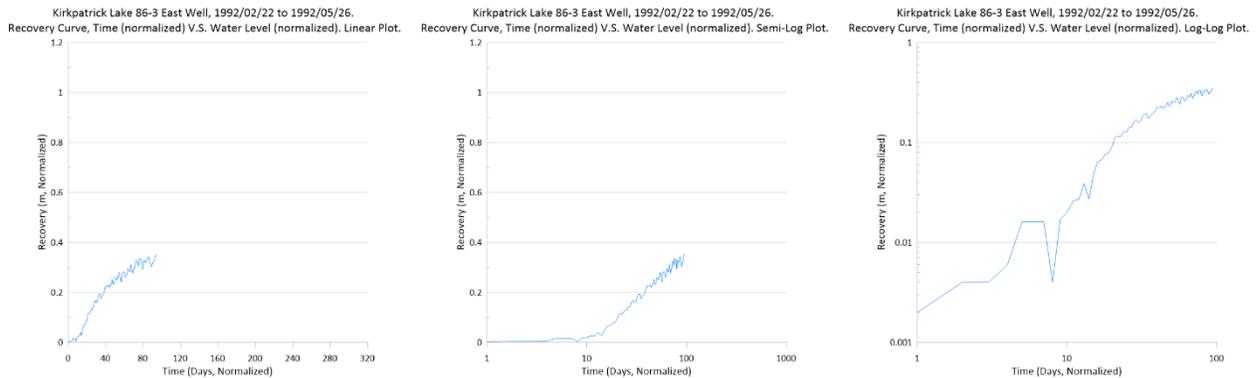


Figure 493: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1992/02/22 to 1992/05/26. Surficial aquifer.

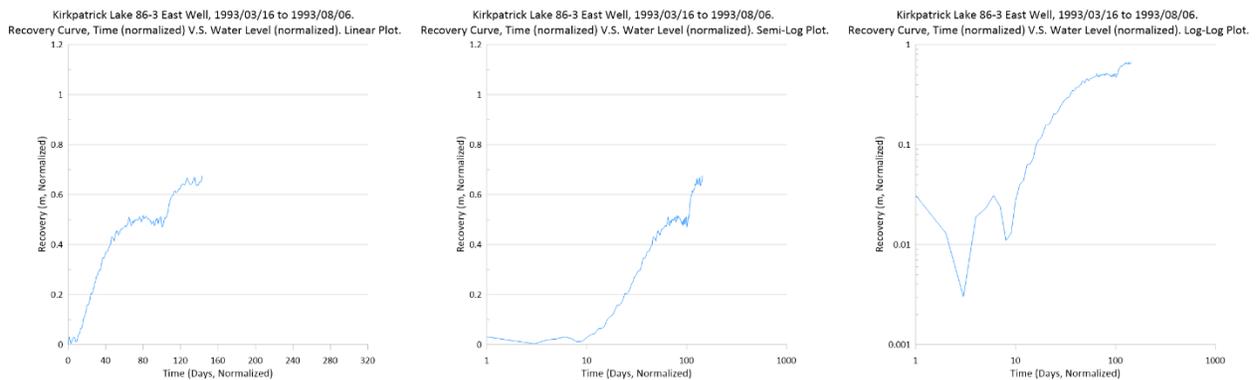


Figure 494: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1993/03/16 to 1993/08/06. Surficial aquifer.

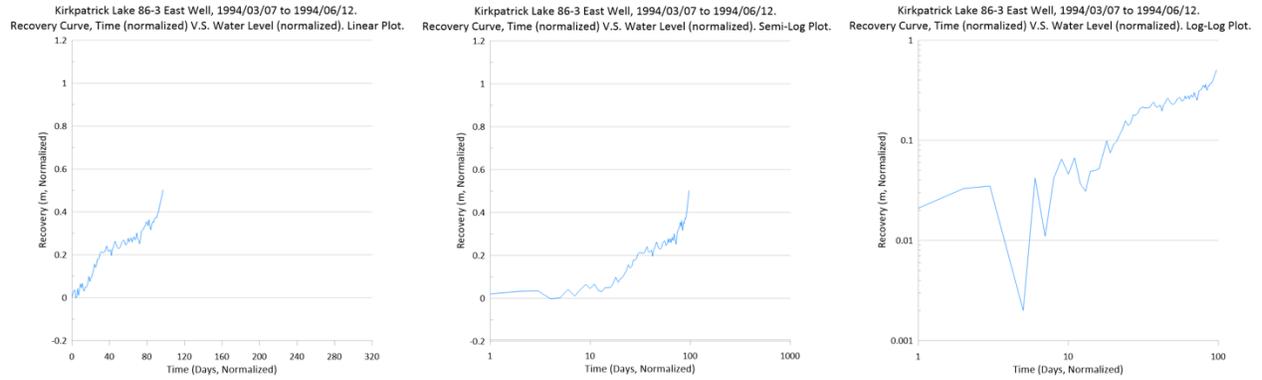


Figure 495: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1994/03/07 to 1994/06/12. Surficial aquifer.

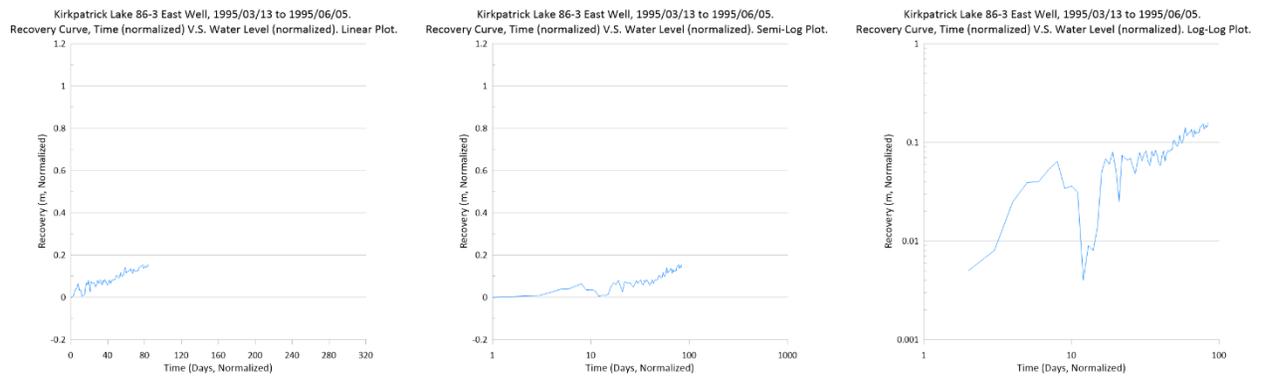


Figure 496: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1995/03/13 to 1995/06/05. Surficial aquifer.

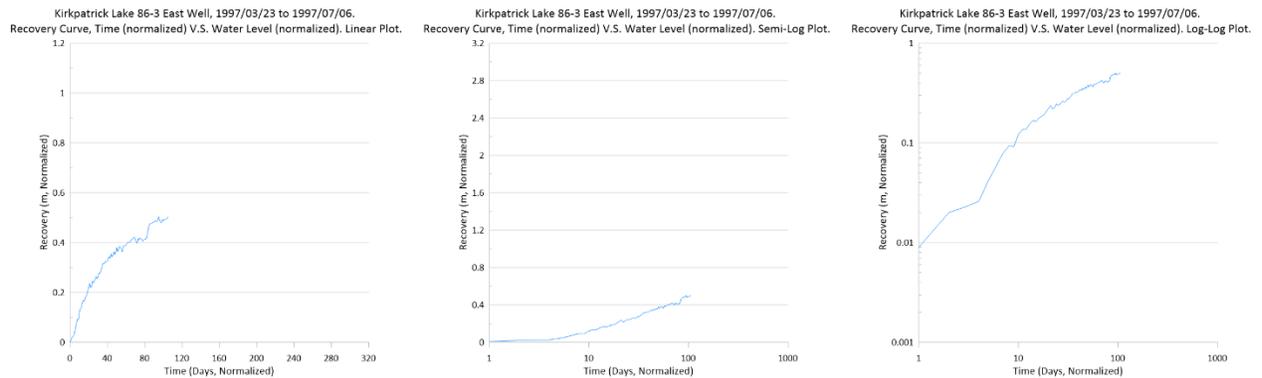


Figure 497: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1997/03/23 to 1997/07/06. Surficial aquifer.

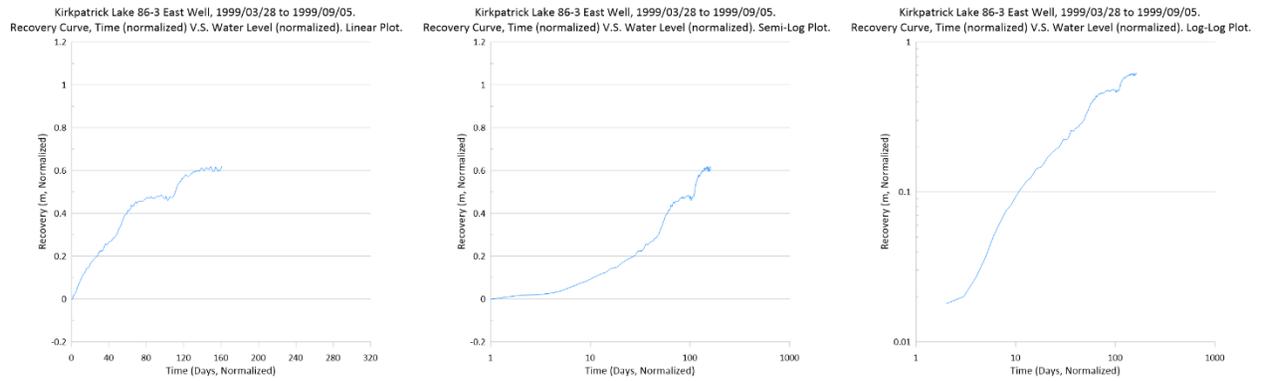


Figure 498: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 1999/03/28 to 1999/09/05. Surficial aquifer.

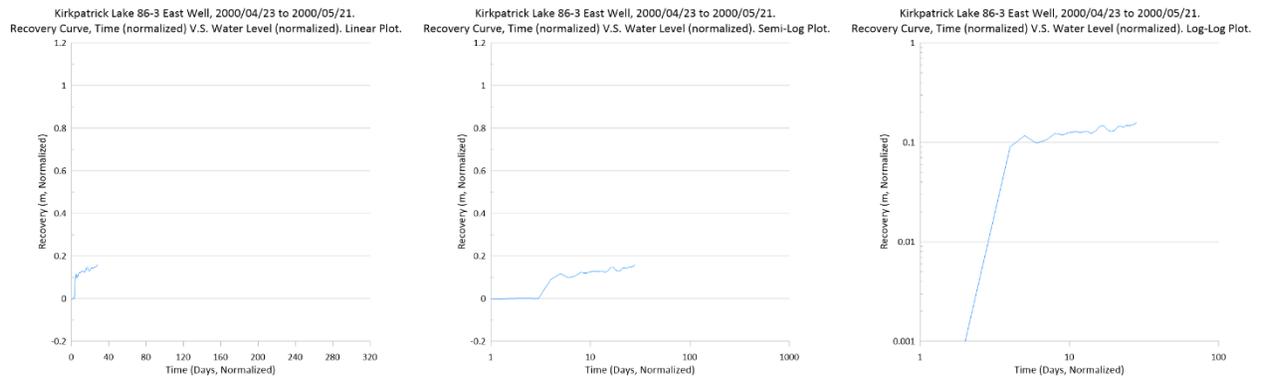


Figure 499: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2000/04/23 to 2000/05/21. Surficial aquifer.

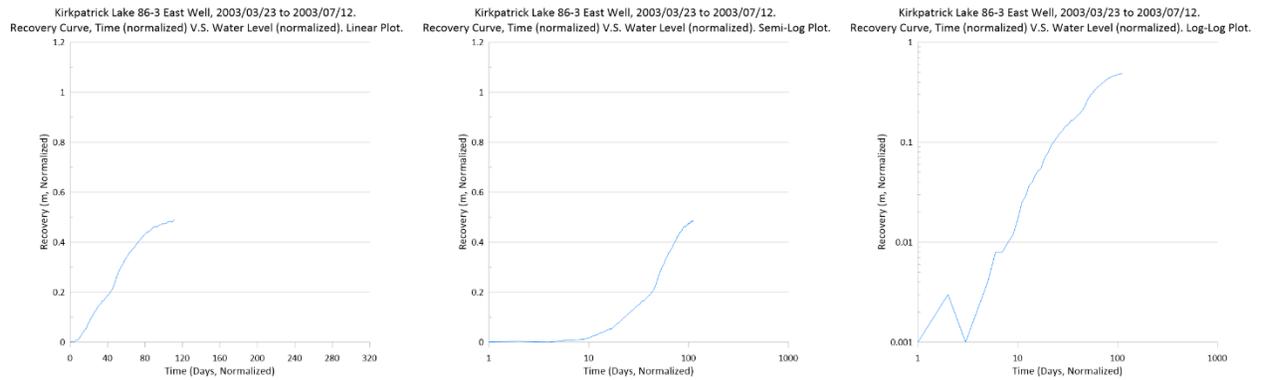


Figure 500: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2003/03/23 to 2003/07/12. Surficial aquifer.

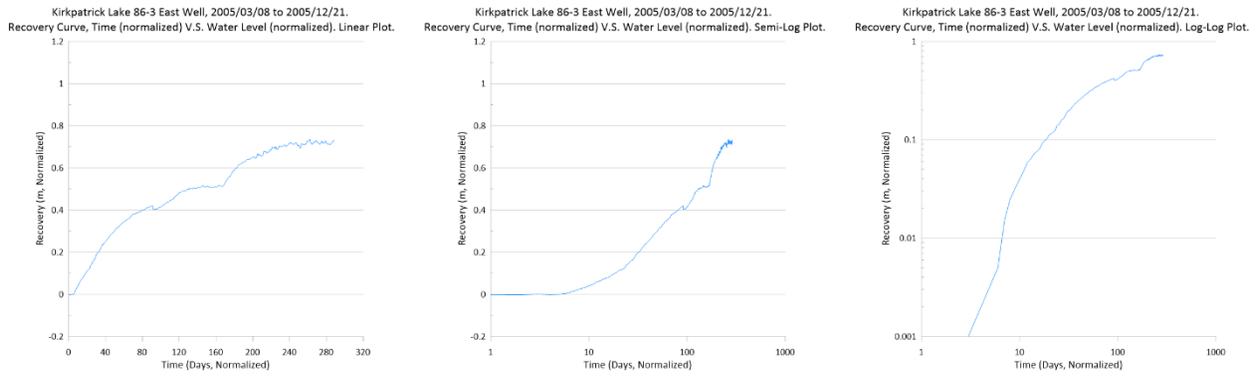


Figure 501: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2005/03/08 to 2005/12/21. Surficial aquifer.

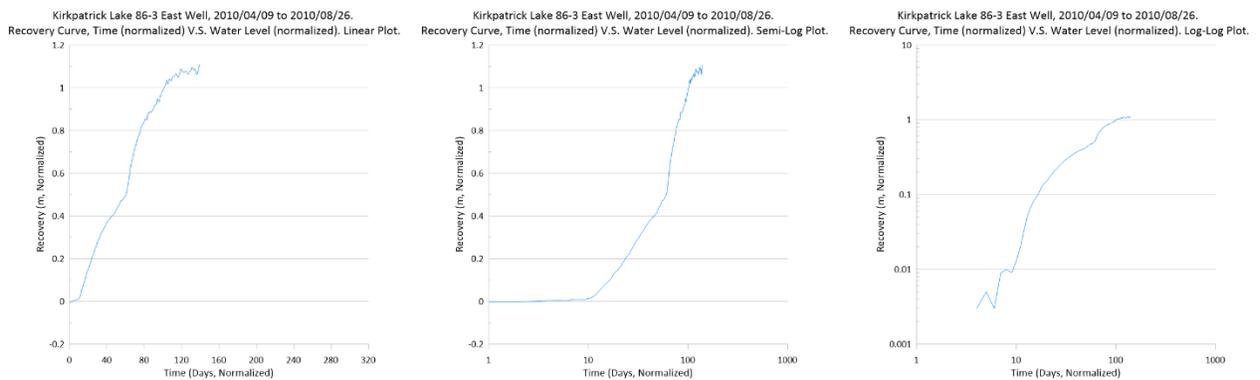


Figure 502: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2010/04/09 to 2010/08/26. Surficial aquifer.

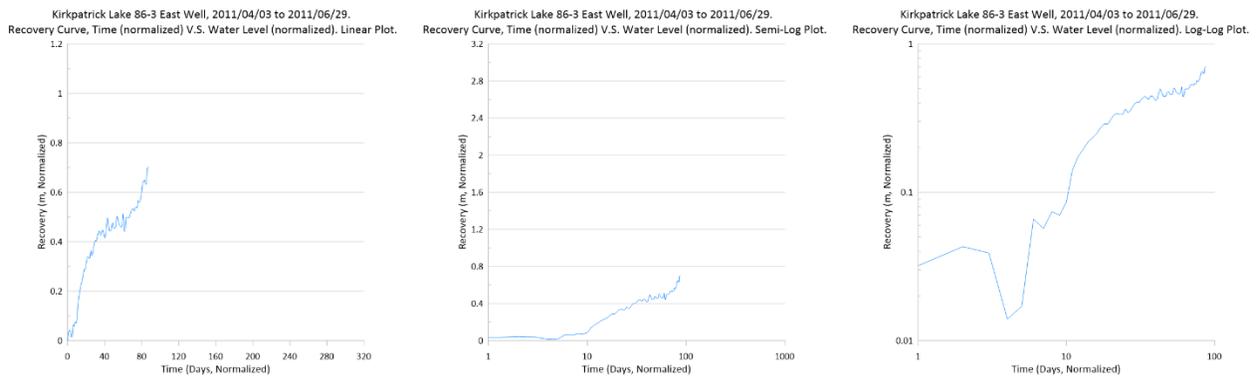


Figure 503: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2011/04/03 to 2011/06/29. Surficial aquifer.

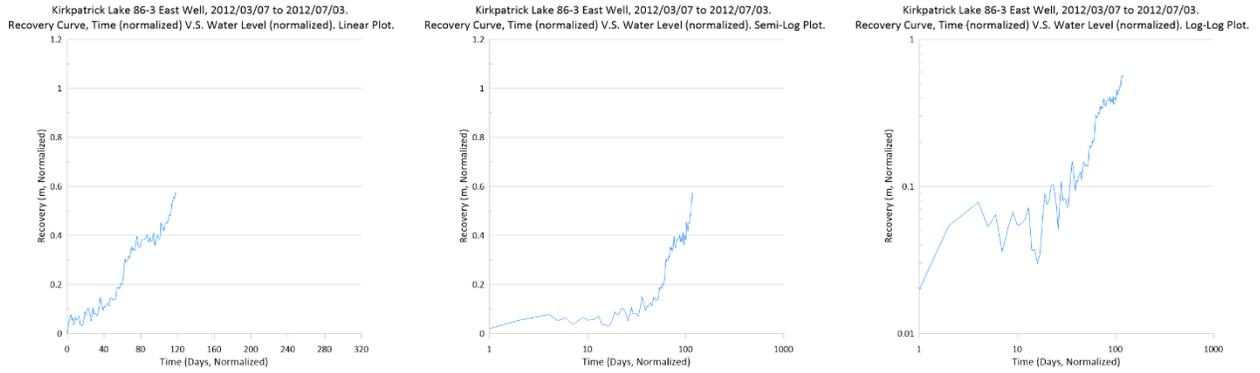


Figure 504: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2012/03/07 to 2012/07/03. Surficial aquifer.

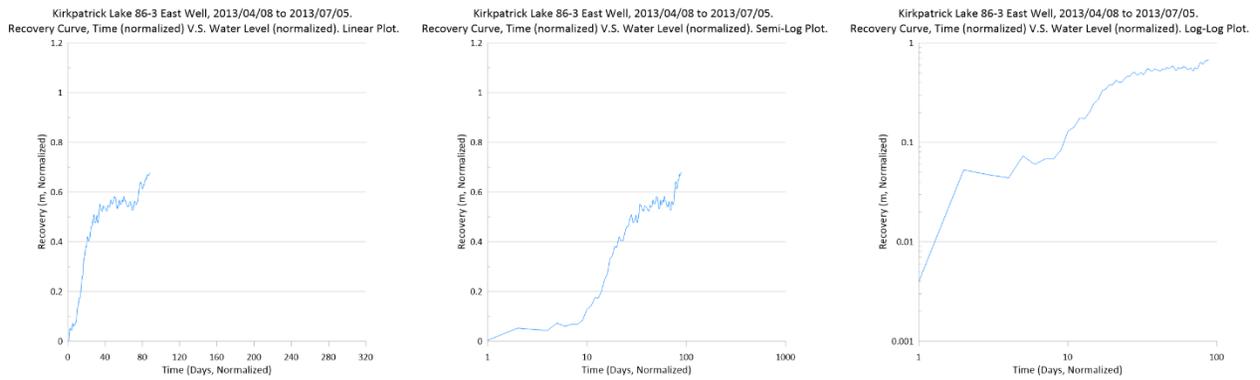


Figure 505: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2013/04/08 to 2013/07/05. Surficial aquifer.

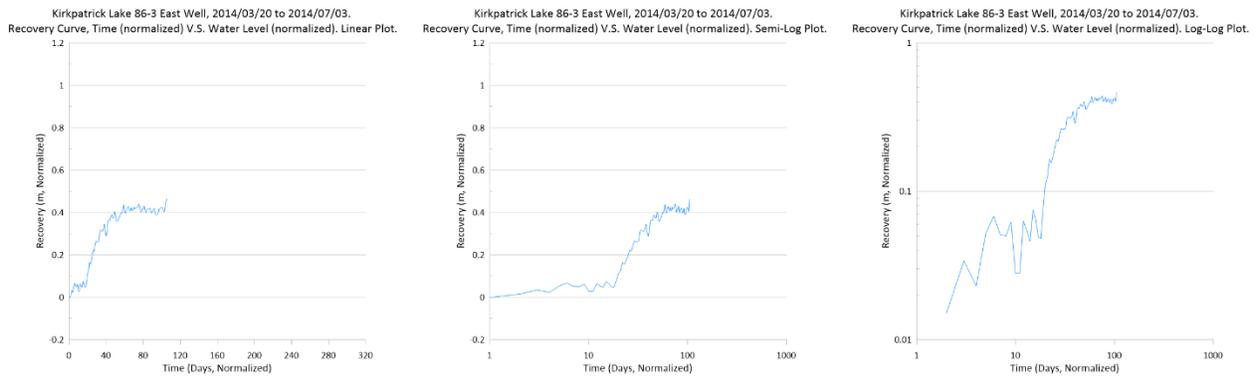


Figure 506: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2014/03/20 to 2014/07/03. Surficial aquifer.

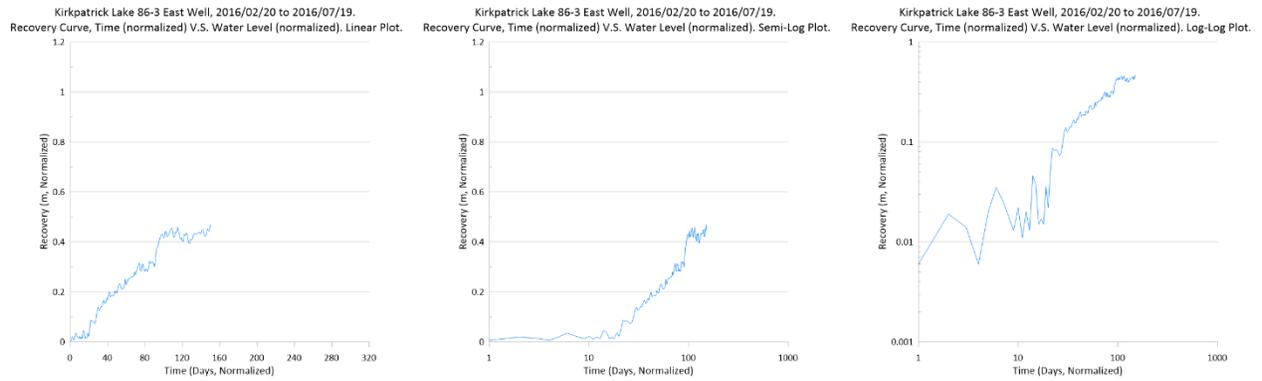


Figure 507: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2016/02/20 to 2016/07/19. Surficial aquifer.

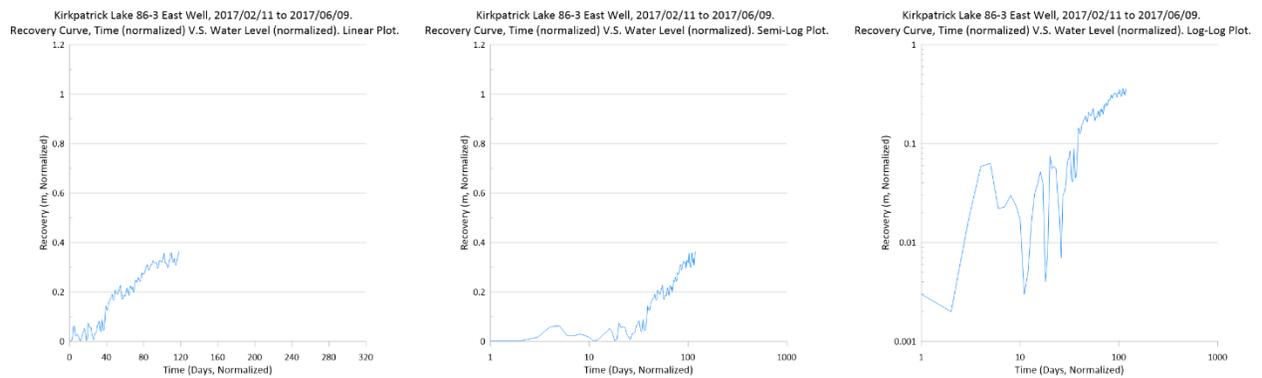


Figure 508: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2017/02/11 to 2017/06/09. Surficial aquifer.

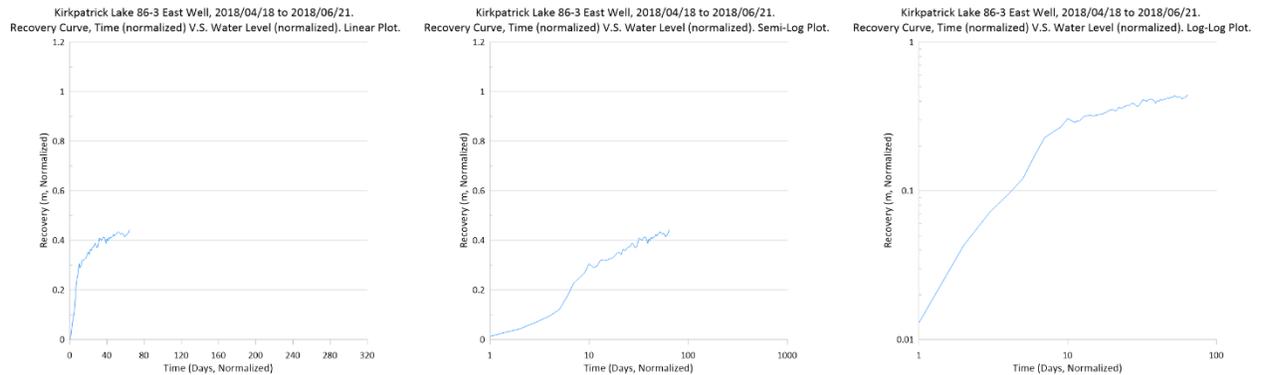


Figure 509: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2018/04/18 to 2018/06/21. Surficial aquifer.

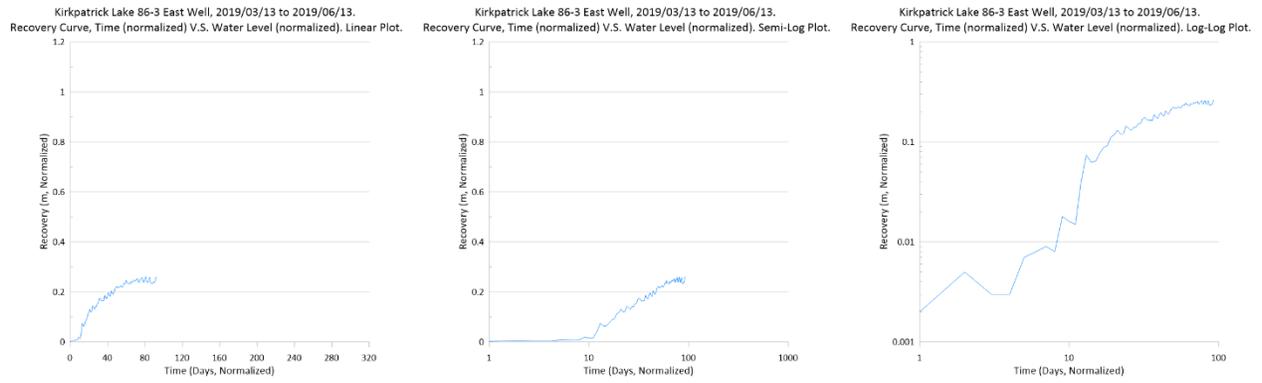


Figure 510: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2019/03/13 to 2019/06/13. Surficial aquifer.

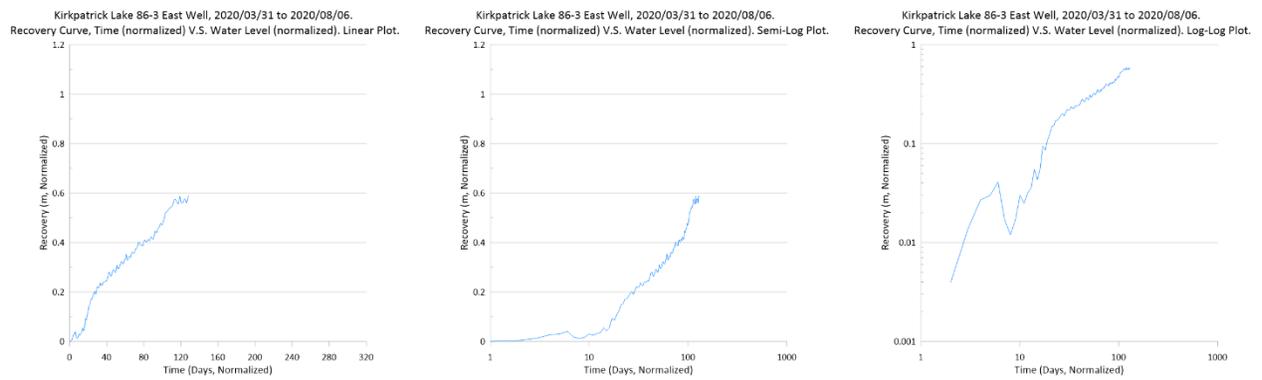


Figure 511: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2020/03/31 to 2020/08/06. Surficial aquifer.

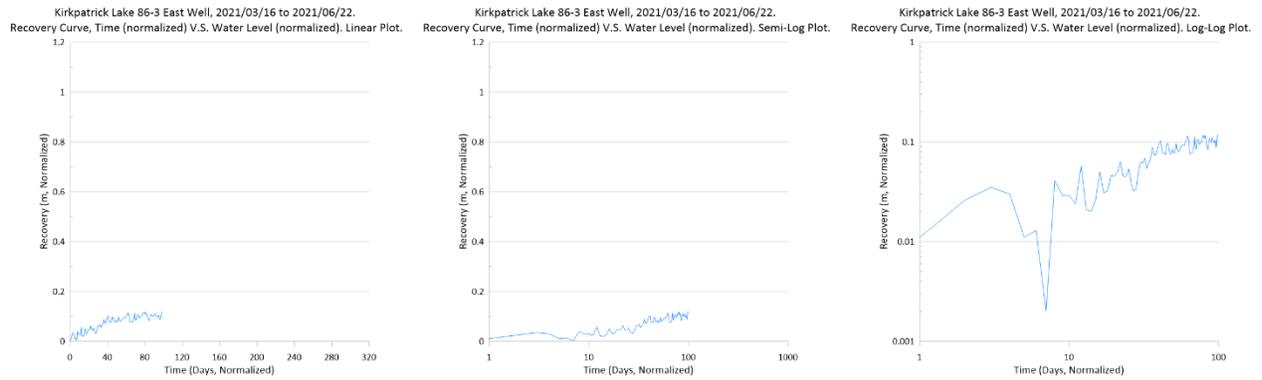


Figure 512: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2021/03/16 to 2021/06/22. Surficial aquifer.

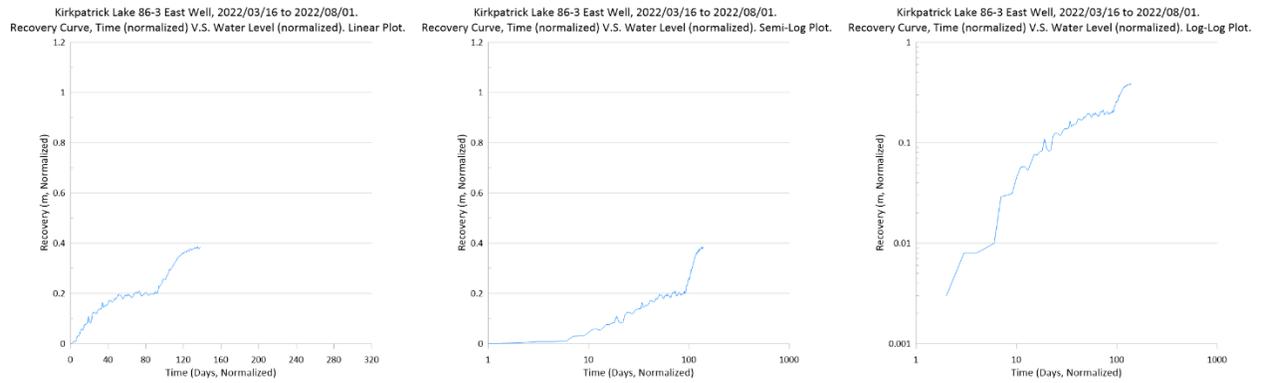


Figure 513: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2022/03/16 to 2022/08/01. Surficial aquifer.

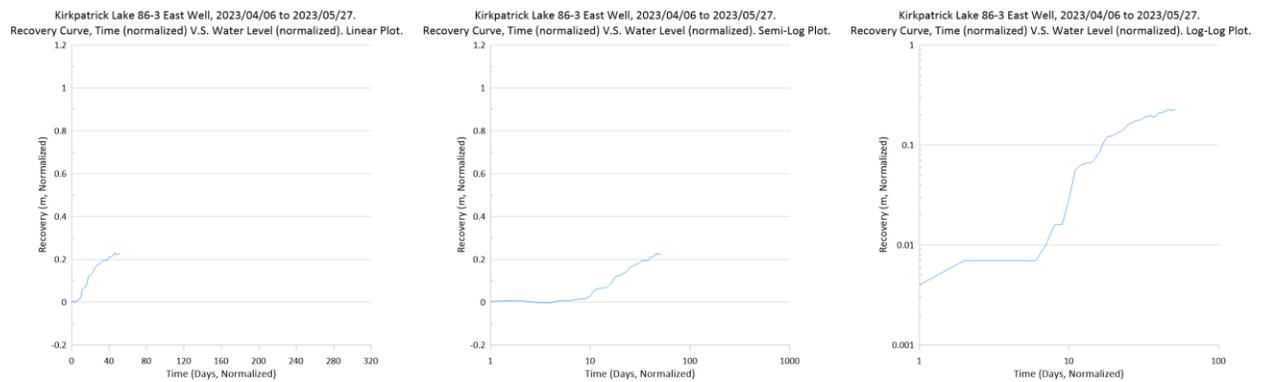


Figure 514: Recovery curve plots for Kirkpatrick Lake 86-3 East_0230 well, 2023/04/06 to 2023/05/27. Surficial aquifer.

Appendix I6: GOWN Monitoring Well Recovery Curve Plots for Many Springs_0364 Well

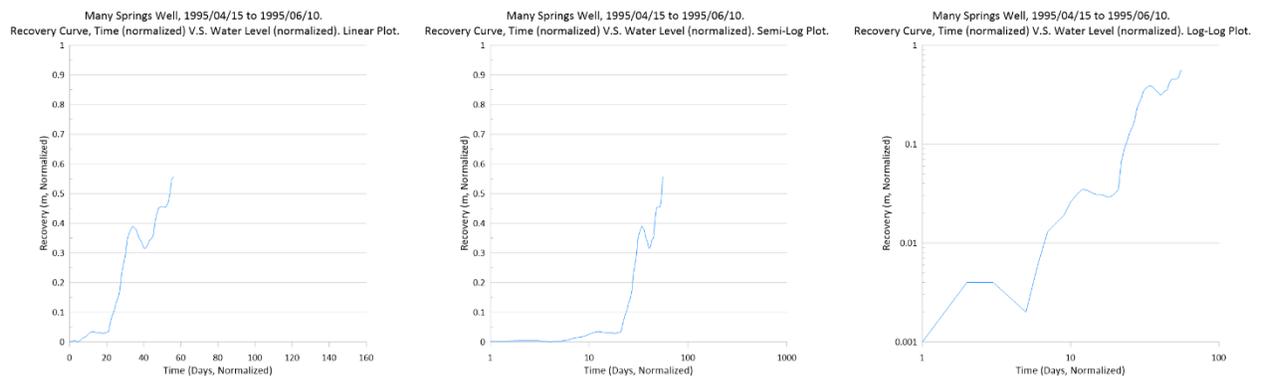


Figure 515: Recovery curve plots for Many Springs_0364 well, 1995/04/15 to 1995/06/10. Surficial aquifer.

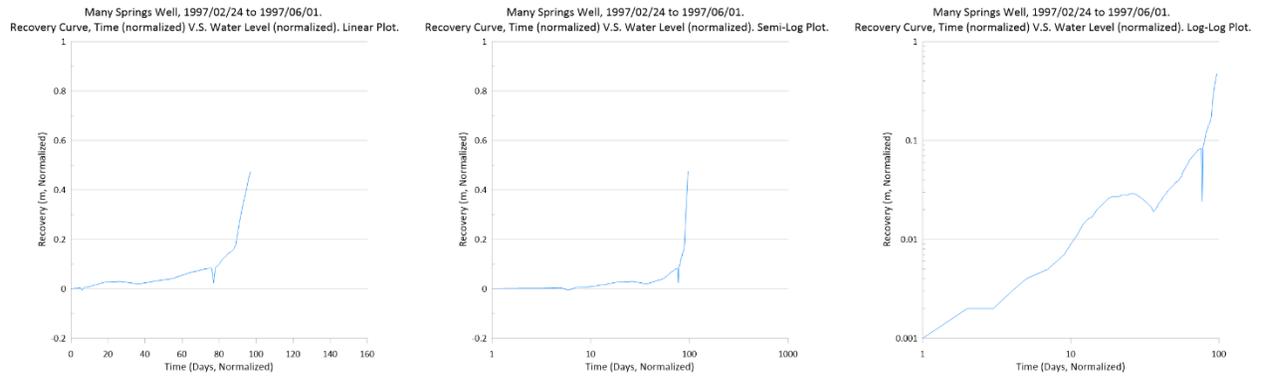


Figure 516: Recovery curve plots for Many Springs_0364 well, 1997/02/24 to 1997/06/01. Surficial aquifer.

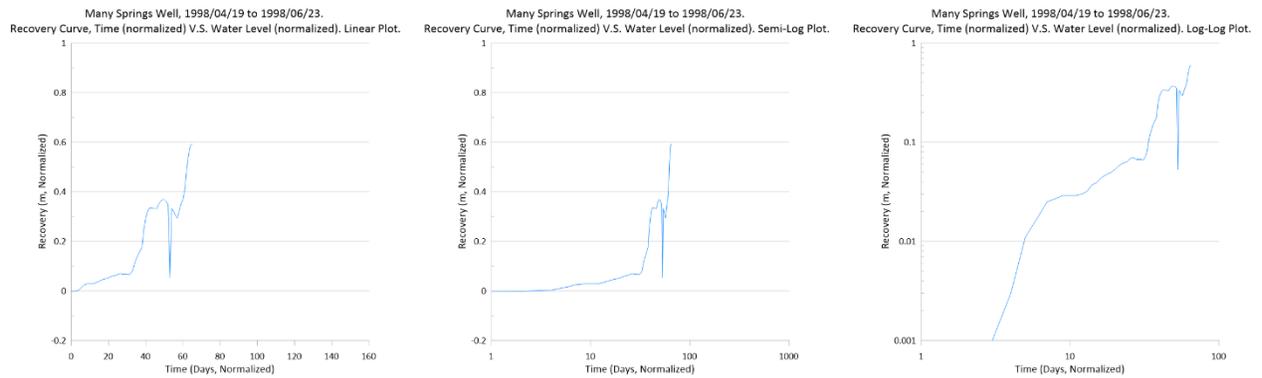


Figure 517: Recovery curve plots for Many Springs_0364 well, 1998/04/19 to 1998/06/23. Surficial aquifer.

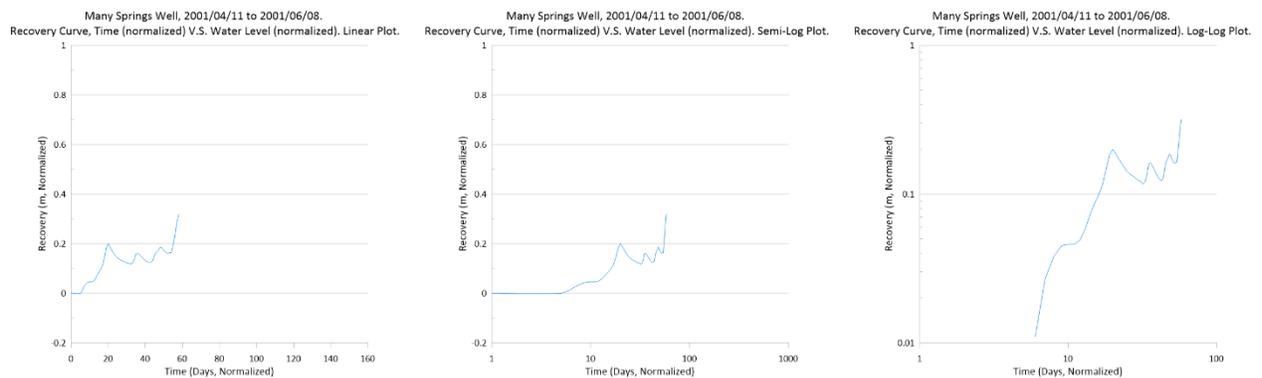


Figure 518: Recovery curve plots for Many Springs_0364 well, 2001/04/11 to 2001/06/08. Surficial aquifer.

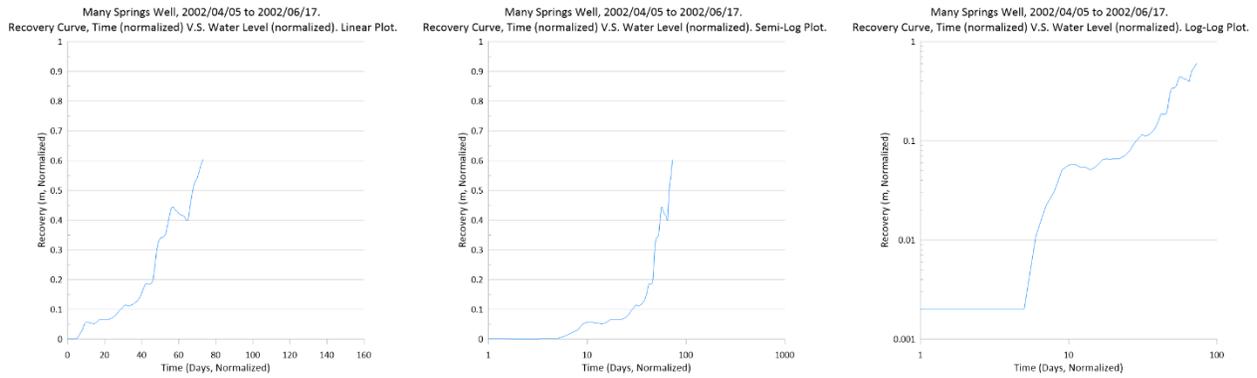


Figure 519: Recovery curve plots for Many Springs_0364 well, 2002/04/05 to 2002/06/17. Surficial aquifer.

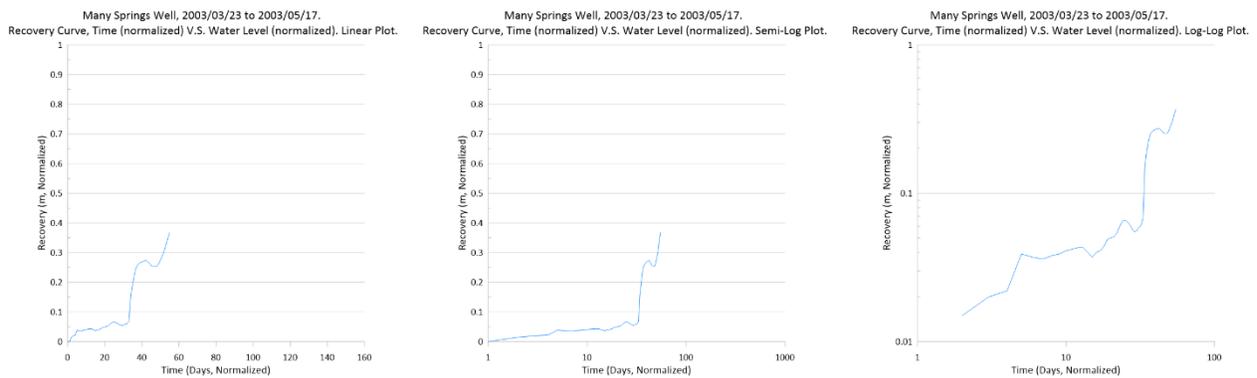


Figure 520: Recovery curve plots for Many Springs_0364 well, 2003/03/23 to 2003/05/17. Surficial aquifer.

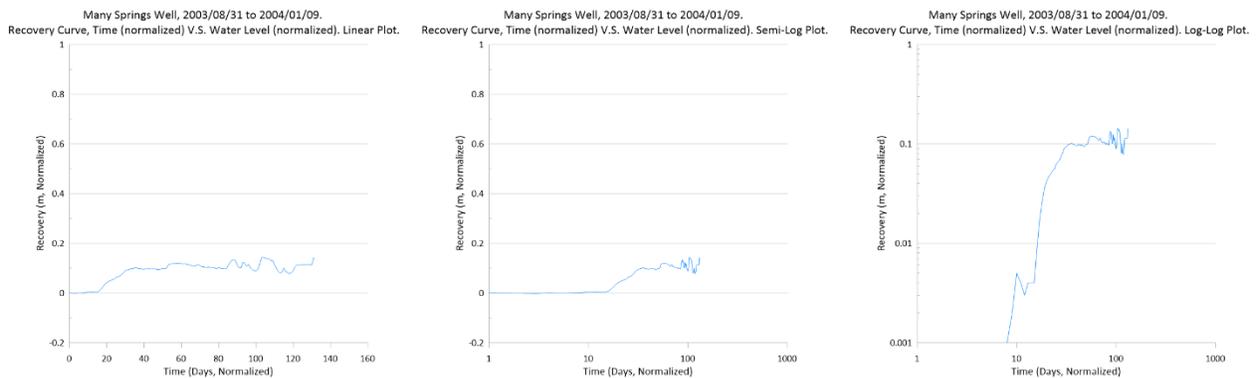


Figure 521: Recovery curve plots for Many Springs_0364 well, 2003/08/31 to 2004/01/09. Surficial aquifer.

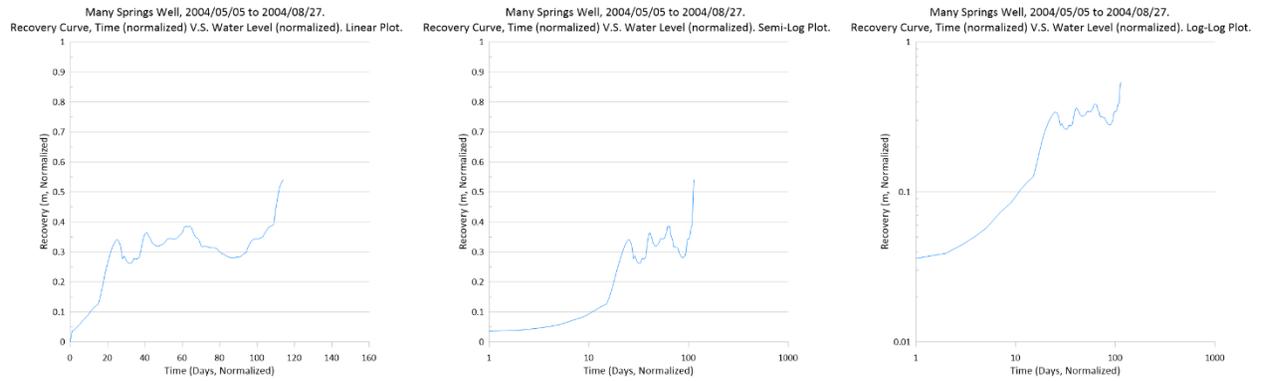


Figure 522: Recovery curve plots for Many Springs_0364 well, 2004/05/05 to 2004/08/27. Surficial aquifer.

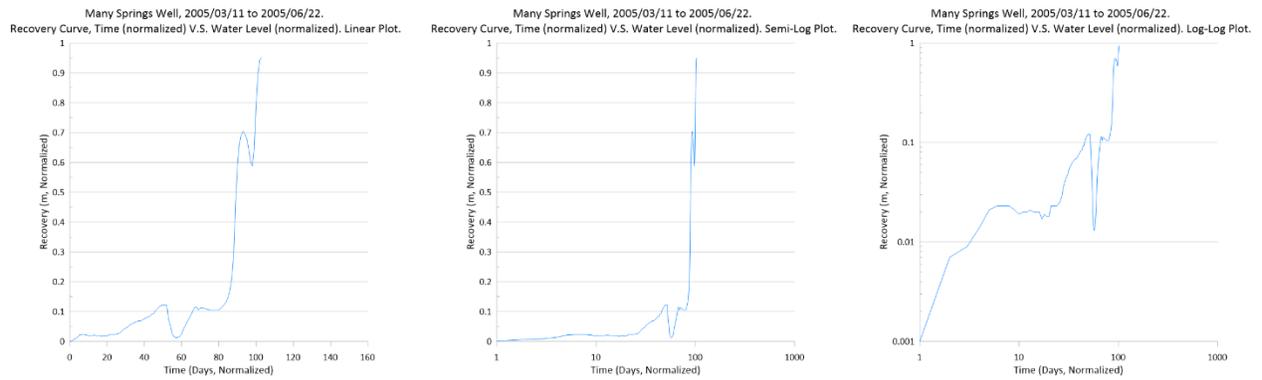


Figure 523: Recovery curve plots for Many Springs_0364 well, 2005/03/11 to 2005/06/22. Surficial aquifer.

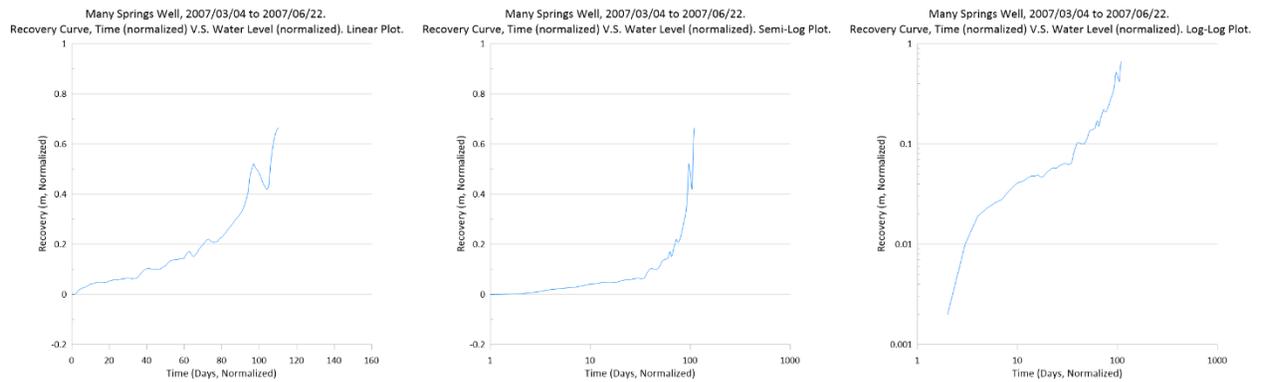


Figure 524: Recovery curve plots for Many Springs_0364 well, 2007/03/04 to 2007/06/22. Surficial aquifer.

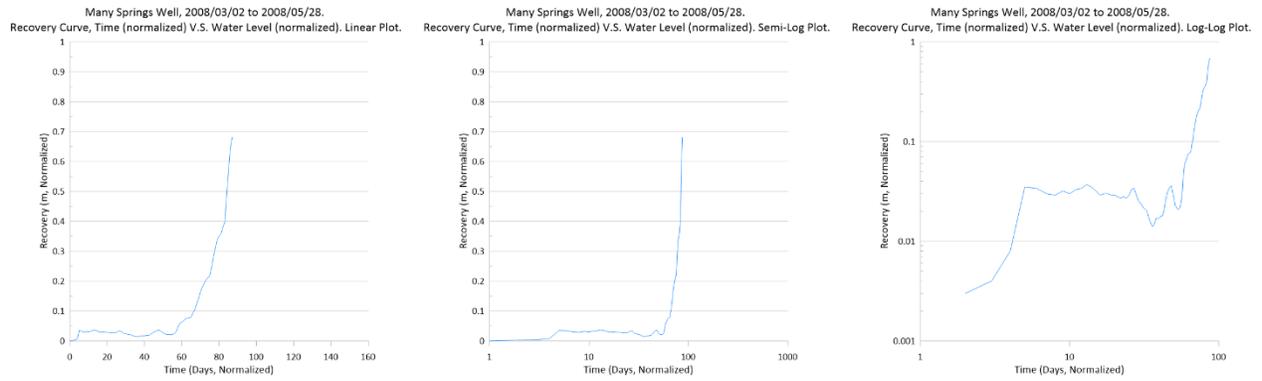


Figure 525: Recovery curve plots for Many Springs_0364 well, 2008/03/02 to 2008/05/28. Surficial aquifer.

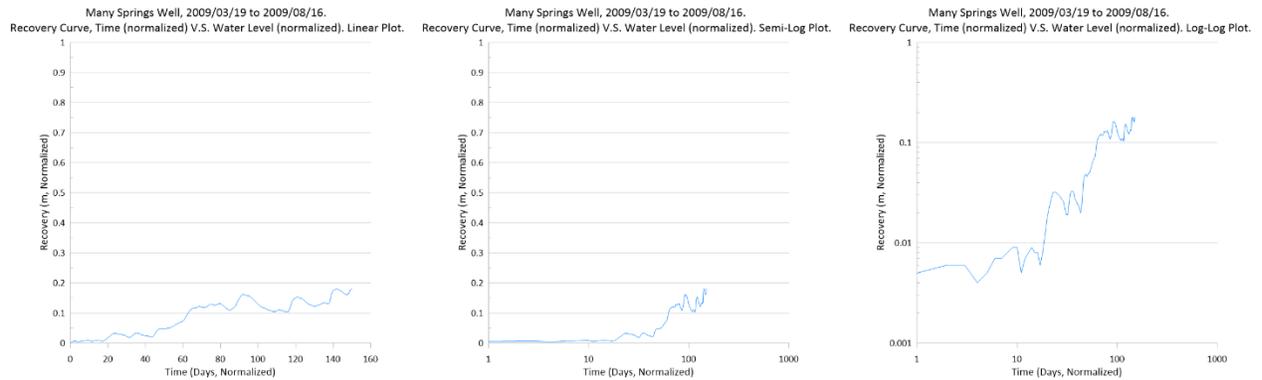


Figure 526: Recovery curve plots for Many Springs_0364 well, 2009/03/19 to 2009/08/16. Surficial aquifer.

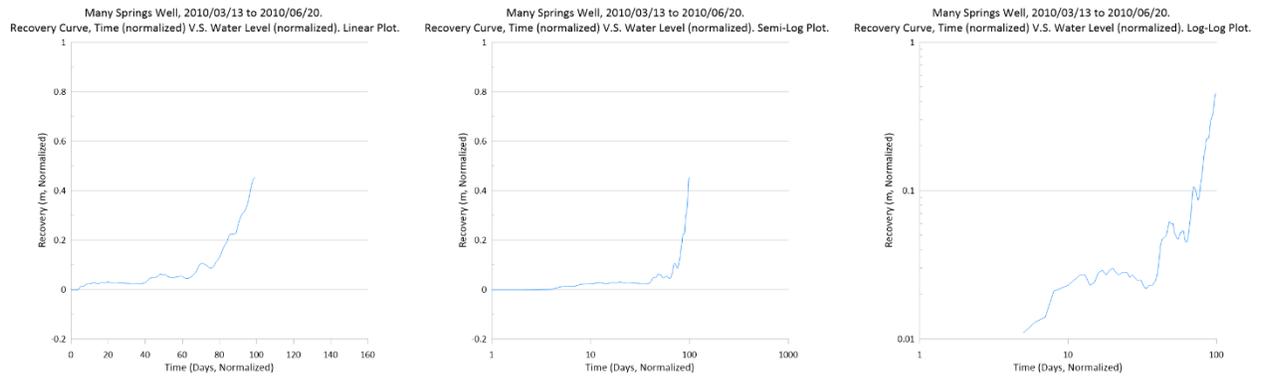


Figure 527: Recovery curve plots for Many Springs_0364 well, 2010/03/13 to 2010/06/20. Surficial aquifer.

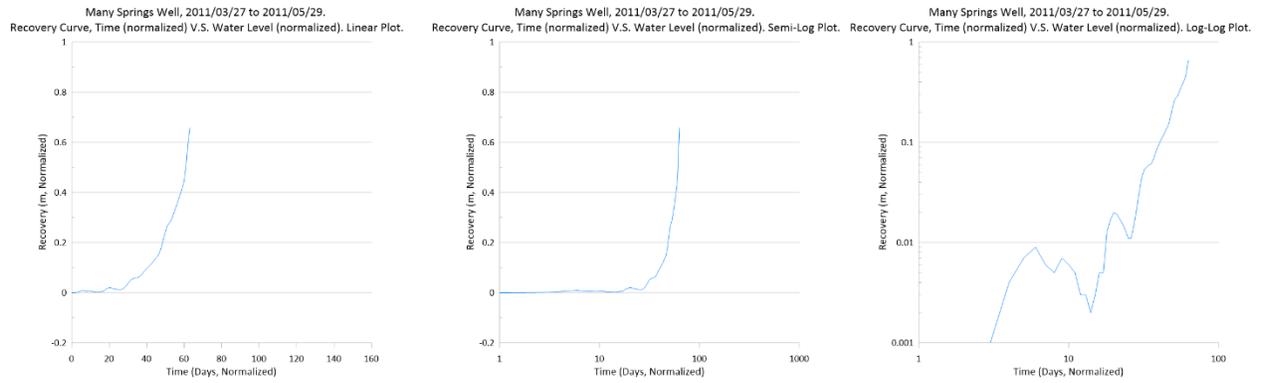


Figure 528: Recovery curve plots for Many Springs_0364 well, 2011/03/27 to 2011/05/29. Surficial aquifer.

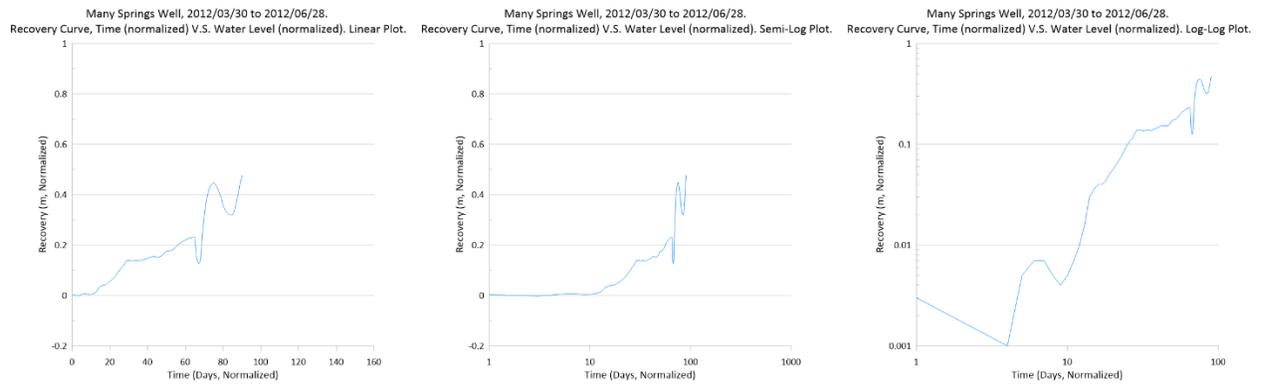


Figure 529: Recovery curve plots for Many Springs_0364 well, 2012/03/30 to 2012/06/28. Surficial aquifer.

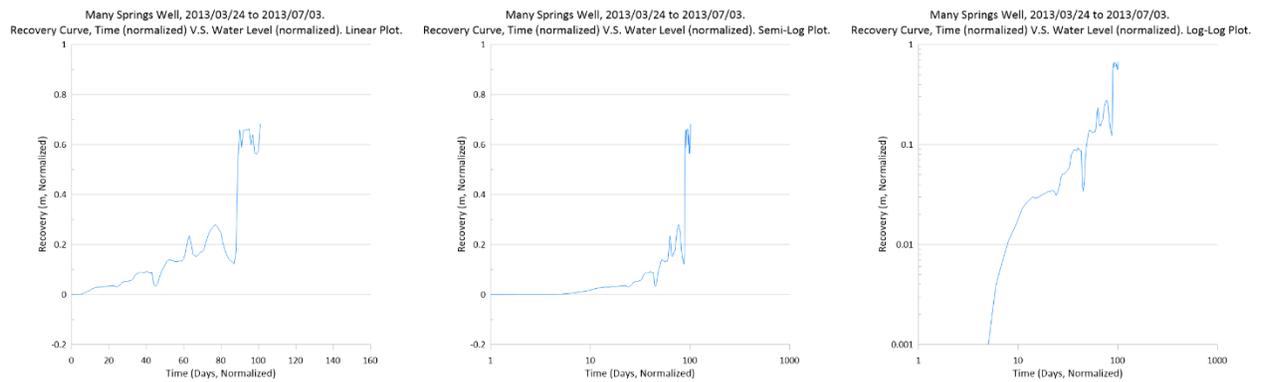


Figure 530: Recovery curve plots for Many Springs_0364 well, 2013/03/24 to 2013/07/03. Surficial aquifer.

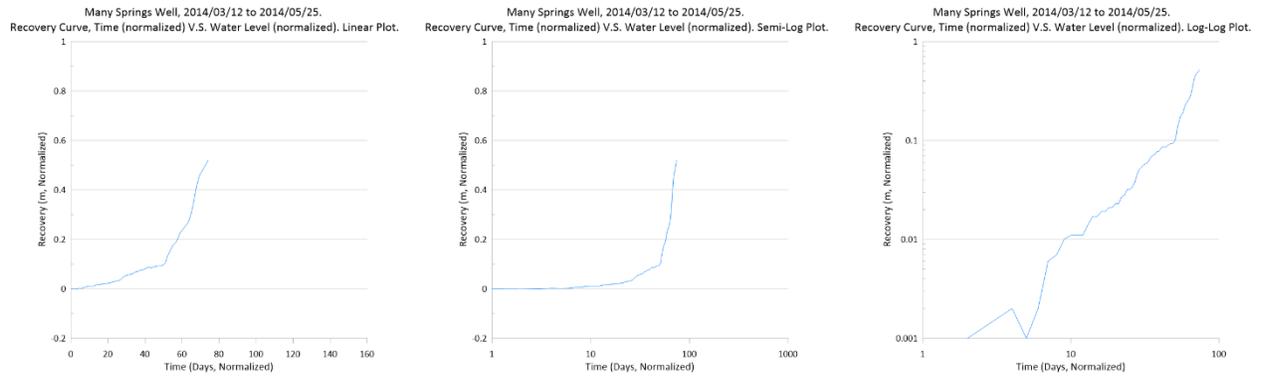


Figure 531: Recovery curve plots for Many Springs_0364 well, 2014/03/12 to 2014/05/25. Surficial aquifer.

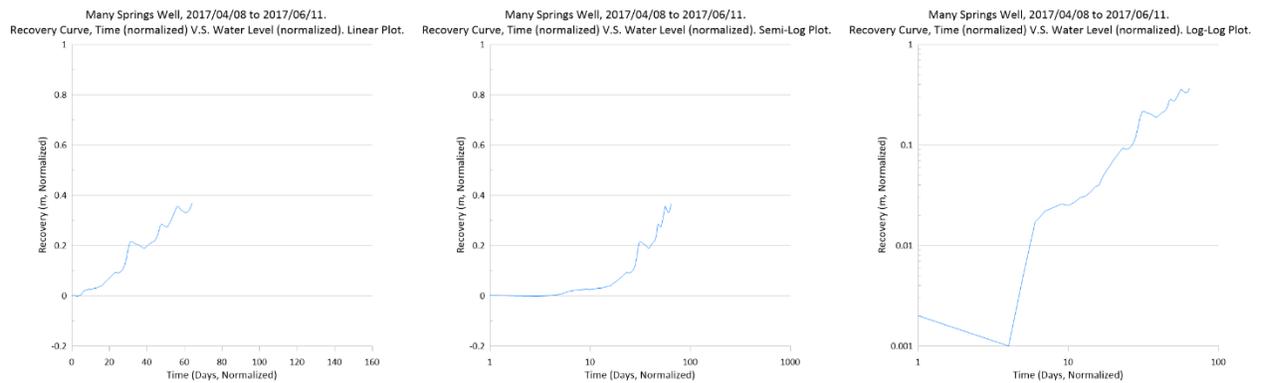


Figure 532: Recovery curve plots for Many Springs_0364 well, 2017/04/08 to 2017/06/11. Surficial aquifer.

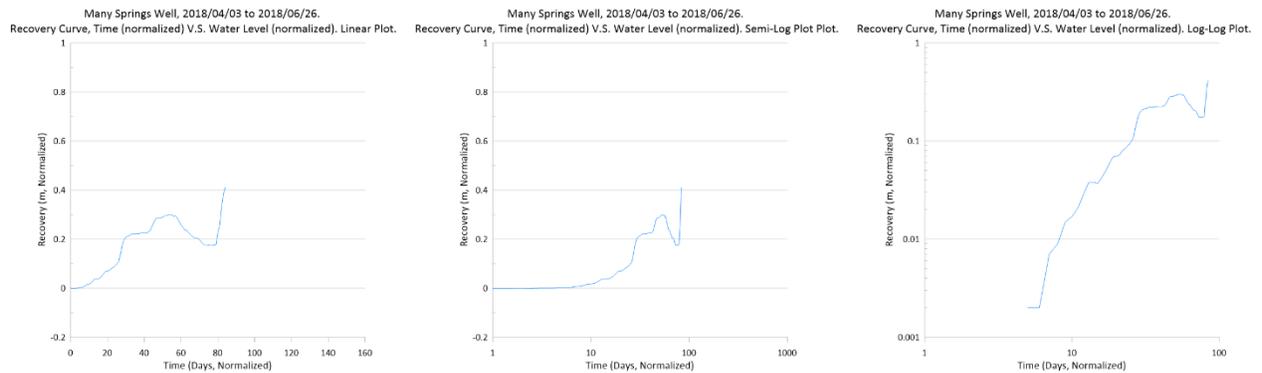


Figure 533: Recovery curve plots for Many Springs_0364 well, 2018/04/03 to 2018/06/26. Surficial aquifer.

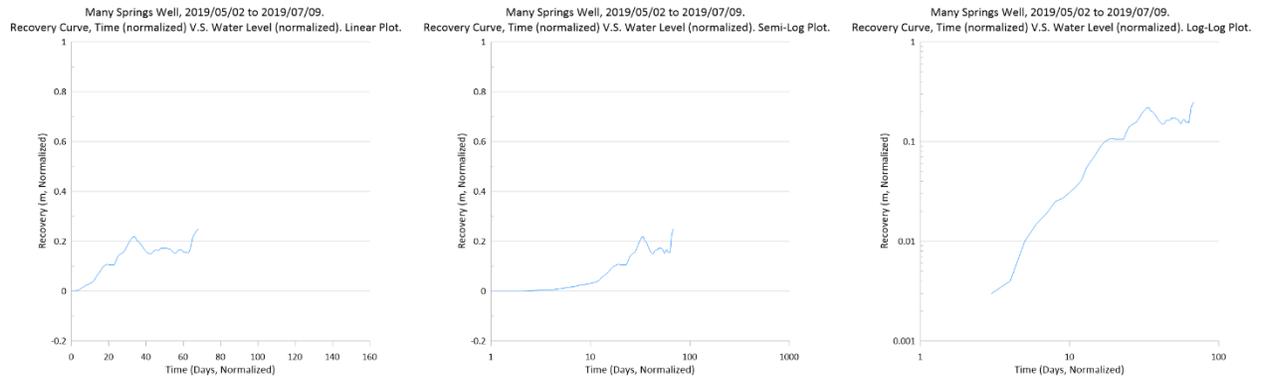


Figure 534: Recovery curve plots for Many Springs_0364 well, 2019/05/02 to 2019/07/09. Surficial aquifer.

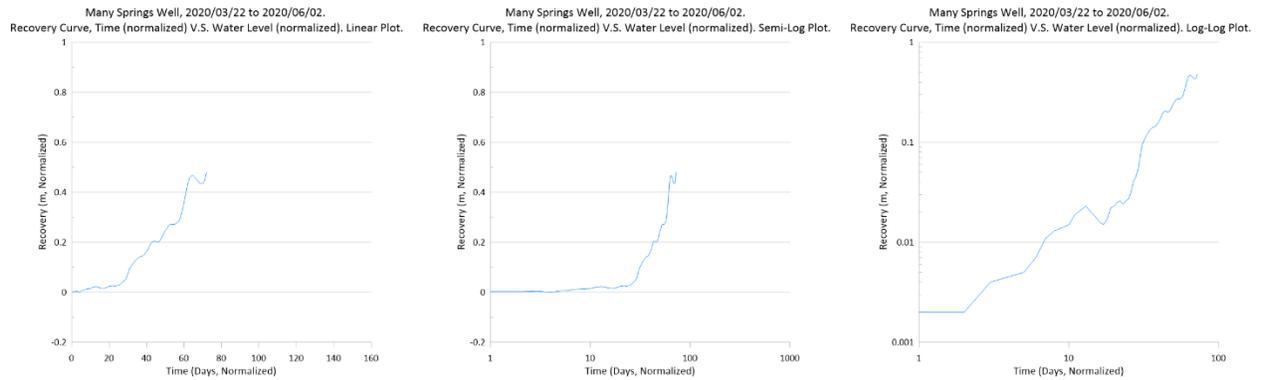


Figure 535: Recovery curve plots for Many Springs_0364 well, 2020/03/22 to 2020/06/02. Surficial aquifer.

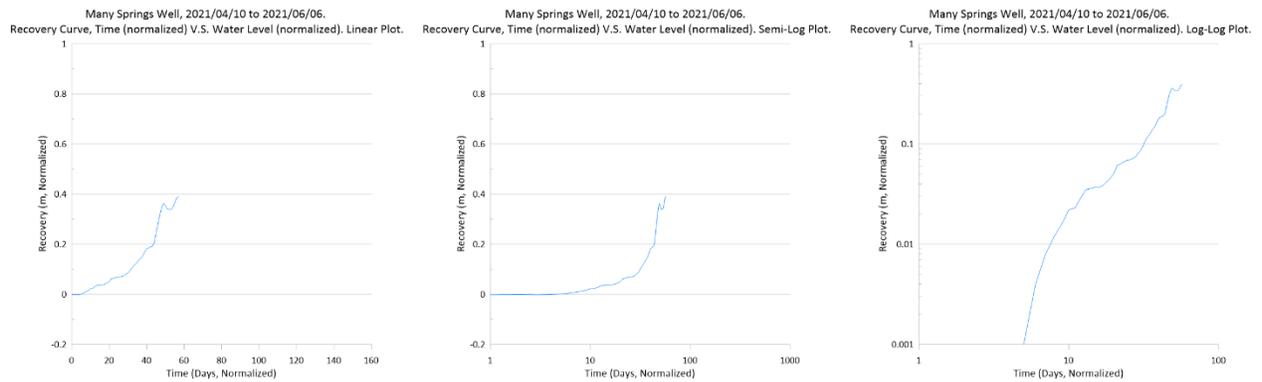


Figure 536: Recovery curve plots for Many Springs_0364 well, 2021/04/10 to 2021/06/06. Surficial aquifer.

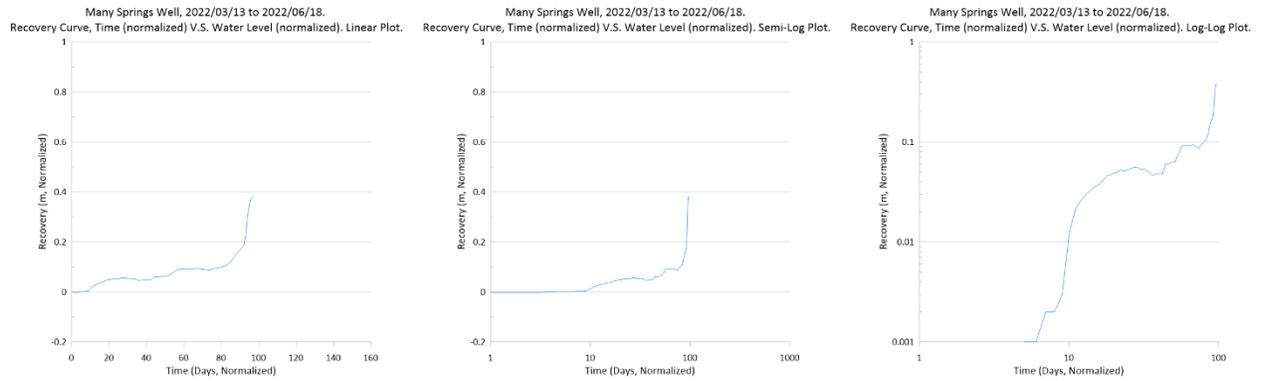


Figure 537: Recovery curve plots for Many Springs_0364 well, 2022/03/13 to 2022/06/18. Surficial aquifer.

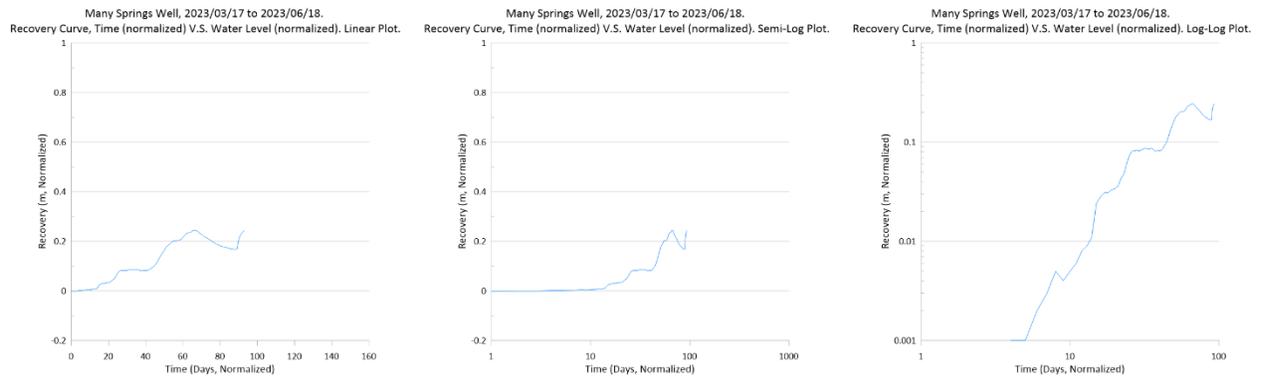


Figure 538: Recovery curve plots for Many Springs_0364 well, 2023/03/17 to 2023/06/18. Surficial aquifer.

Appendix I7: GOWN Monitoring Well Recovery Curve Plots for Medicine Hat North_3050 Well

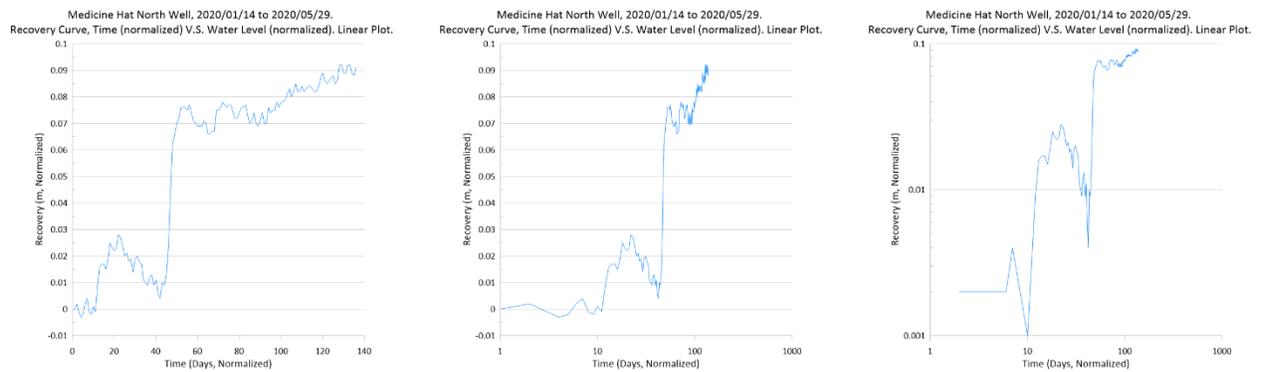


Figure 539: Recovery curve plots for Medicine Hat North_3050 well, 2020/01/14 to 2020/05/29. Surficial aquifer.

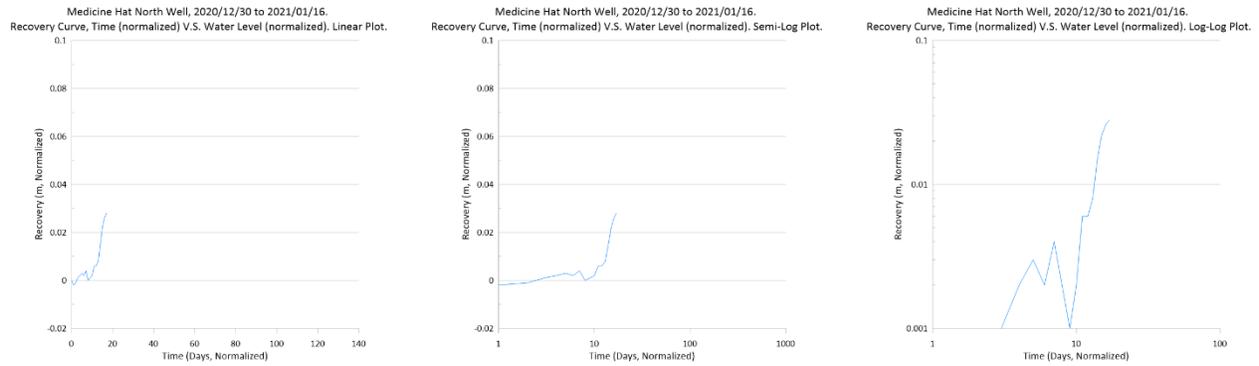


Figure 540: Recovery curve plots for Medicine Hat North_3050 well, 2020/12/30 to 2021/01/16. Surficial aquifer.

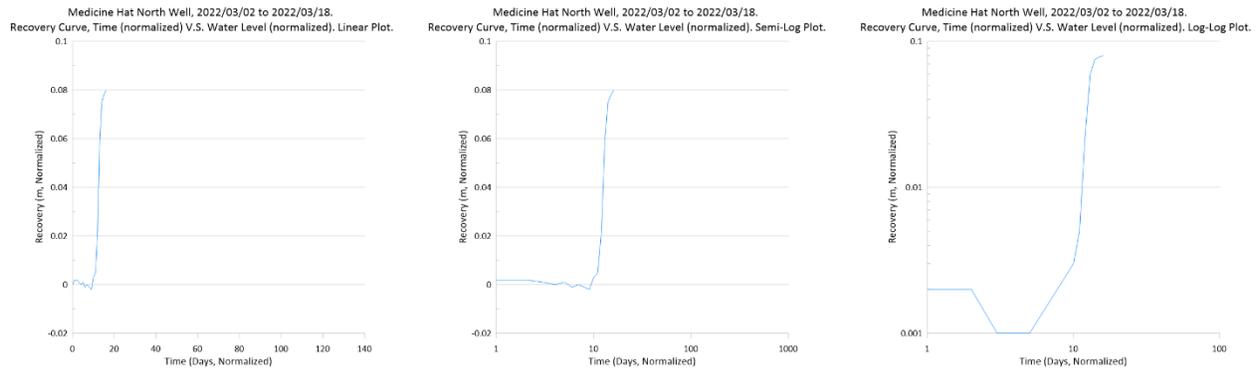


Figure 541: Recovery curve plots for Medicine Hat North_3050 well, 2022/03/02 to 2022/03/18. Surficial aquifer.

Appendix I8: GOWN Monitoring Well Recovery Curve Plots for Rockyford_3026 Well

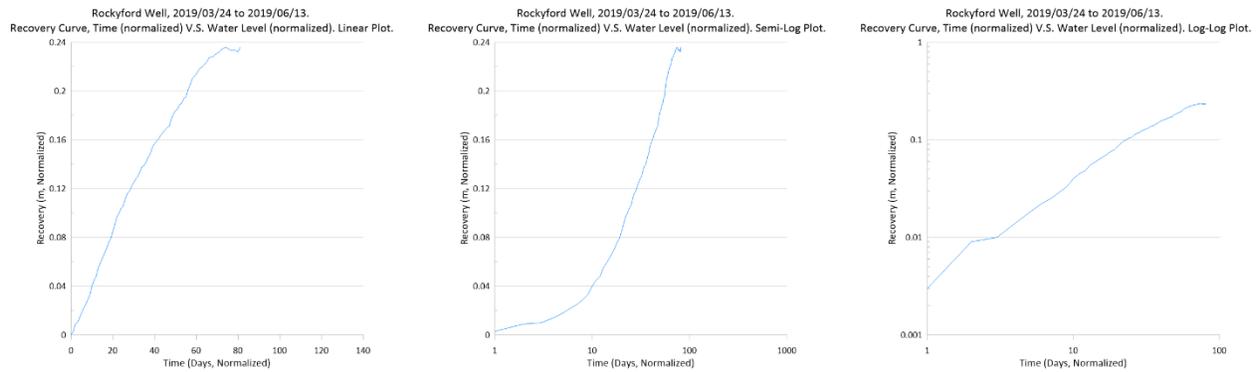


Figure 542: Recovery curve plots for Rockyford_3026 well, 2019/03/24 to 2019/06/13. Surficial aquifer.

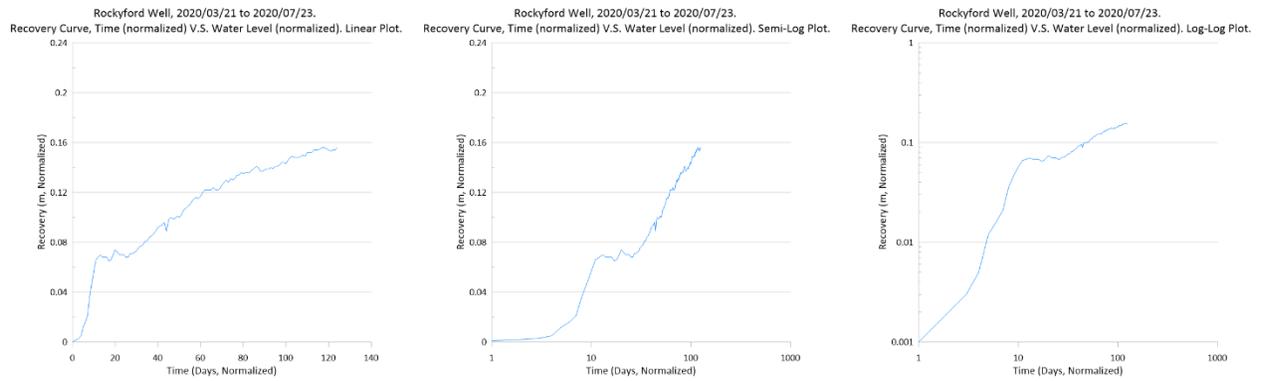


Figure 543: Recovery curve plots for Rockyford_3026 well, 2020/03/21 to 2020/07/23. Surficial aquifer.

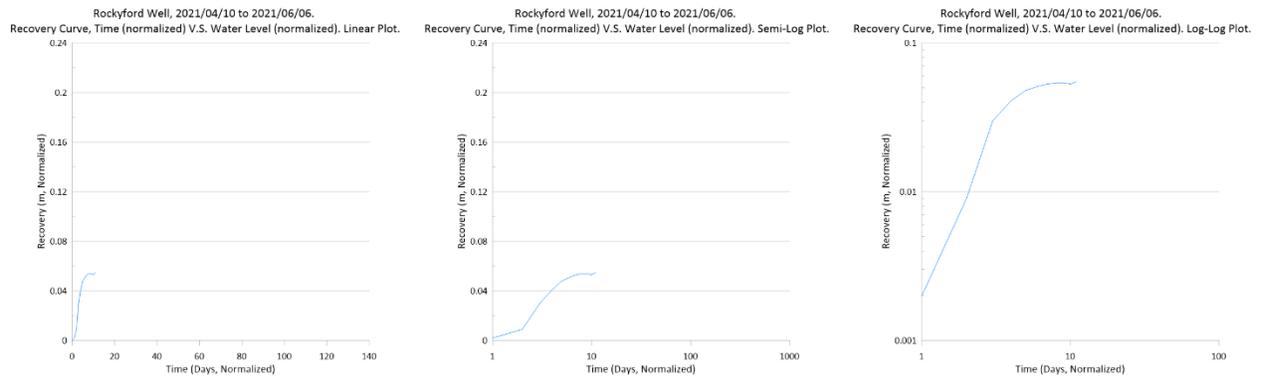


Figure 544: Recovery curve plots for Rockyford_3026 well, 2021/04/10 to 2021/06/06. Surficial aquifer.

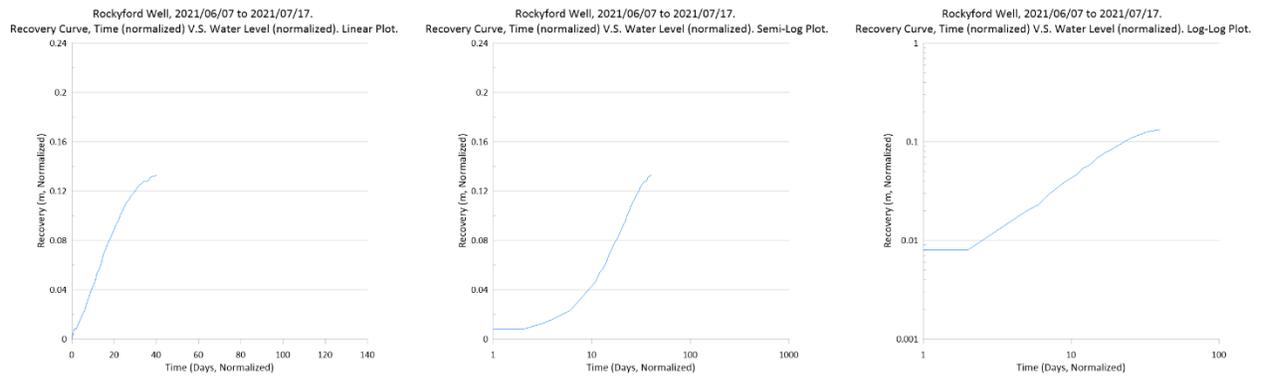


Figure 545: Recovery curve plots for Rockyford_3026 well, 2021/06/07 to 2021/07/17. Surficial aquifer.

Appendix I9: GOWN Monitoring Well Recovery Curve Plots for Waterton Dam #5_0105 Well

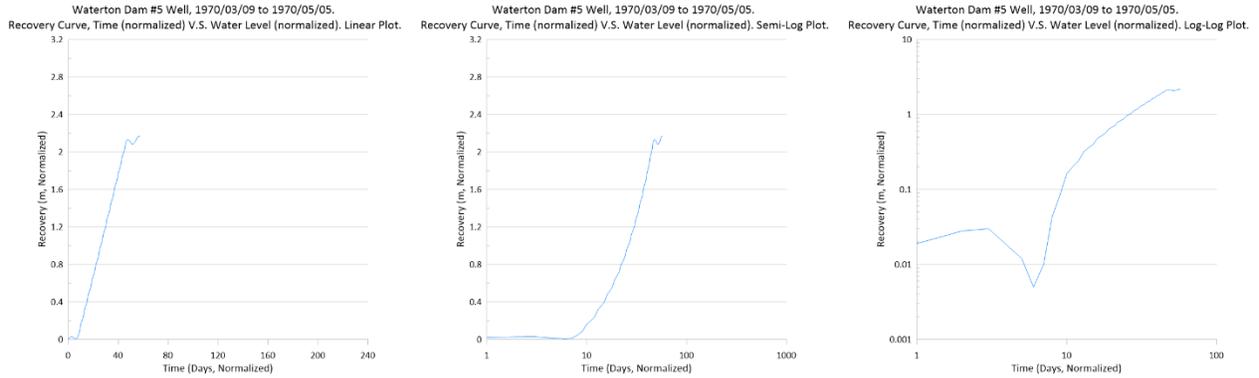


Figure 546: Recovery curve plots for Waterton Dam #5_0105 well, 1970/03/09 to 1970/05/05. Surficial aquifer.

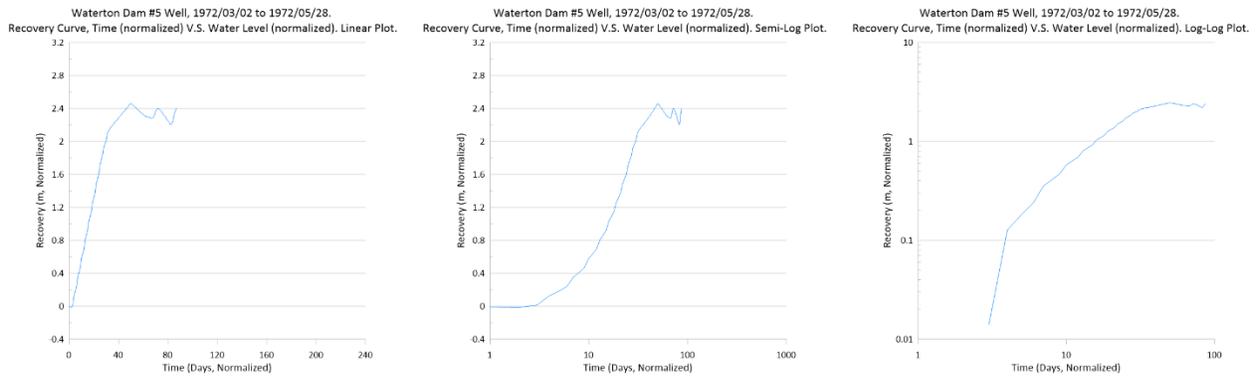


Figure 547: Recovery curve plots for Waterton Dam #5_0105 well, 1972/03/02 to 1972/05/28. Surficial aquifer.

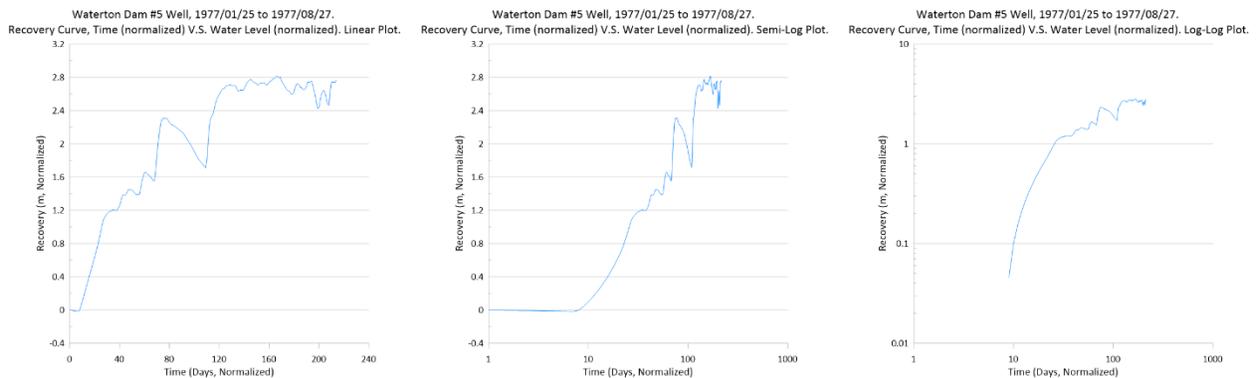


Figure 548: Recovery curve plots for Waterton Dam #5_0105 well, 1977/01/25 to 1977/08/27. Surficial aquifer.

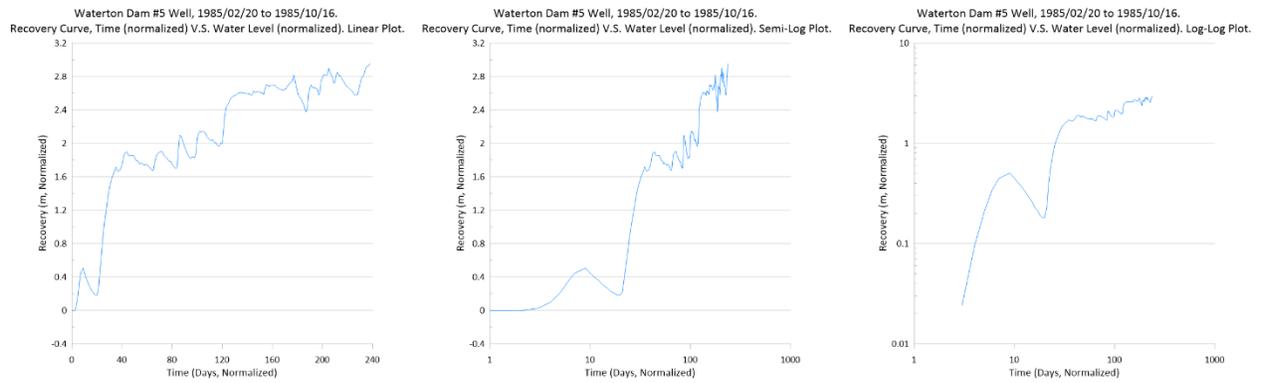


Figure 549: Recovery curve plots for Waterton Dam #5_0105 well, 1985/02/20 to 1985/10/16. Surficial aquifer.

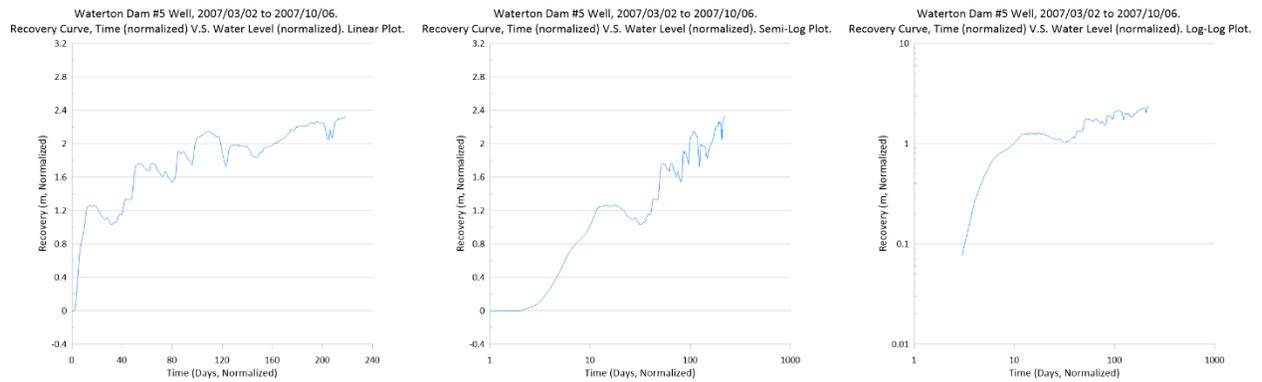


Figure 550: Recovery curve plots for Waterton Dam #5_0105 well, 2007/03/02 to 2007/10/06. Surficial aquifer.

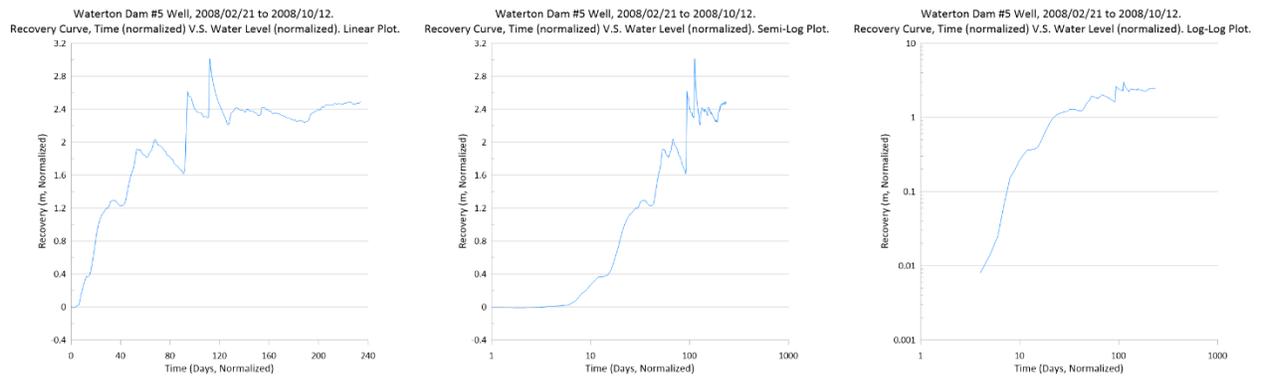


Figure 551: Recovery curve plots for Waterton Dam #5_0105 well, 2008/02/21 to 2008/10/12. Surficial aquifer.

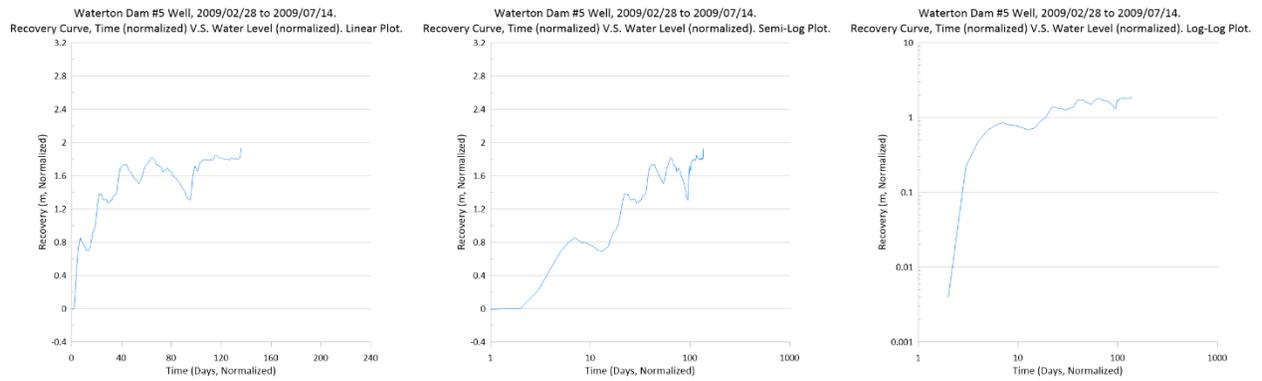


Figure 552: Recovery curve plots for Waterton Dam #5_0105 well, 2009/02/28 to 2009/07/14. Surficial aquifer.

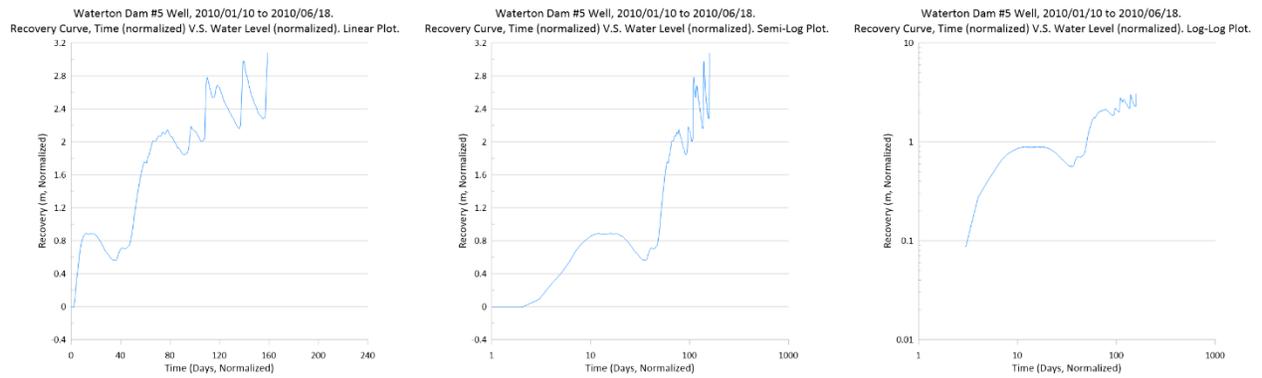


Figure 553: Recovery curve plots for Waterton Dam #5_0105 well, 2010/01/10 to 2010/06/18. Surficial aquifer.

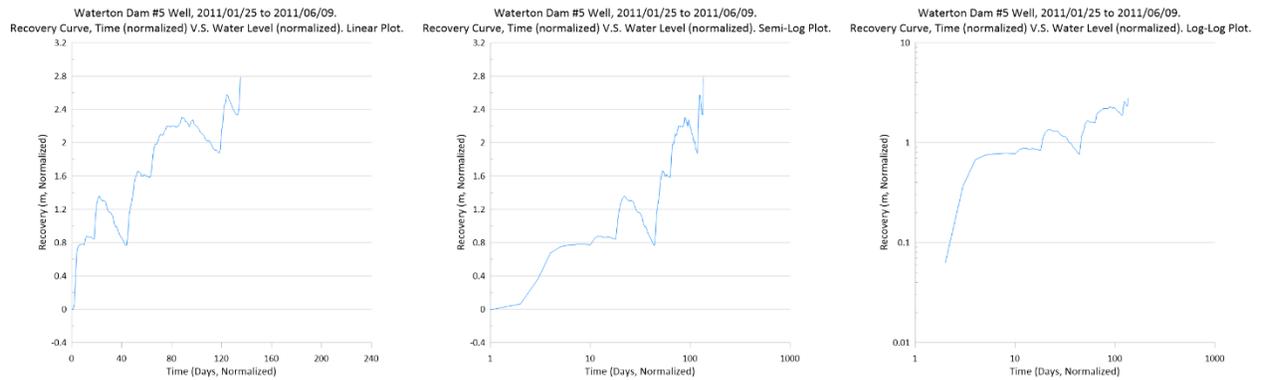


Figure 554: Recovery curve plots for Waterton Dam #5_0105 well, 2011/01/25 to 2011/06/09. Surficial aquifer.

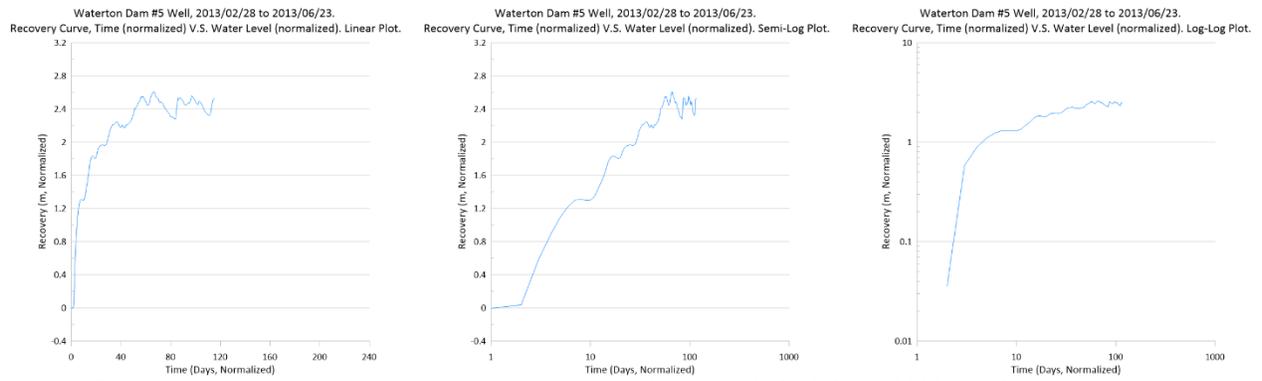


Figure 555: Recovery curve plots for Waterton Dam #5_0105 well, 2013/02/28 to 2013/06/23. Surficial aquifer.

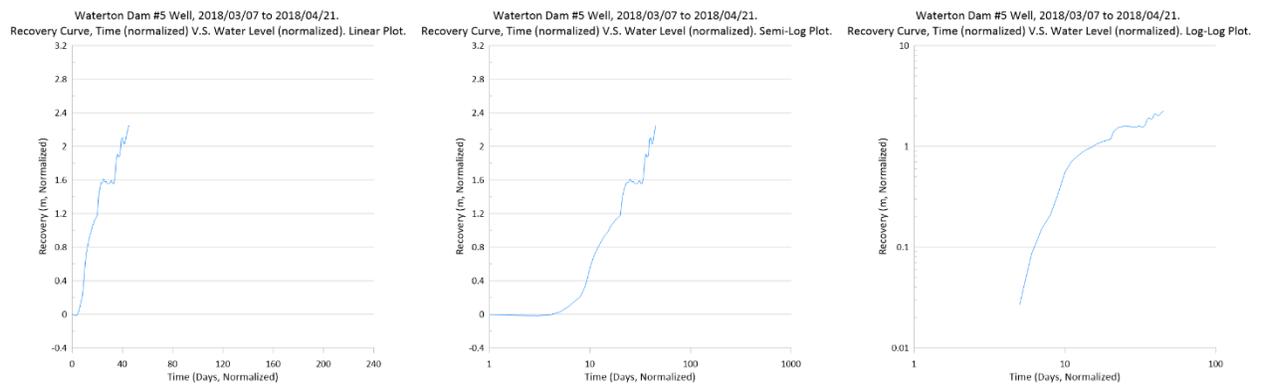


Figure 556: Recovery curve plots for Waterton Dam #5_0105 well, 2018/03/07 to 2018/04/21. Surficial aquifer.

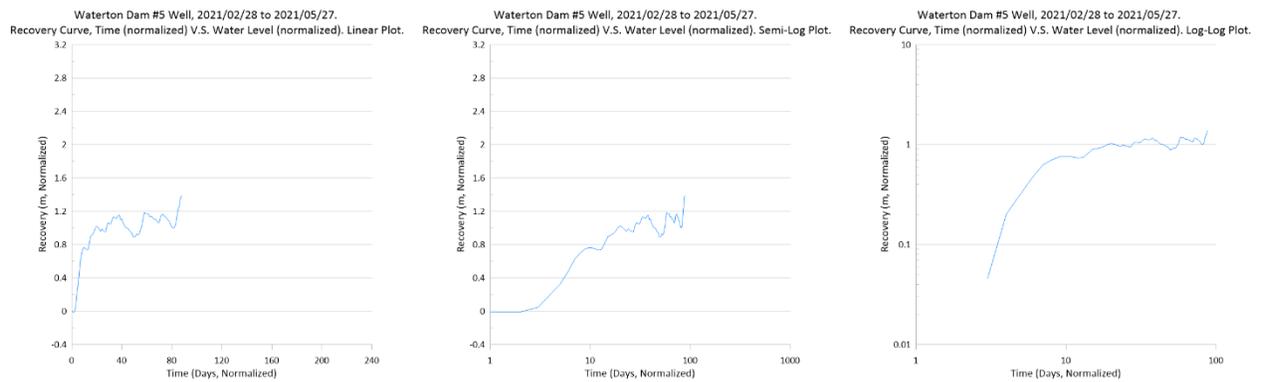


Figure 557: Recovery curve plots for Waterton Dam #5_0105 well, 2021/02/28 to 2021/05/27. Surficial aquifer.

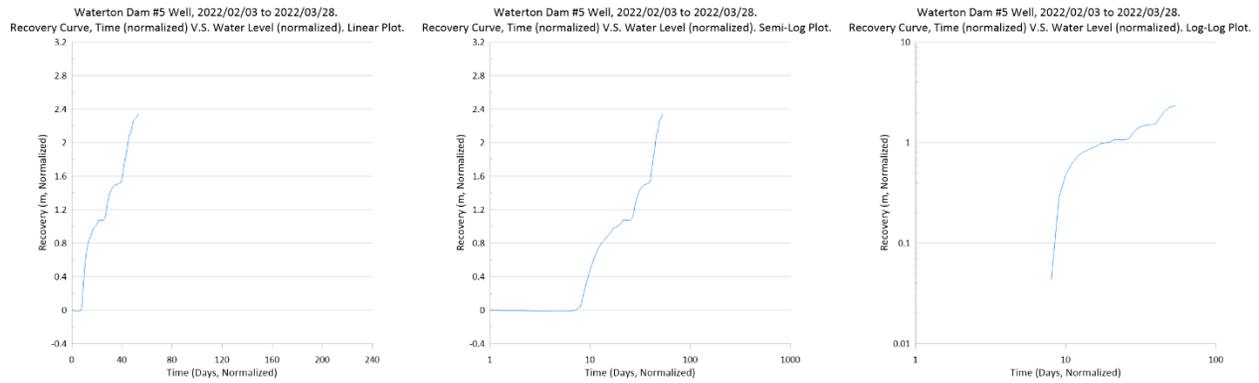


Figure 558: Recovery curve plots for Waterton Dam #5_0105 well, 2022/02/03 to 2022/03/28. Surficial aquifer.

Appendix I10: GOWN Monitoring Well Recovery Curve Plots for Watino 2353E_0369 Well

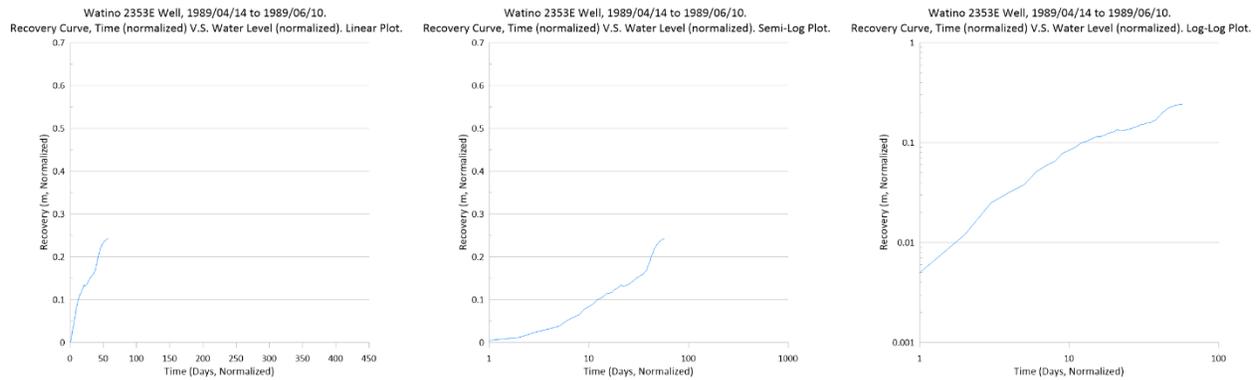


Figure 559: Recovery curve plots for Watino 2353E_0369 well, 1989/04/14 to 1989/06/10. Surficial aquifer.

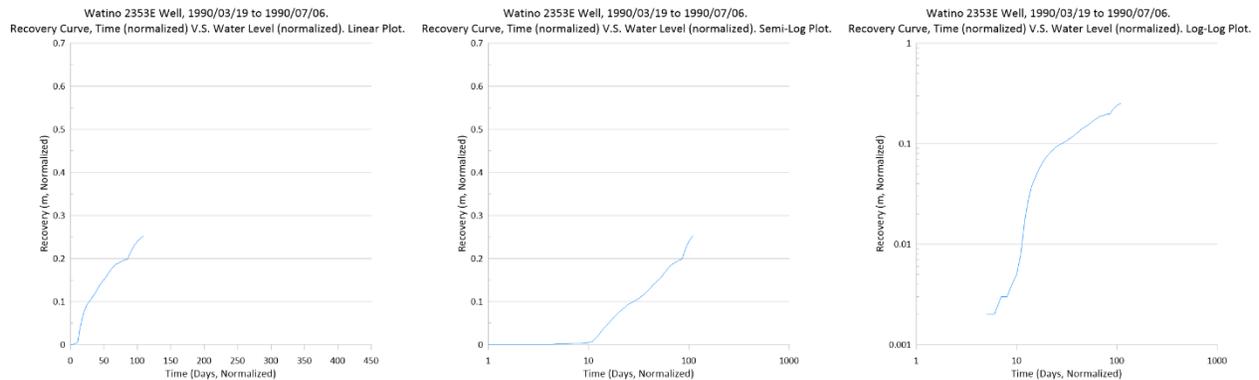


Figure 560: Recovery curve plots for Watino 2353E_0369 well, 1990/03/19 to 1990/07/06. Surficial aquifer.

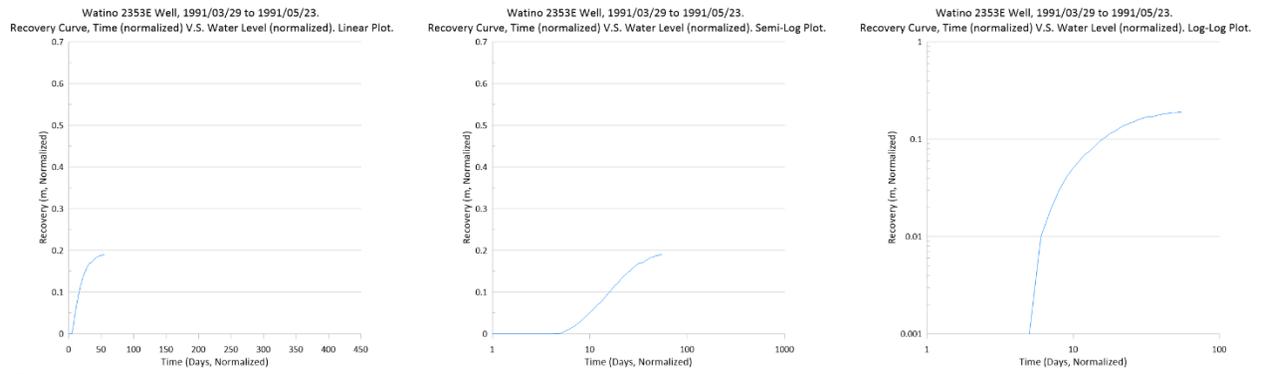


Figure 561: Recovery curve plots for Watino 2353E_0369 well, 1991/03/29 to 1991/05/23. Surficial aquifer.

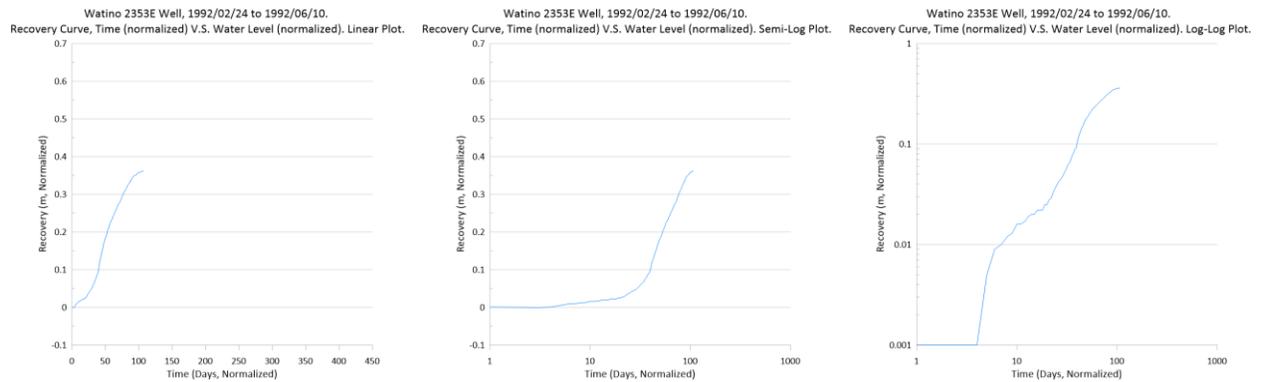


Figure 562: Recovery curve plots for Watino 2353E_0369 well, 1992/02/24 to 1992/06/10. Surficial aquifer.

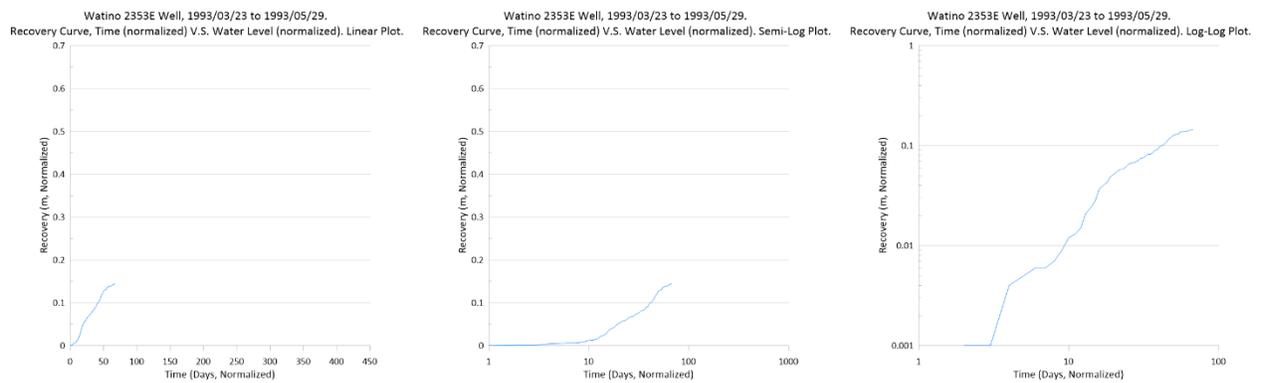


Figure 563: Recovery curve plots for Watino 2353E_0369 well, 1993/03/23 to 1993/05/29. Surficial aquifer.

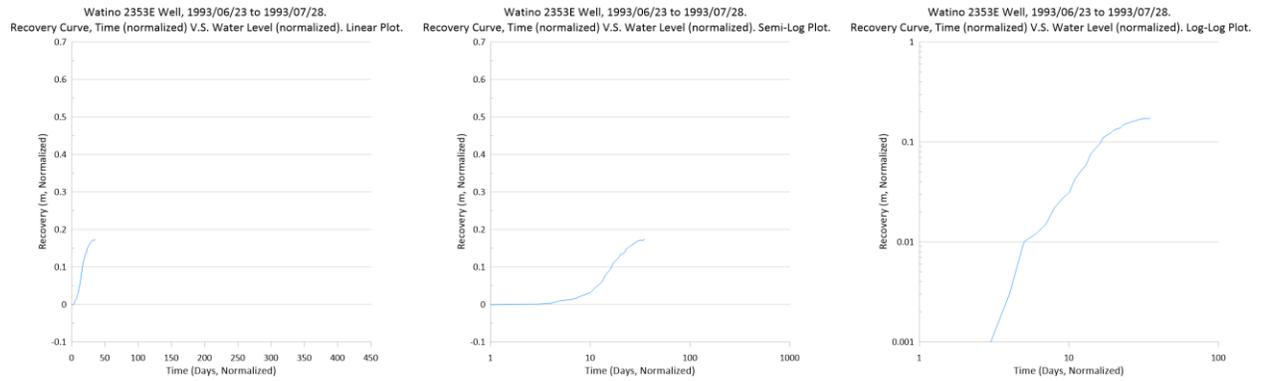


Figure 564: Recovery curve plots for Watino 2353E_0369 well, 1993/06/23 to 1993/07/28. Surficial aquifer.

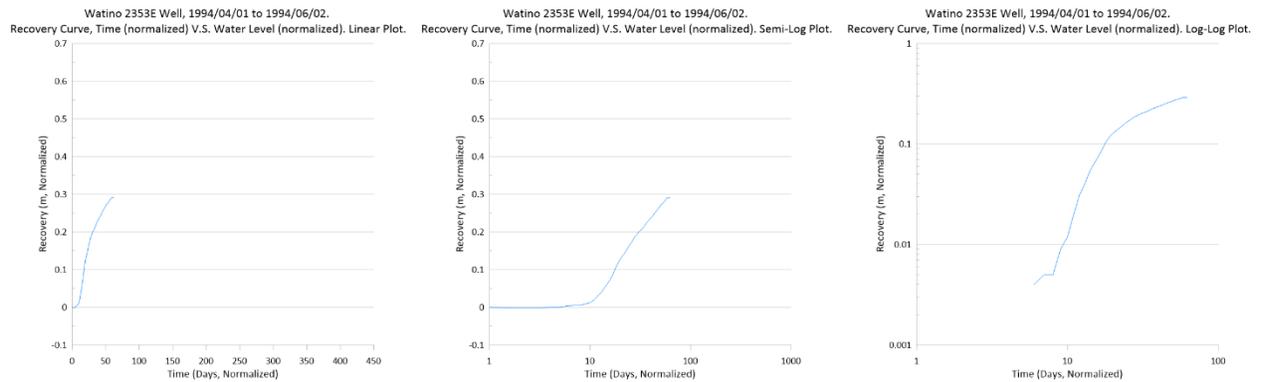


Figure 565: Recovery curve plots for Watino 2353E_0369 well, 1994/04/01 to 1994/06/02. Surficial aquifer.

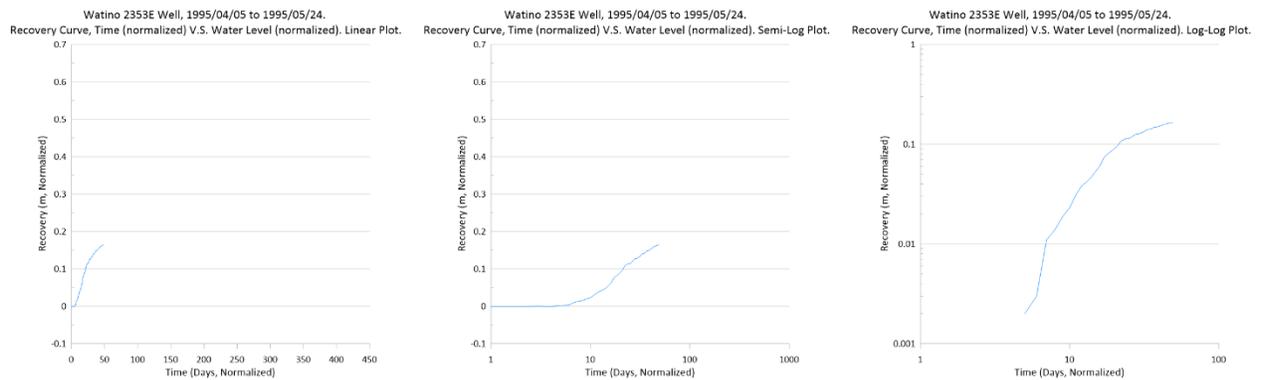


Figure 566: Recovery curve plots for Watino 2353E_0369 well, 1995/04/05 to 1995/05/24. Surficial aquifer.

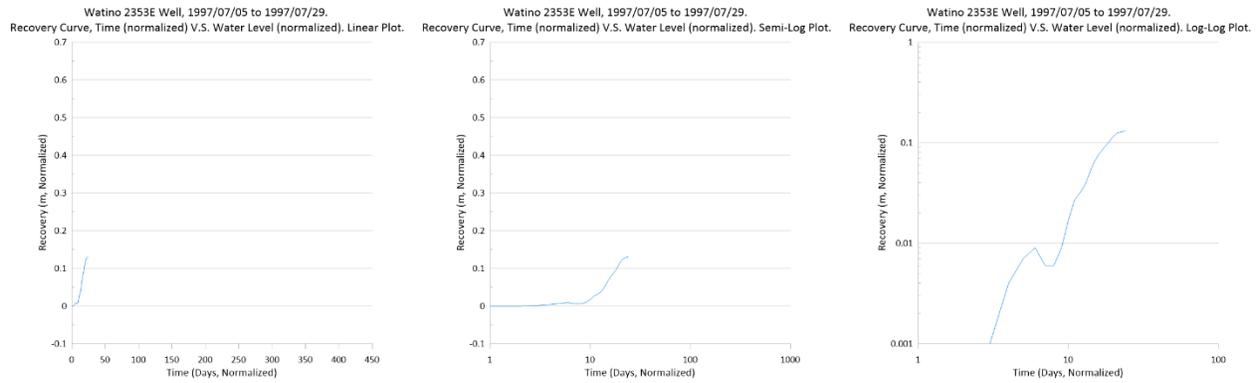


Figure 567: Recovery curve plots for Watino 2353E_0369 well, 1997/07/05 to 1997/07/29. Surficial aquifer.

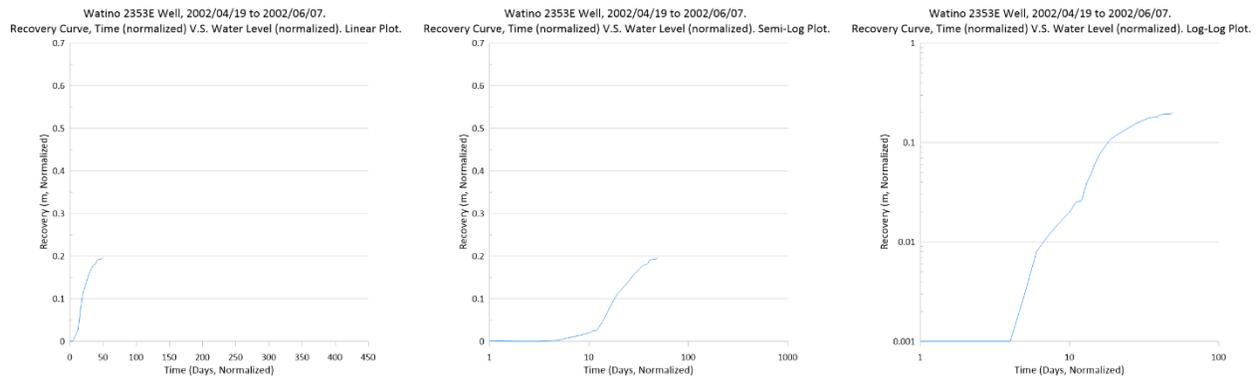


Figure 568: Recovery curve plots for Watino 2353E_0369 well, 2002/04/19 to 2002/06/07. Surficial aquifer.

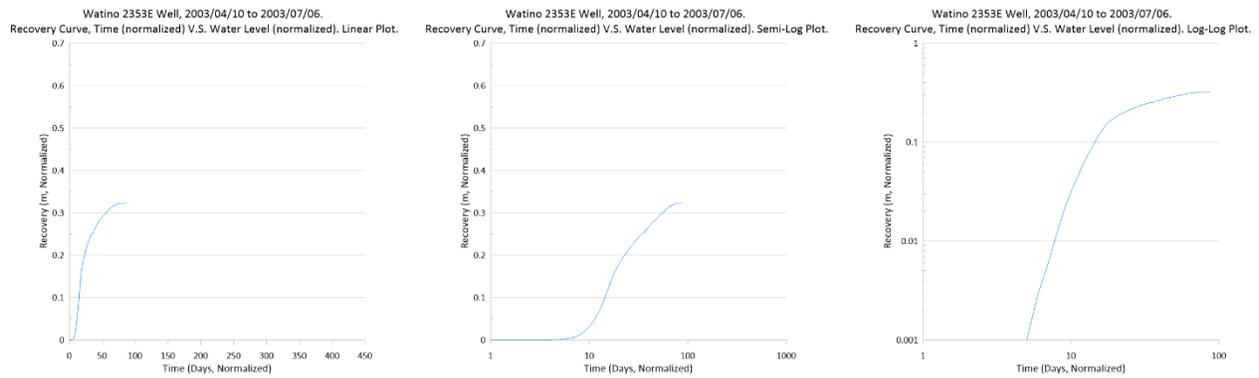


Figure 569: Recovery curve plots for Watino 2353E_0369 well, 2003/04/10 to 2003/07/06. Surficial aquifer.

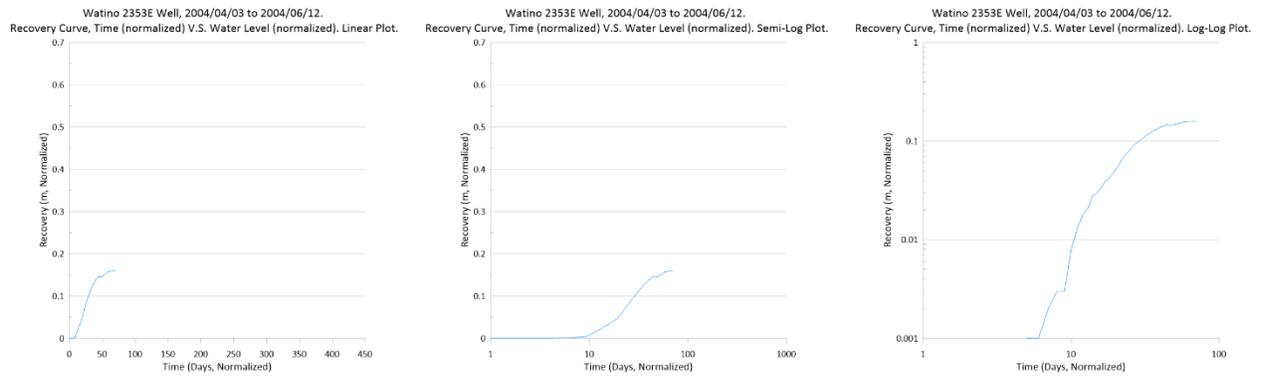


Figure 570: Recovery curve plots for Watino 2353E_0369 well, 2004/04/03 to 2004/06/12. Surficial aquifer.

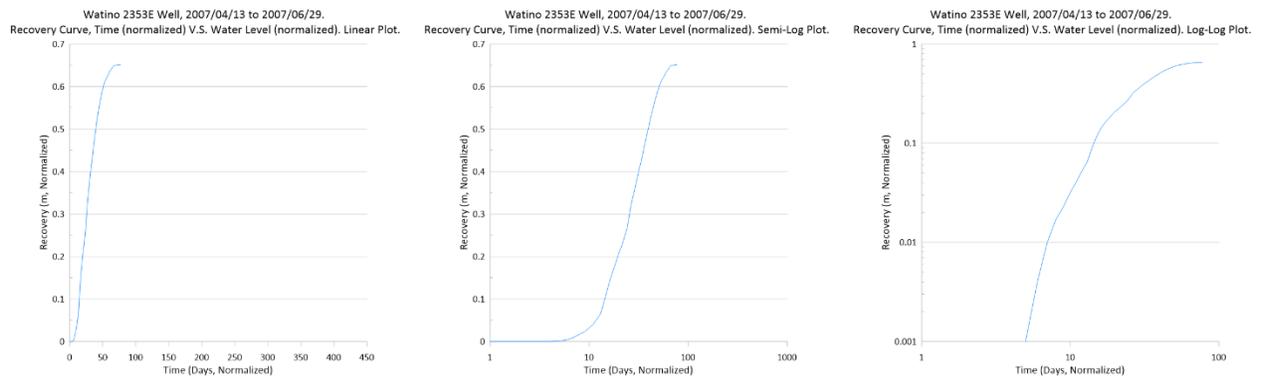


Figure 571: Recovery curve plots for Watino 2353E_0369 well, 2007/04/13 to 2007/06/29. Surficial aquifer.

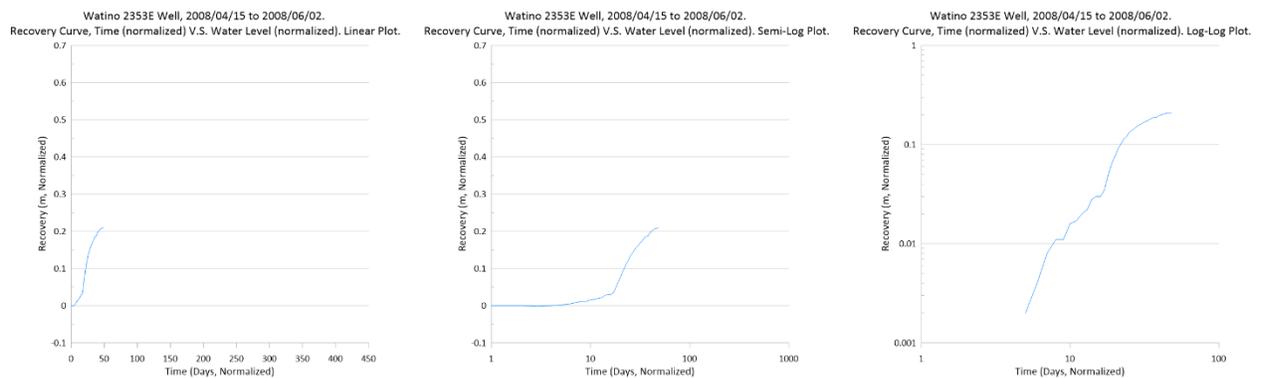


Figure 572: Recovery curve plots for Watino 2353E_0369 well, 2008/04/15 to 2008/06/02. Surficial aquifer.

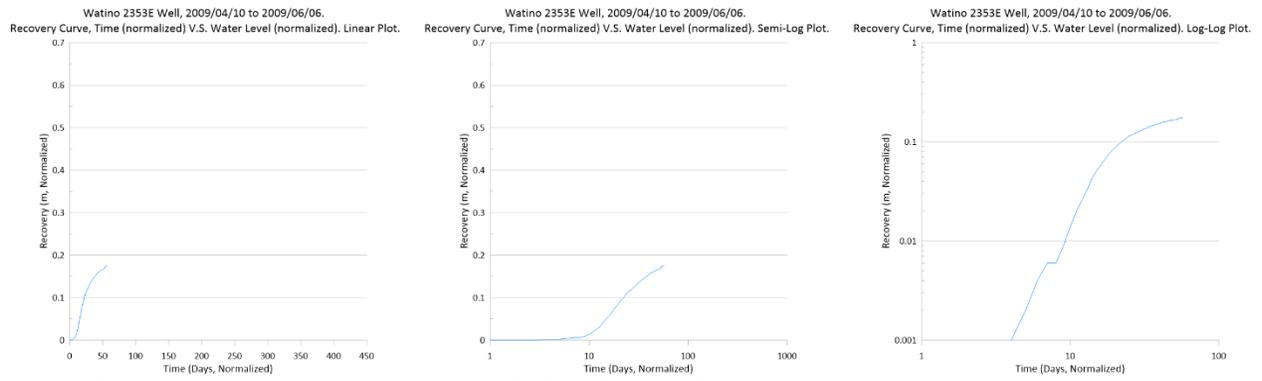


Figure 573: Recovery curve plots for Watino 2353E_0369 well, 2009/04/10 to 2009/06/06. Surficial aquifer.

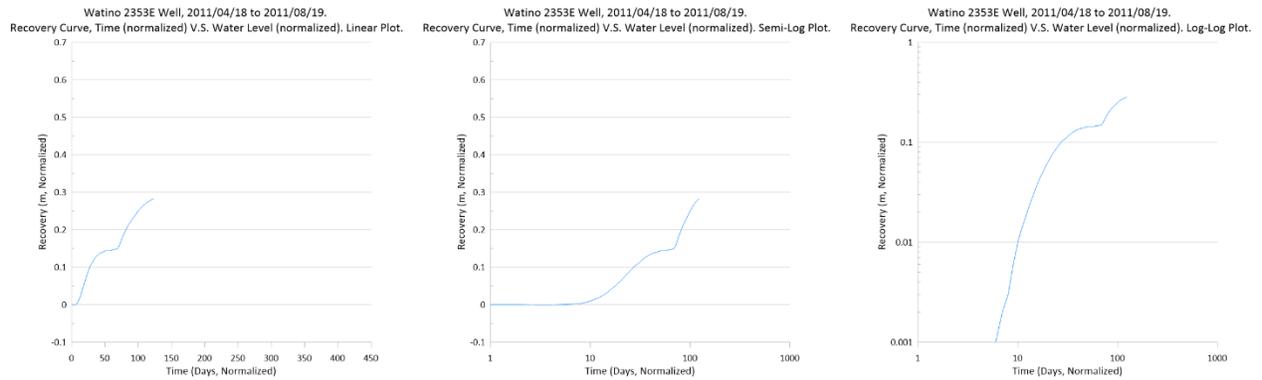


Figure 574: Recovery curve plots for Watino 2353E_0369 well, 2011/04/18 to 2011/08/19. Surficial aquifer.

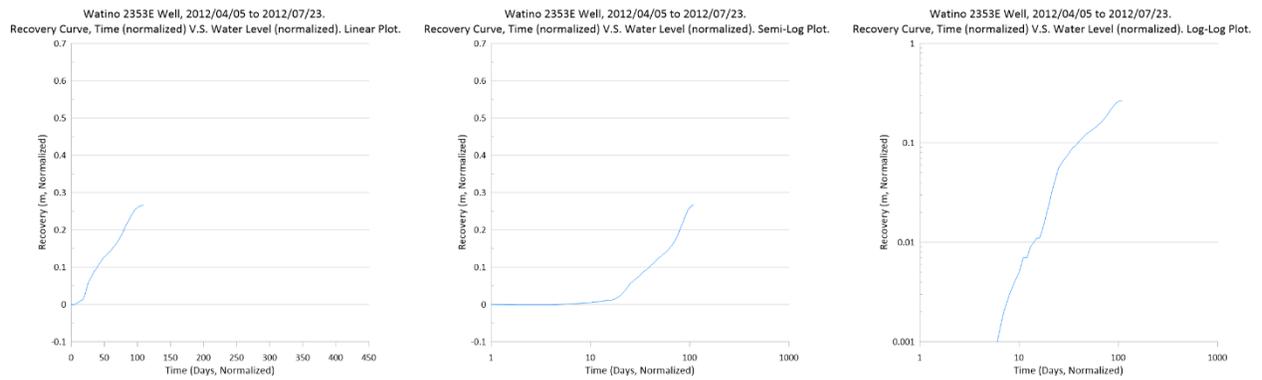


Figure 575: Recovery curve plots for Watino 2353E_0369 well, 2012/04/05 to 2012/07/23. Surficial aquifer.

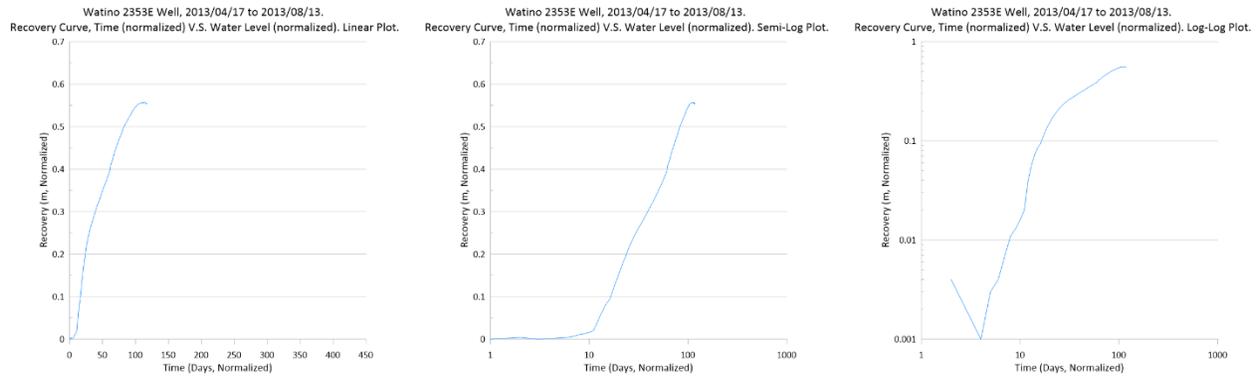


Figure 576: Recovery curve plots for Watino 2353E_0369 well, 2013/04/17 to 2013/08/13. Surficial aquifer.

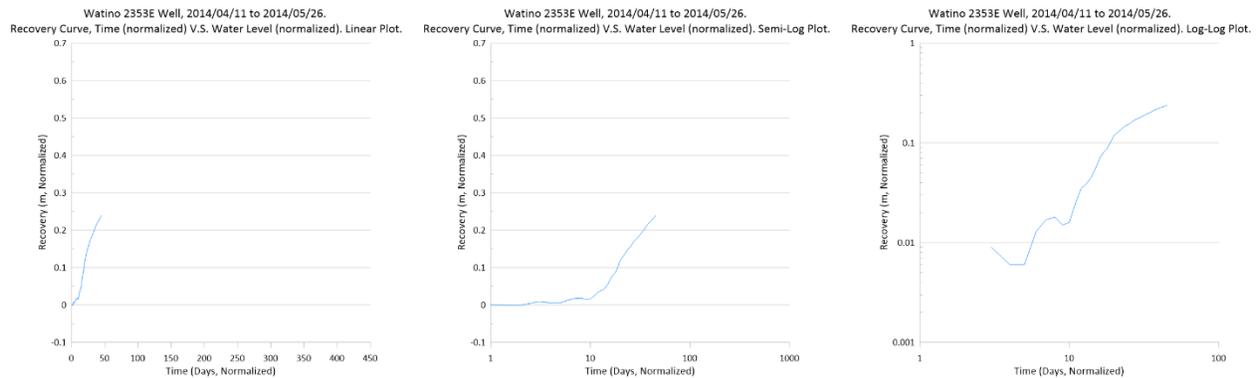


Figure 577: Recovery curve plots for Watino 2353E_0369 well, 2014/04/11 to 2014/05/26. Surficial aquifer.

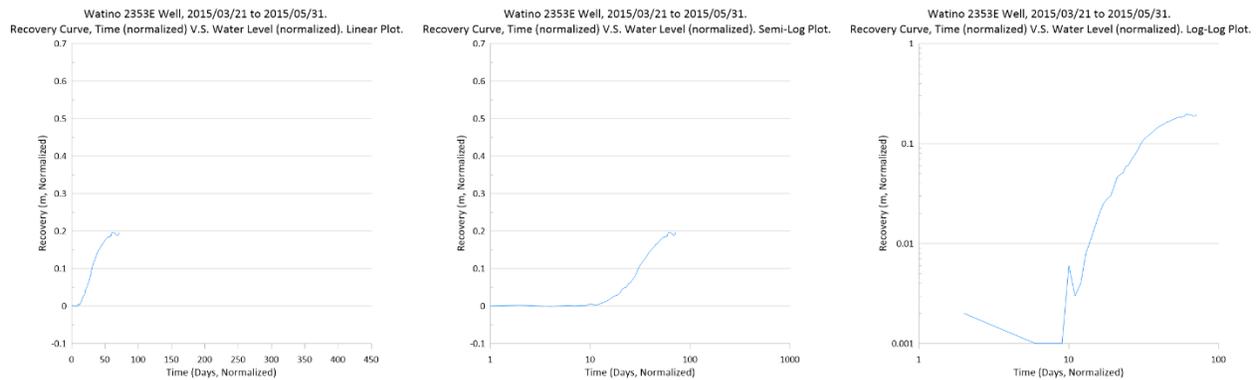


Figure 578: Recovery curve plots for Watino 2353E_0369 well, 2015/03/21 to 2015/05/31. Surficial aquifer.

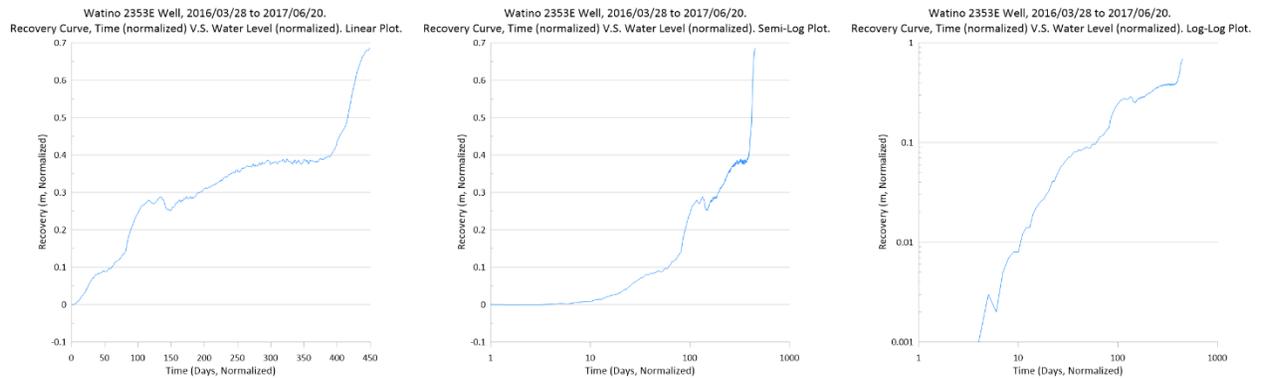


Figure 579: Recovery curve plots for Watino 2353E_0369 well, 2016/03/28 to 2017/06/20. Surficial aquifer.

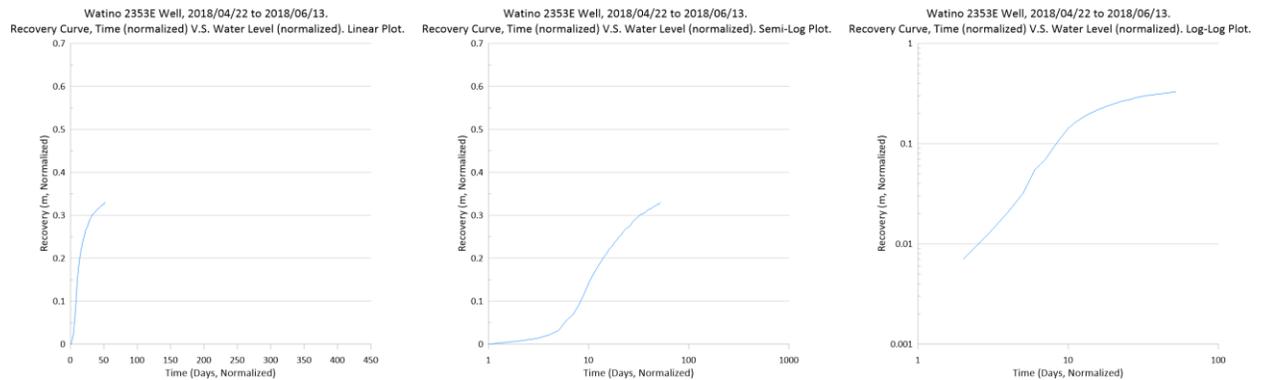


Figure 580: Recovery curve plots for Watino 2353E_0369 well, 2018/04/22 to 2018/06/13. Surficial aquifer.

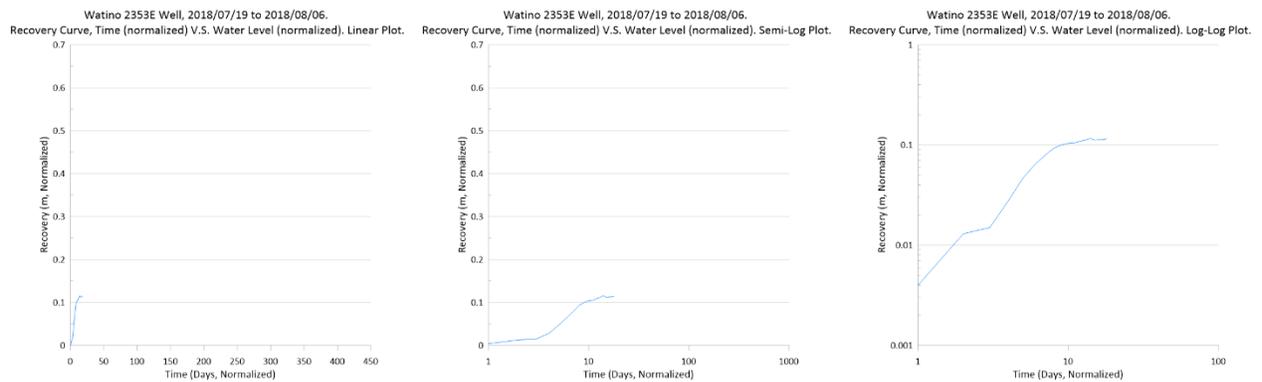


Figure 581: Recovery curve plots for Watino 2353E_0369 well, 2018/07/19 to 2018/08/06. Surficial aquifer.

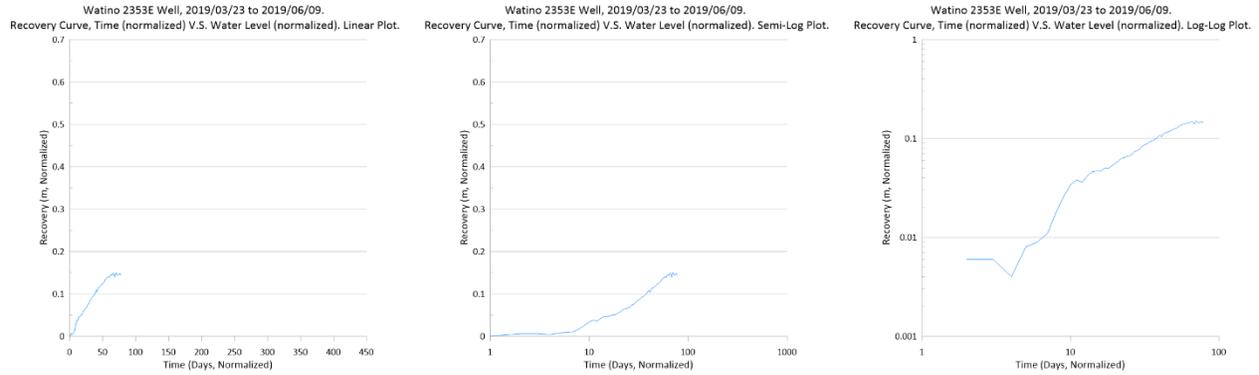


Figure 582: Recovery curve plots for Watino 2353E_0369 well, 2019/03/23 to 2019/06/09. Surficial aquifer.

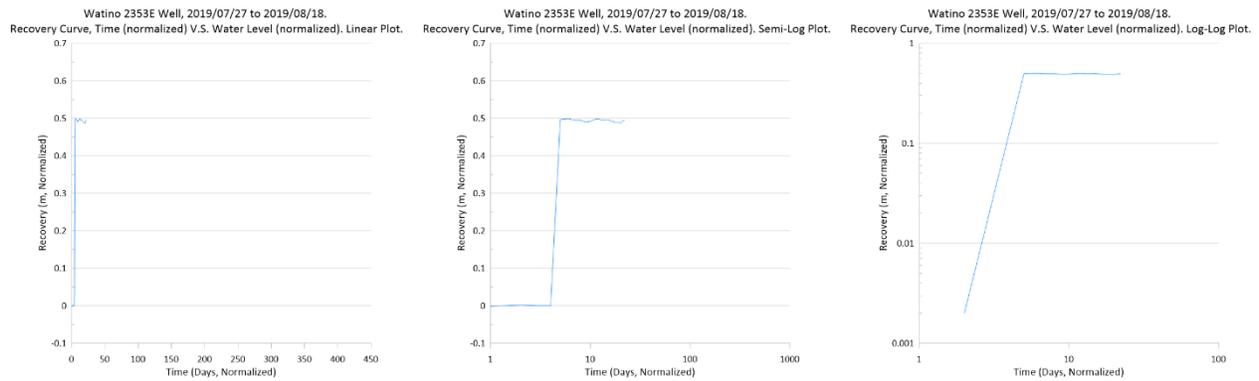


Figure 583: Recovery curve plots for Watino 2353E_0369 well, 2019/07/27 to 2019/08/18. Surficial aquifer.

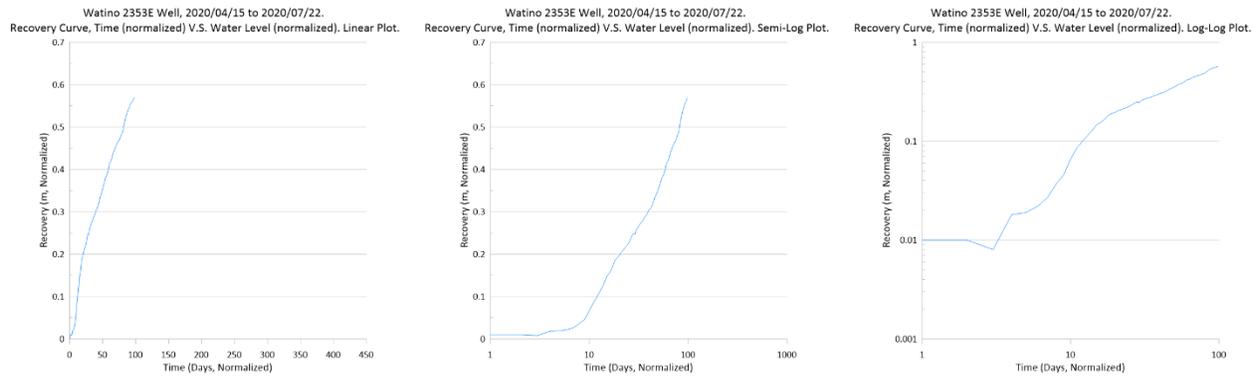


Figure 584: Recovery curve plots for Watino 2353E_0369 well, 2020/04/15 to 2020/07/22. Surficial aquifer.

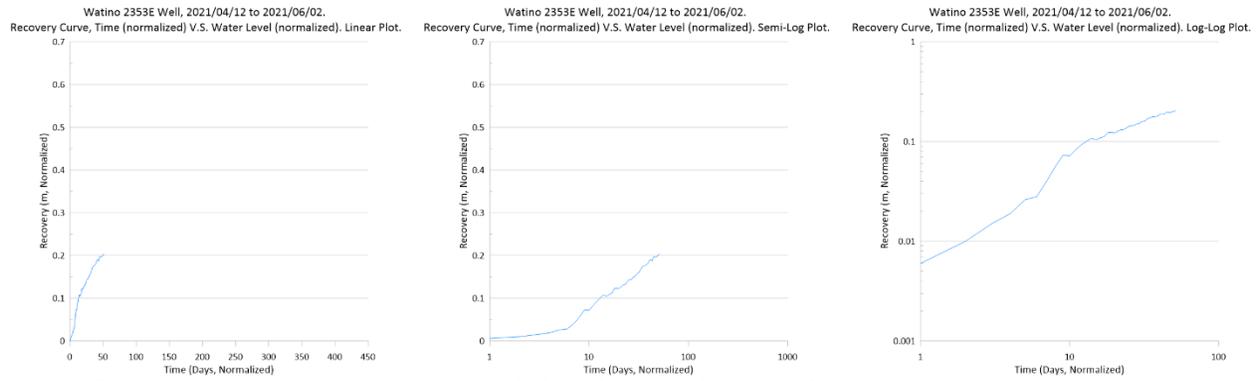


Figure 585: Recovery curve plots for Watino 2353E_0369 well, 2021/04/12 to 2021/06/02. Surficial aquifer.

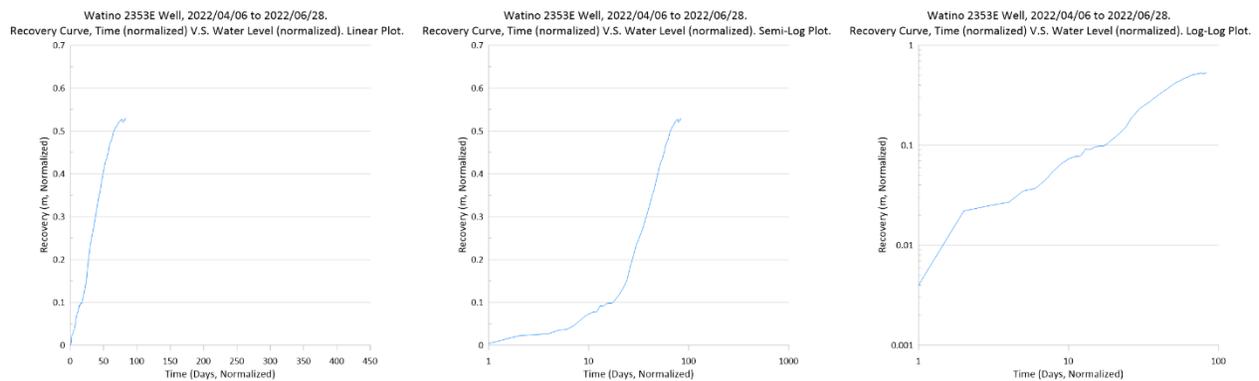


Figure 586: Recovery curve plots for Watino 2353E_0369 well, 2022/04/06 to 2022/06/28. Surficial aquifer.

Appendix III: GOWN Monitoring Well Recovery Curve Plots for La Crete 2447E_0380 Well

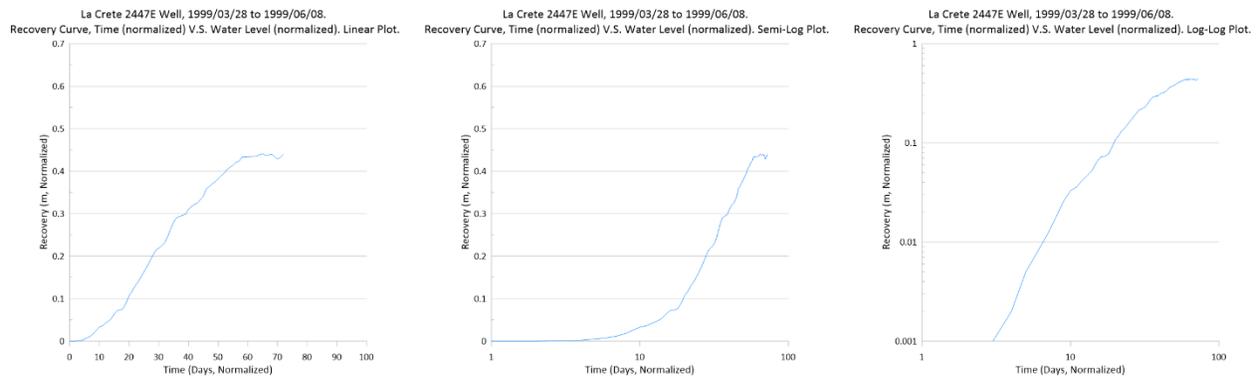


Figure 587: Recovery curve plots for La Crete 2447E_0380 well, 1999/03/28 to 1999/06/08. Surficial aquifer.

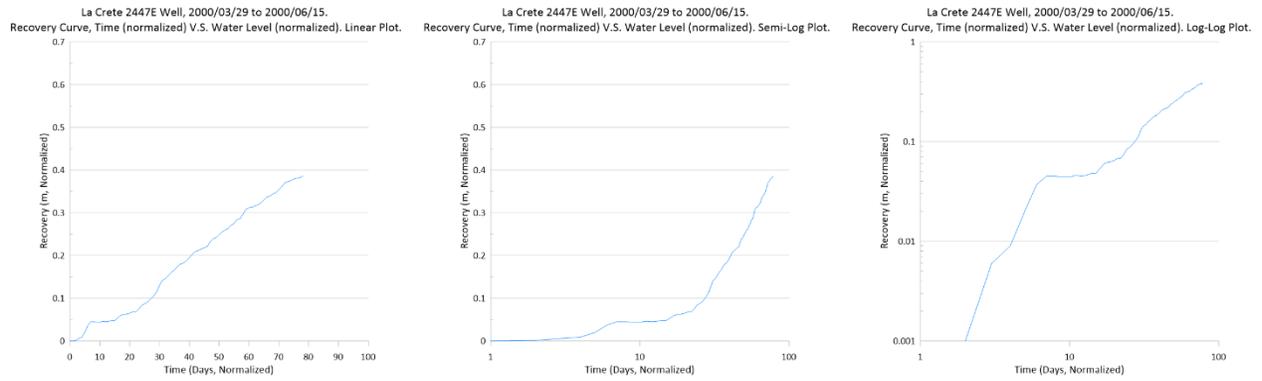


Figure 588: Recovery curve plots for La Crete 2447E_0380 well, 2000/03/29 to 2000/06/15. Surficial aquifer.

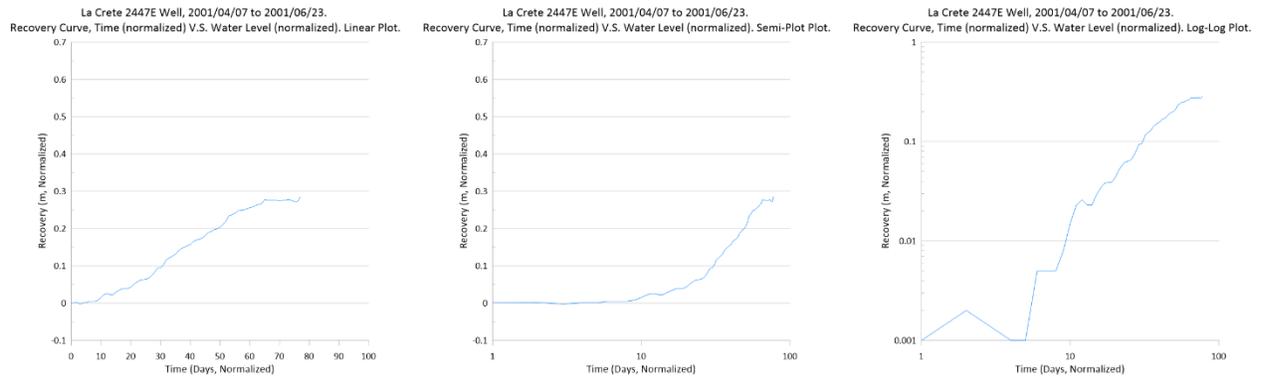


Figure 589: Recovery curve plots for La Crete 2447E_0380 well, 2001/04/07 to 2001/06/23. Surficial aquifer.

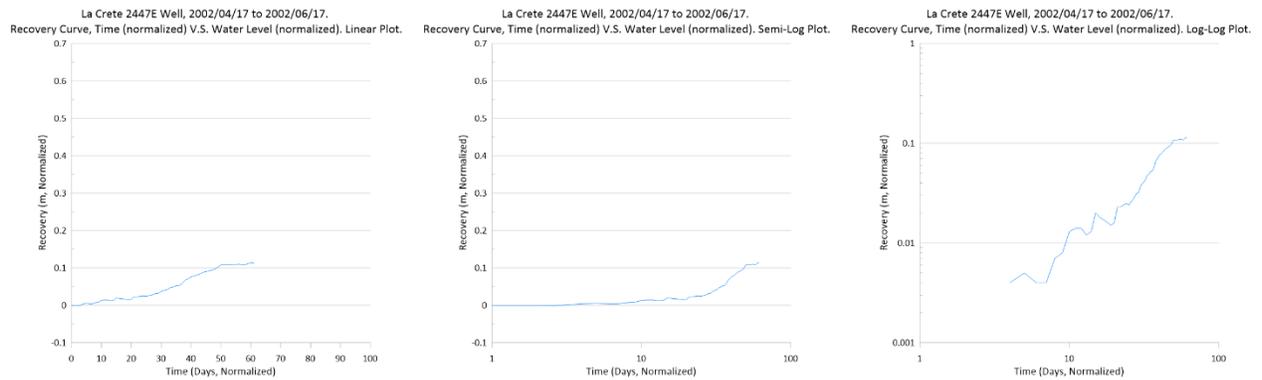


Figure 590: Recovery curve plots for La Crete 2447E_0380 well, 2002/04/17 to 2002/06/17. Surficial aquifer.

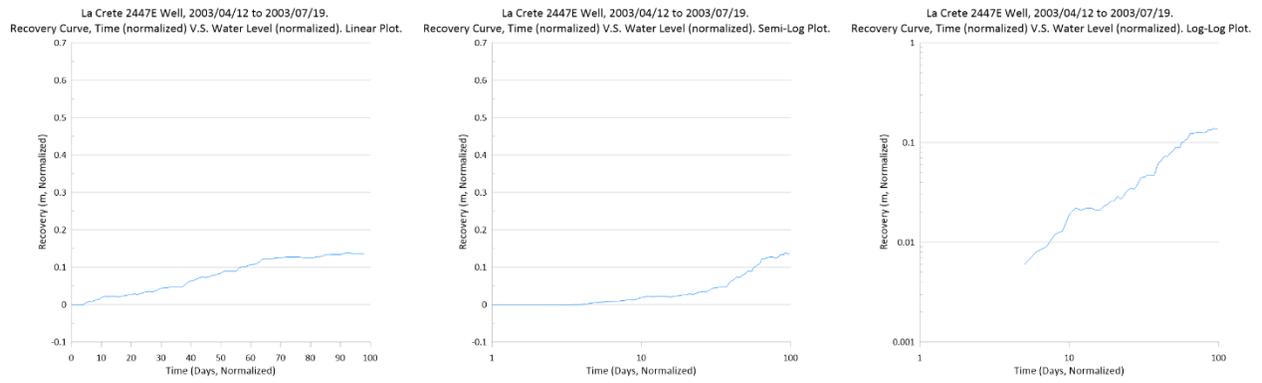


Figure 591: Recovery curve plots for La Crete 2447E_0380 well, 2003/04/12 to 2003/07/19. Surficial aquifer.

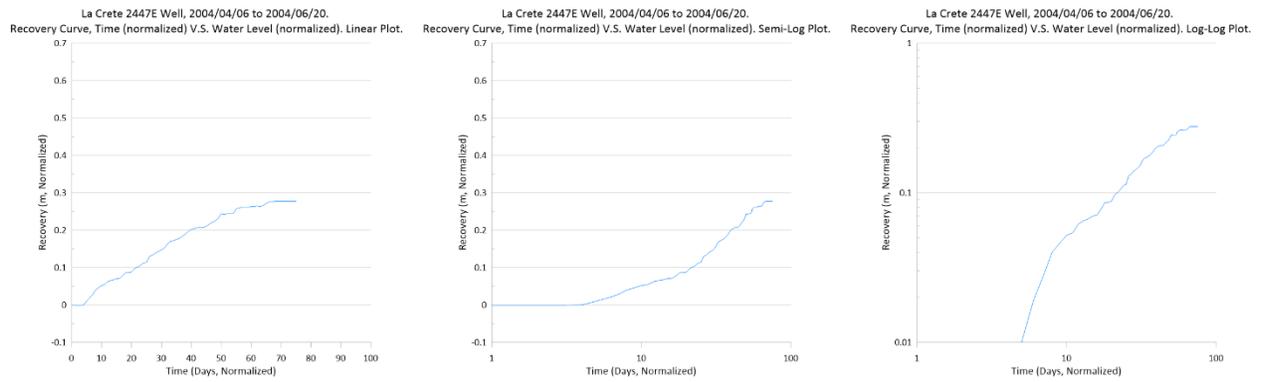


Figure 592: Recovery curve plots for La Crete 2447E_0380 well, 2004/04/06 to 2004/06/20. Surficial aquifer.

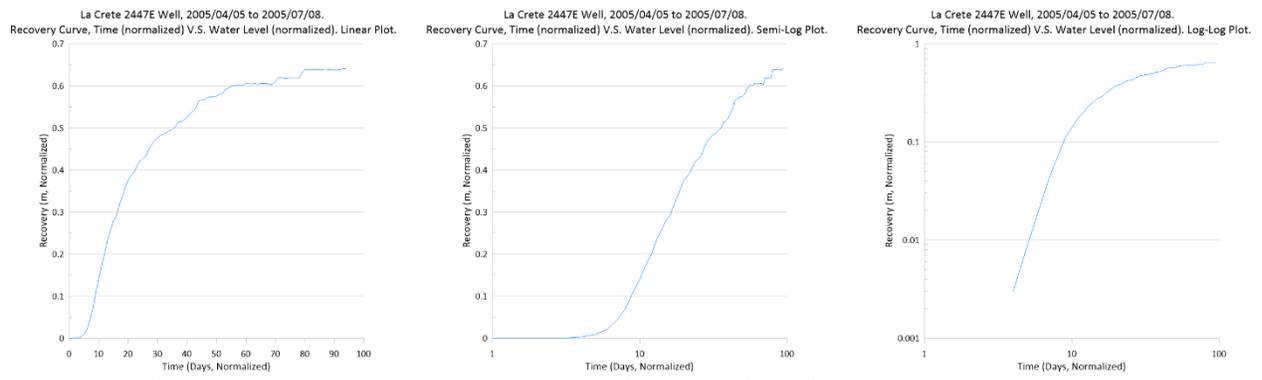


Figure 593: Recovery curve plots for La Crete 2447E_0380 well, 2005/04/05 to 2005/07/08. Surficial aquifer.

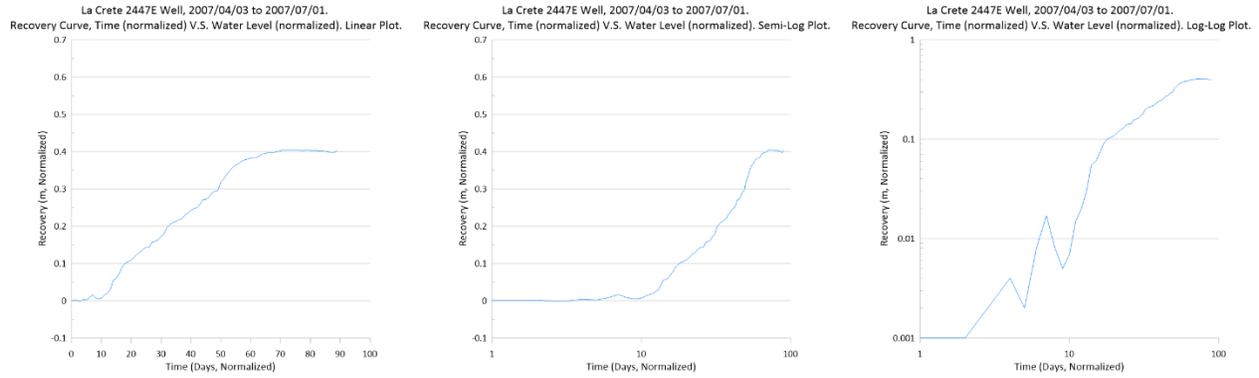


Figure 594: Recovery curve plots for La Crete 2447E_0380 well, 2007/04/03 to 2007/07/01. Surficial aquifer.

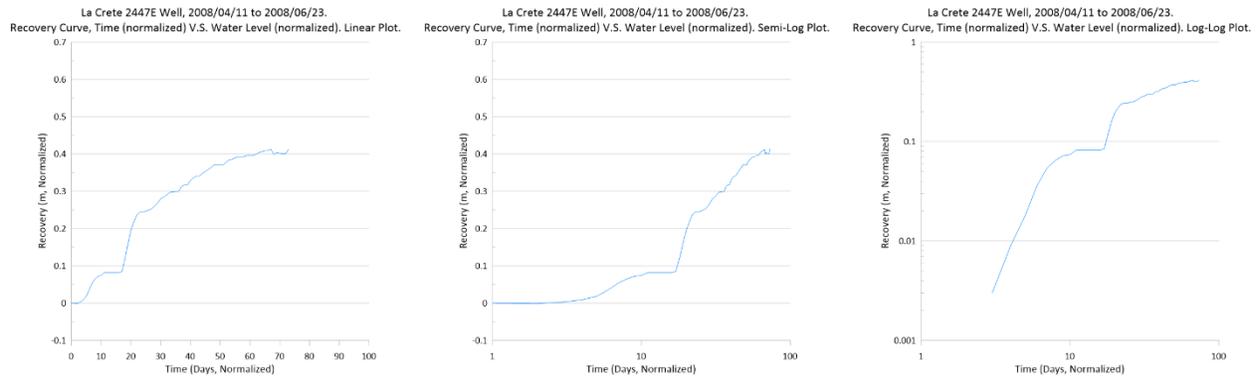


Figure 595: Recovery curve plots for La Crete 2447E_0380 well, 2008/04/11 to 2008/06/23. Surficial aquifer.

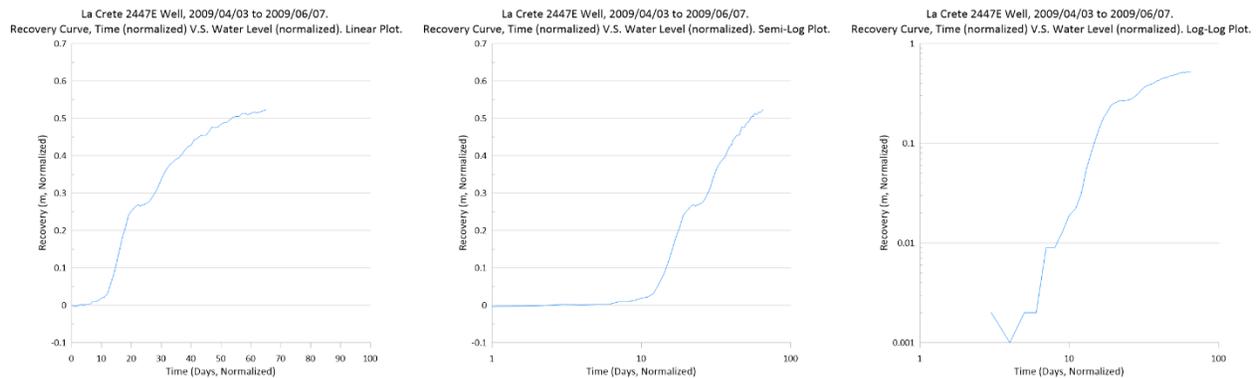


Figure 596: Recovery curve plots for La Crete 2447E_0380 well, 2009/04/03 to 2009/06/07. Surficial aquifer.

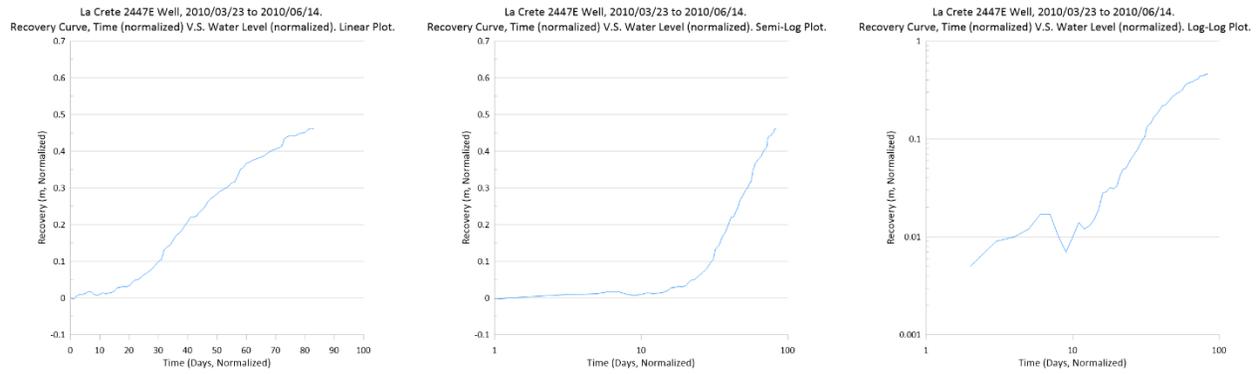


Figure 597: Recovery curve plots for La Crete 2447E_0380 well, 2010/03/23 to 2010/06/14. Surficial aquifer.

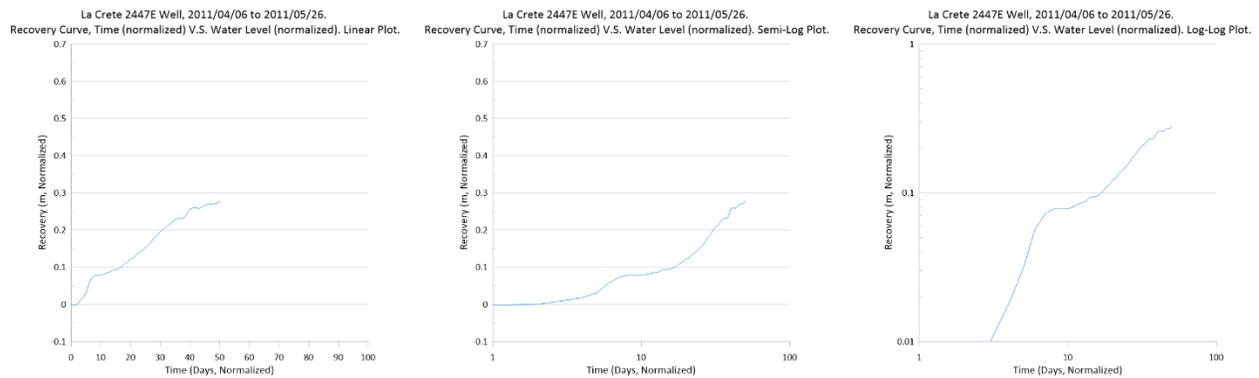


Figure 598: Recovery curve plots for La Crete 2447E_0380 well, 2011/04/06 to 2011/05/26. Surficial aquifer.

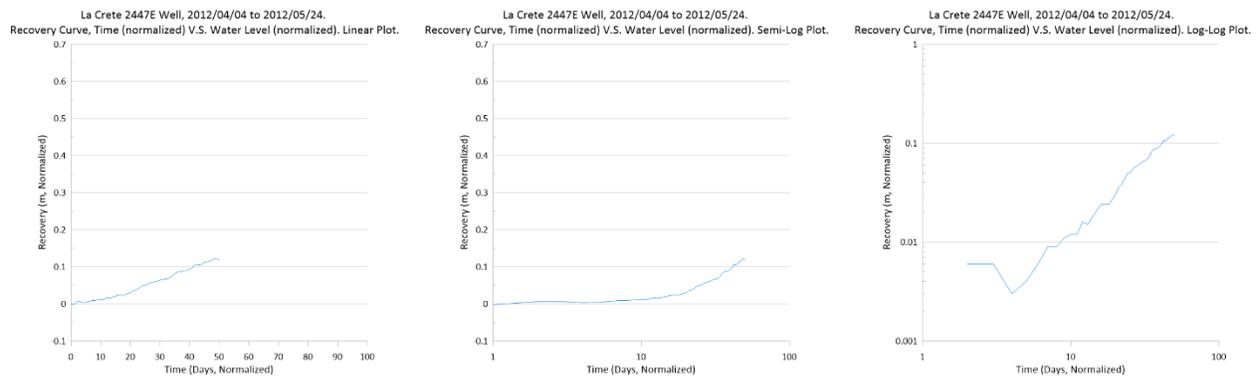


Figure 599: Recovery curve plots for La Crete 2447E_0380 well, 2012/04/04 to 2012/05/24. Surficial aquifer.

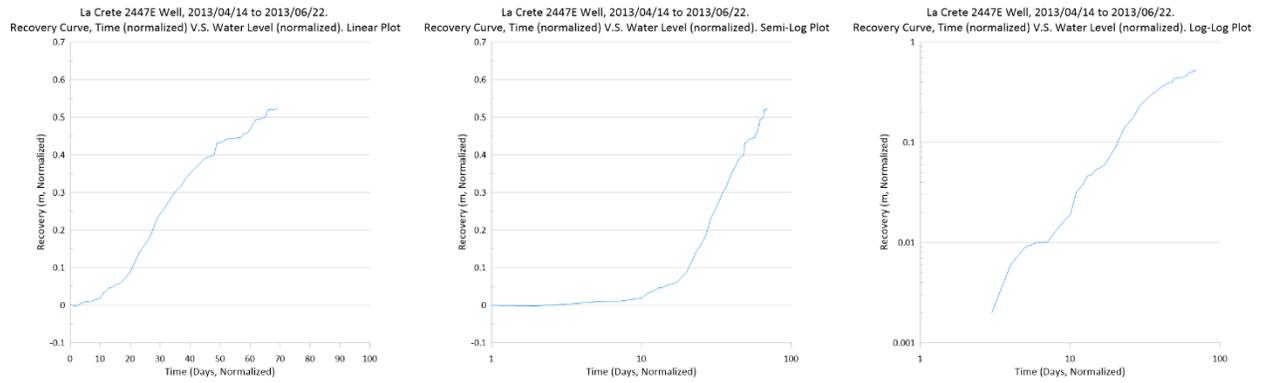


Figure 600: Recovery curve plots for La Crete 2447E_0380 well, 2013/04/14 to 2013/06/22. Surficial aquifer.

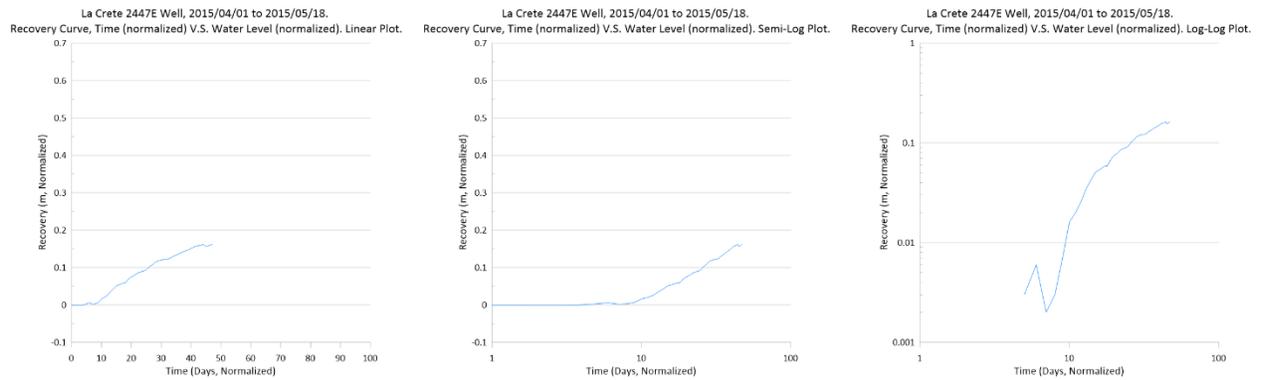


Figure 601: Recovery curve plots for La Crete 2447E_0380 well, 2015/04/01 to 2015/05/18. Surficial aquifer.

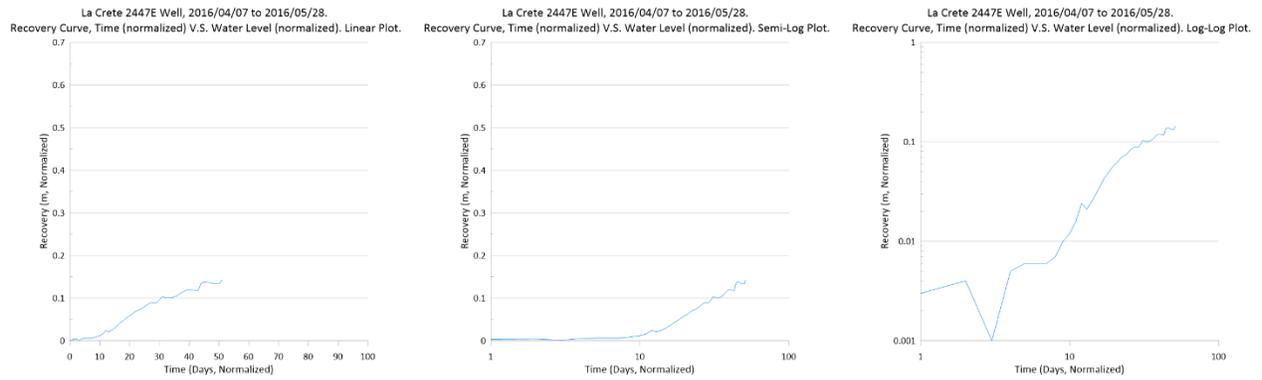


Figure 602: Recovery curve plots for La Crete 2447E_0380 well, 2016/04/07 to 2016/05/28. Surficial aquifer.

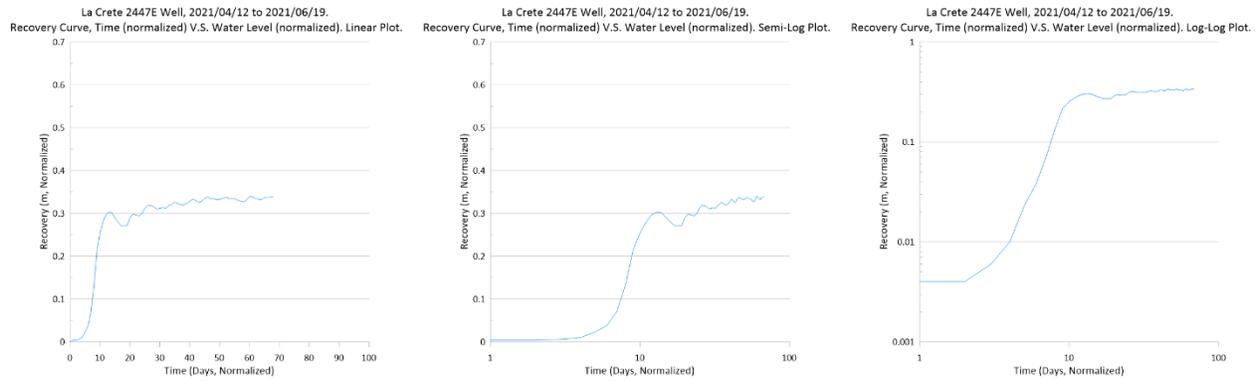


Figure 603: Recovery curve plots for La Crete 2447E_0380 well, 2021/04/12 to 2021/06/19. Surficial aquifer.

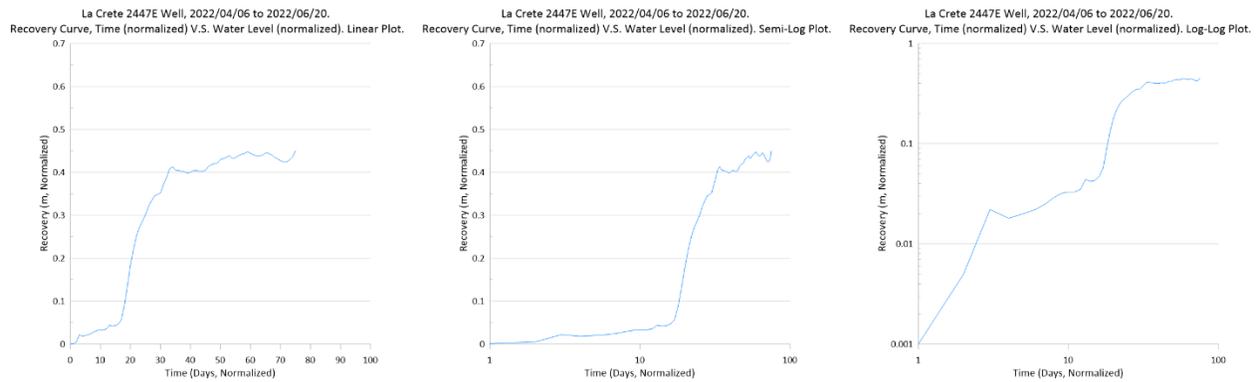


Figure 604: Recovery curve plots for La Crete 2447E_0380 well, 2022/04/06 to 2022/06/20. Surficial aquifer.

Appendix I12: GOWN Monitoring Well Recovery Curve Plots for Innisfree 2403E_0235 Well

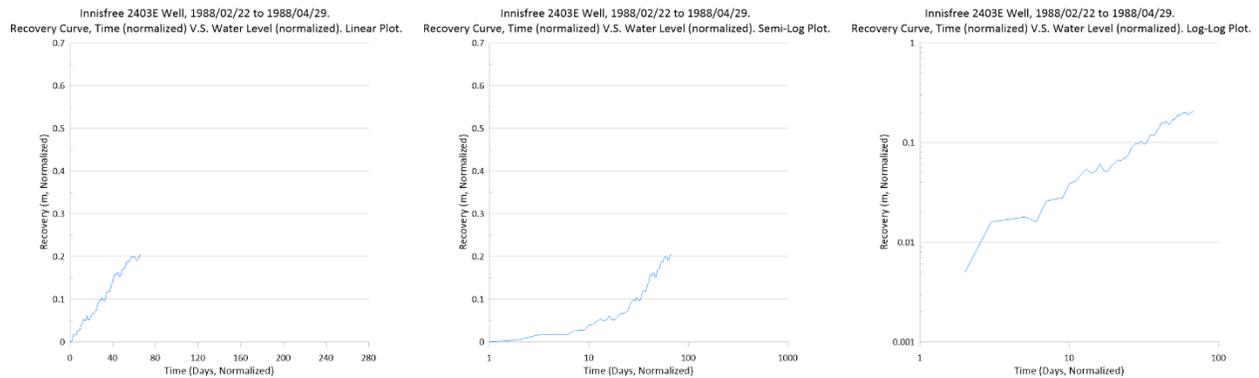


Figure 605: Recovery curve plots for Innisfree 2403E_0235 well, 1988/02/22 to 1988/04/29. Surficial aquifer.

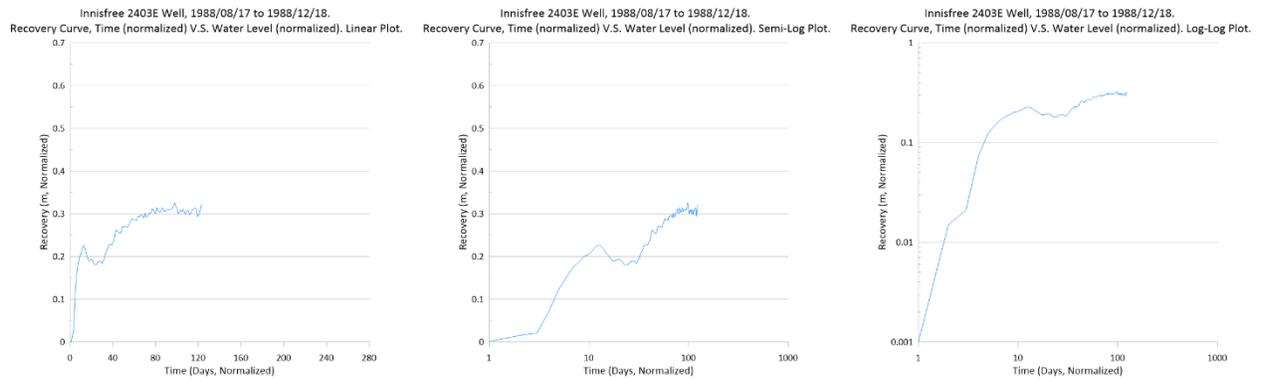


Figure 606: Recovery curve plots for Innisfree 2403E_0235 well, 1988/08/17 to 1988/12/18. Surficial aquifer.

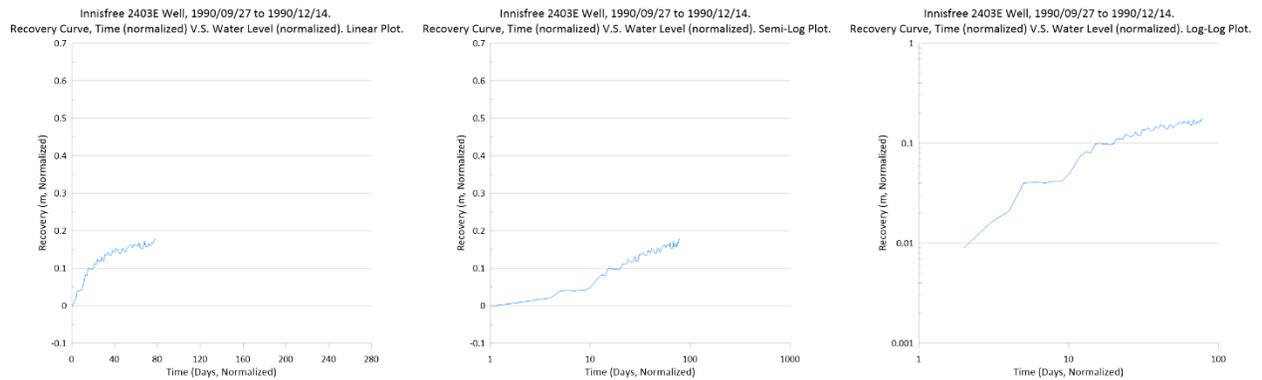


Figure 607: Recovery curve plots for Innisfree 2403E_0235 well, 1990/09/27 to 1990/12/14. Surficial aquifer.

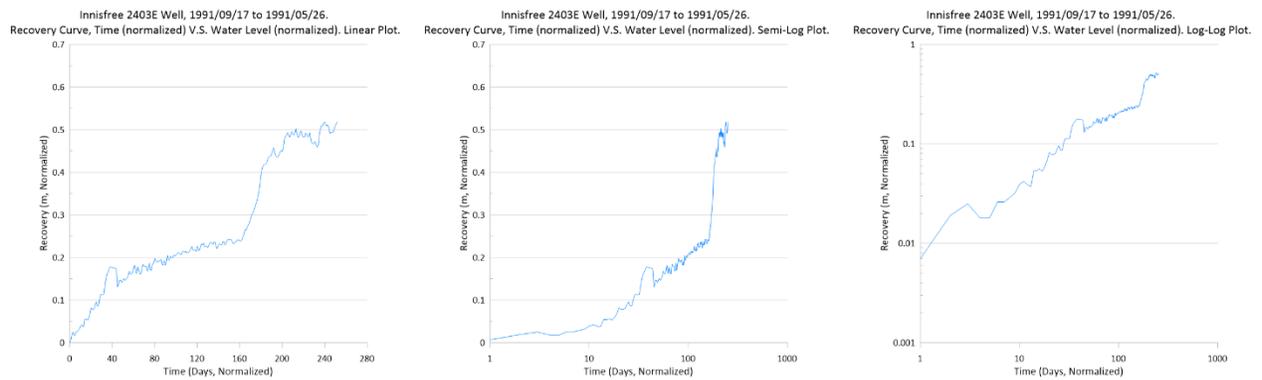


Figure 608: Recovery curve plots for Innisfree 2403E_0235 well, 1991/09/17 to 1991/05/26. Surficial aquifer.

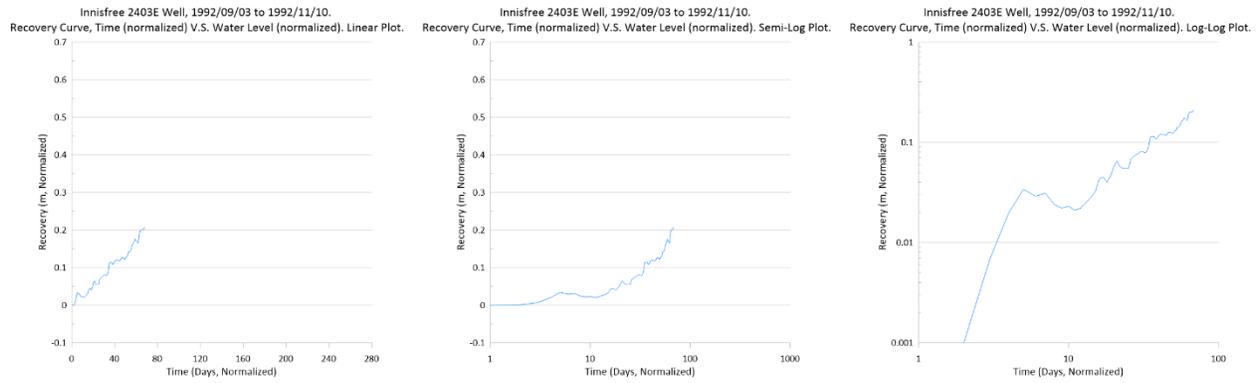


Figure 609: Recovery curve plots for Innisfree 2403E_0235 well, 1992/09/03 to 1992/11/10. Surficial aquifer.

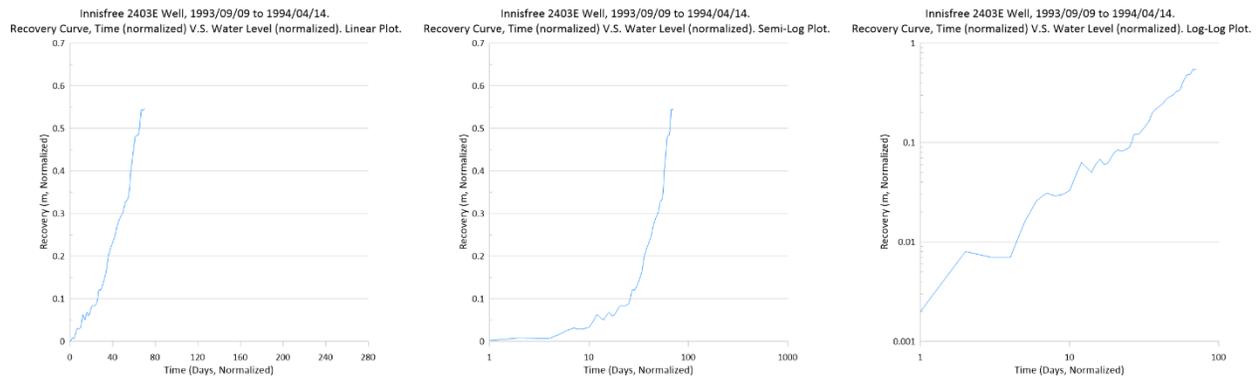


Figure 610: Recovery curve plots for Innisfree 2403E_0235 well, 1993/09/09 to 1994/04/14. Surficial aquifer.

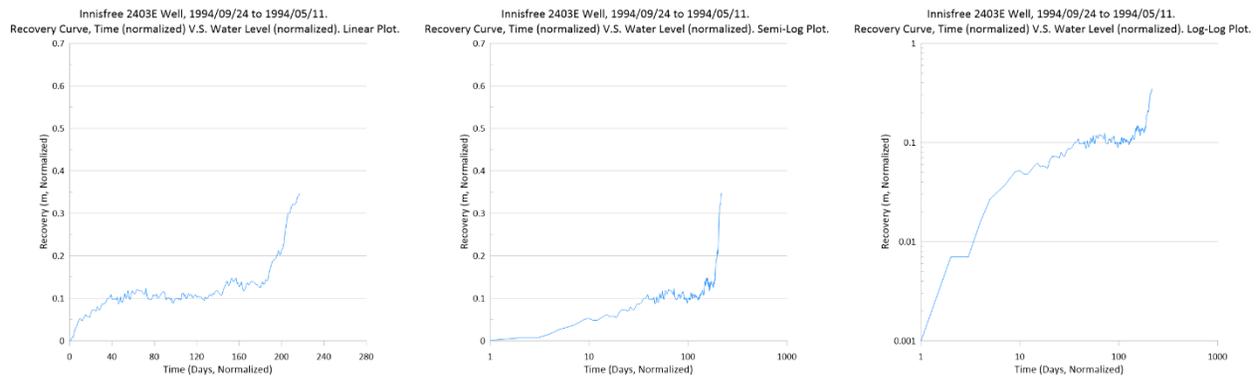


Figure 611: Recovery curve plots for Innisfree 2403E_0235 well, 1994/09/24 to 1995/05/11. Surficial aquifer.

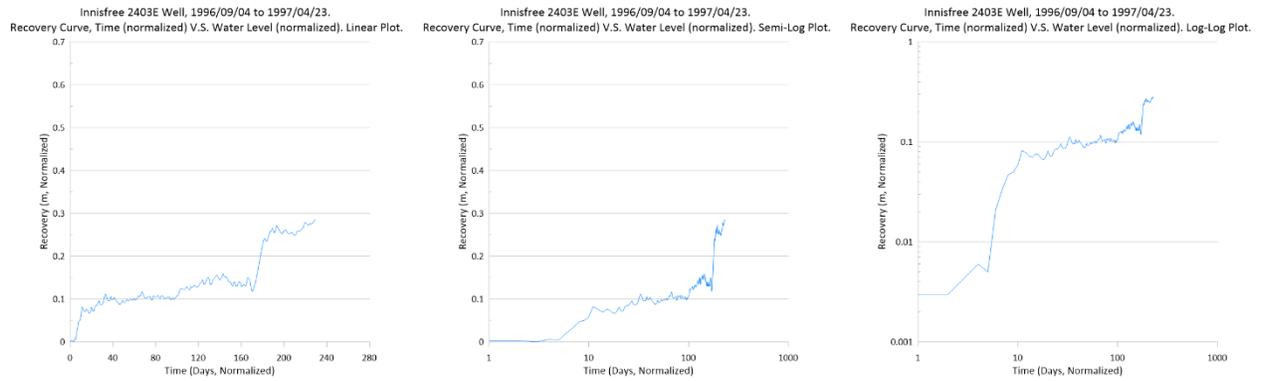


Figure 612: Recovery curve plots for Innisfree 2403E_0235 well, 1996/09/04 to 1997/04/23. Surficial aquifer.

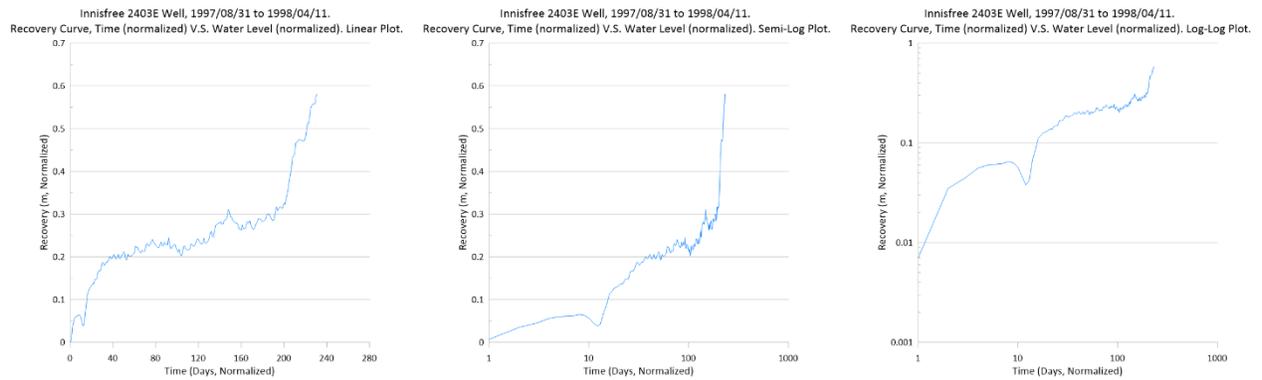


Figure 613: Recovery curve plots for Innisfree 2403E_0235 well, 1997/08/31 to 1998/04/11. Surficial aquifer.

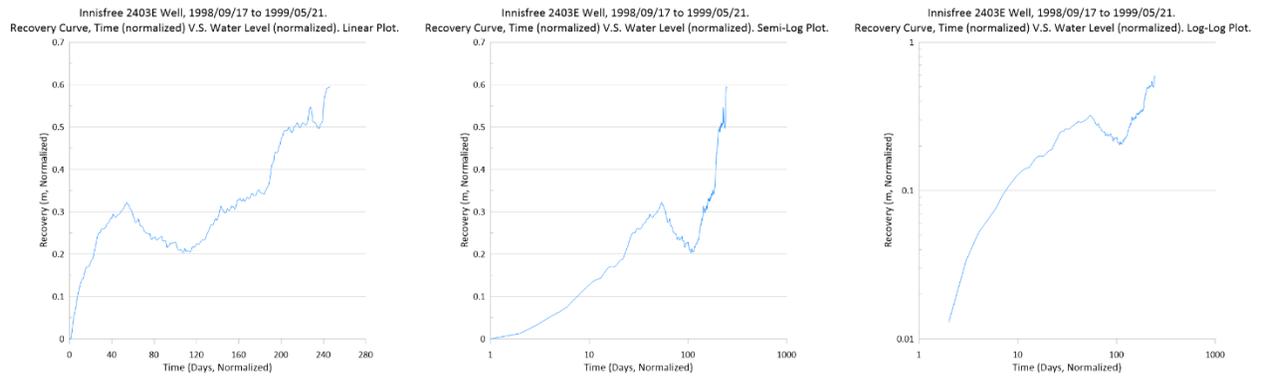


Figure 614: Recovery curve plots for Innisfree 2403E_0235 well, 1998/09/17 to 1999/05/21. Surficial aquifer.

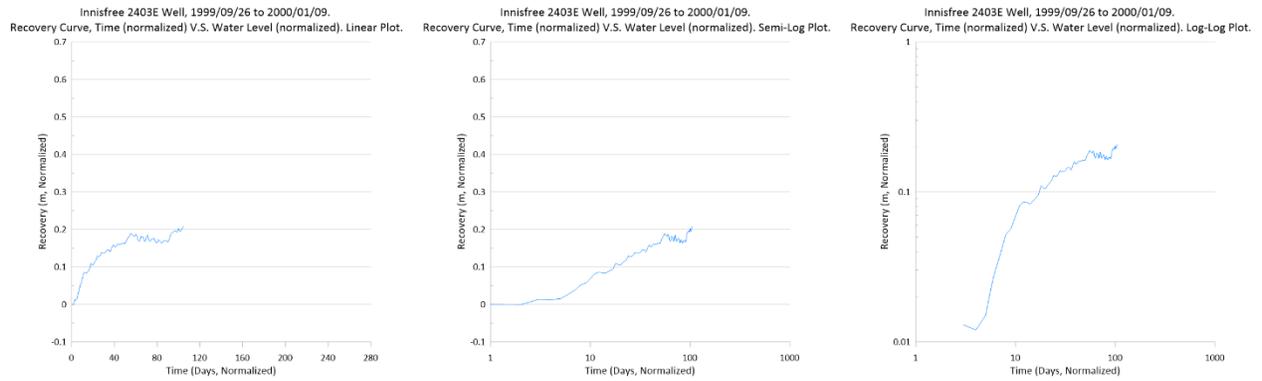


Figure 615: Recovery curve plots for Innisfree 2403E_0235 well, 1999/09/26 to 2000/01/09. Surficial aquifer.

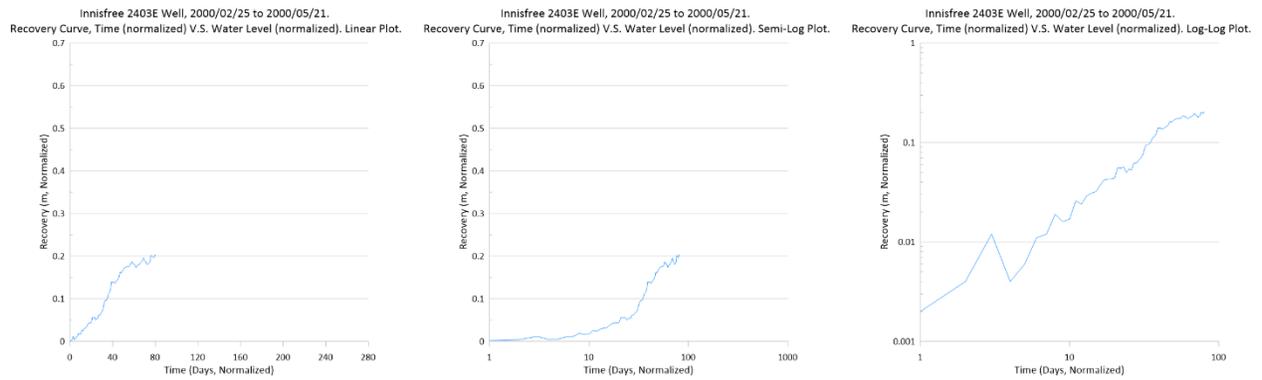


Figure 616: Recovery curve plots for Innisfree 2403E_0235 well, 2000/02/25 to 2000/05/21. Surficial aquifer.

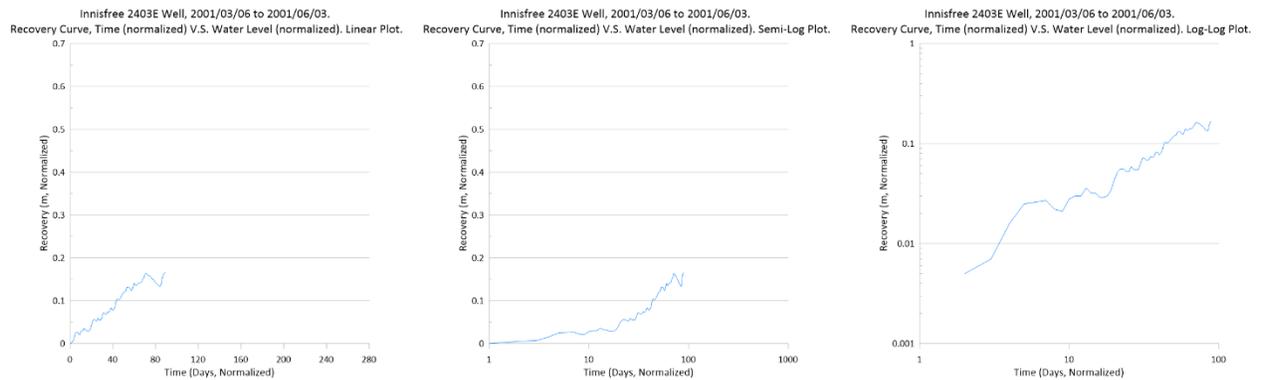


Figure 617: Recovery curve plots for Innisfree 2403E_0235 well, 2001/03/06 to 2001/06/03. Surficial aquifer.

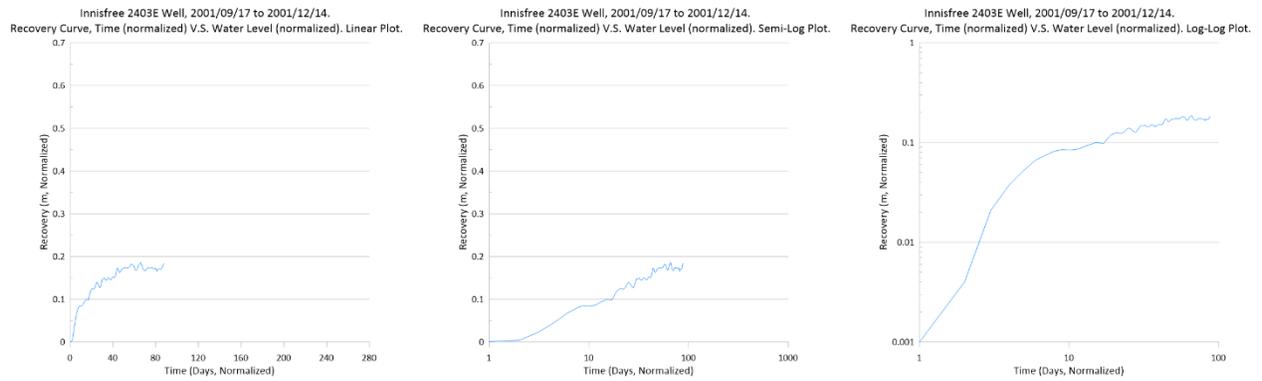


Figure 618: Recovery curve plots for Innisfree 2403E_0235 well, 2001/09/17 to 2001/12/14. Surficial aquifer.

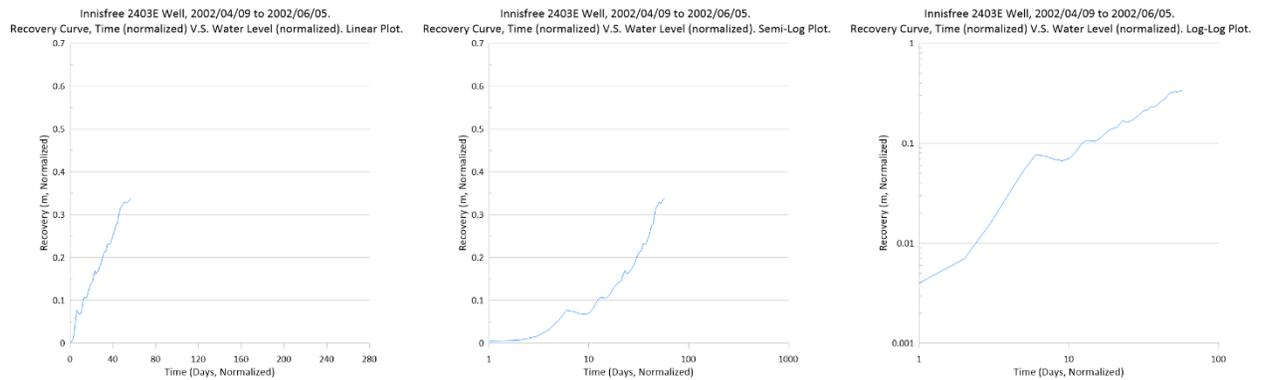


Figure 619: Recovery curve plots for Innisfree 2403E_0235 well, 2002/04/09 to 2002/06/05. Surficial aquifer.

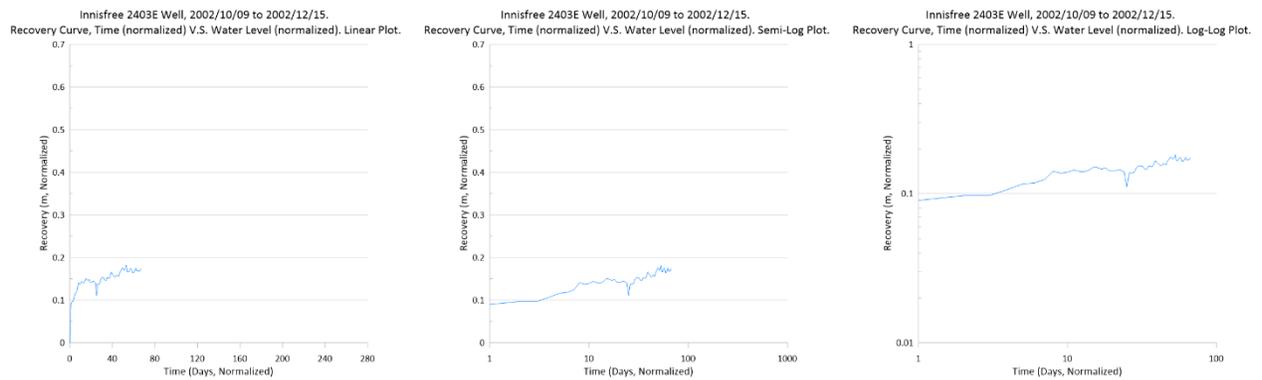


Figure 620: Recovery curve plots for Innisfree 2403E_0235 well, 2002/10/09 to 2002/12/15. Surficial aquifer.

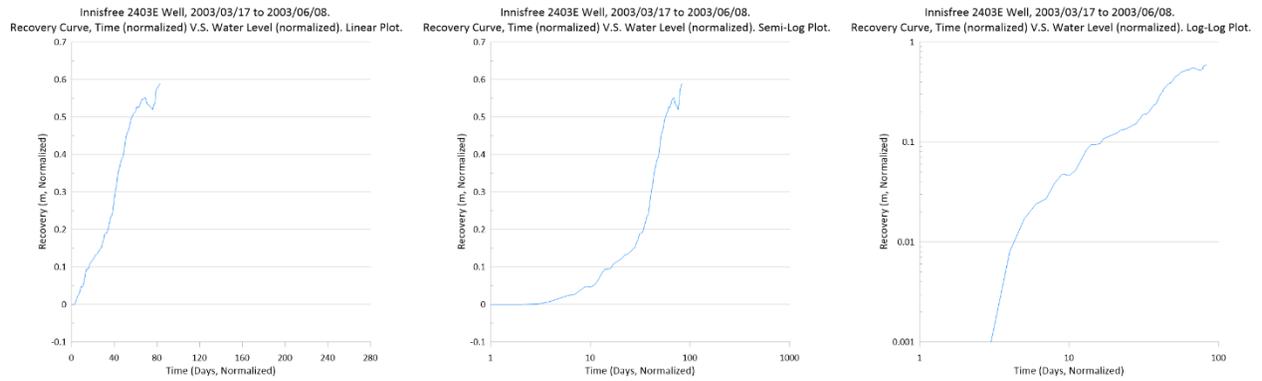


Figure 621: Recovery curve plots for Innisfree 2403E_0235 well, 2001/03/17 to 2003/06/08. Surficial aquifer.

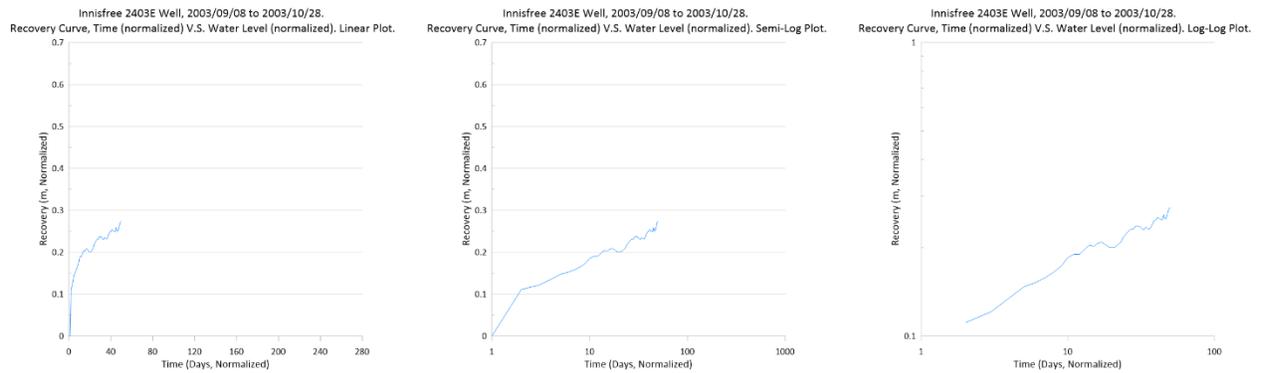


Figure 622: Recovery curve plots for Innisfree 2403E_0235 well, 2003/09/08 to 2003/10/28. Surficial aquifer.

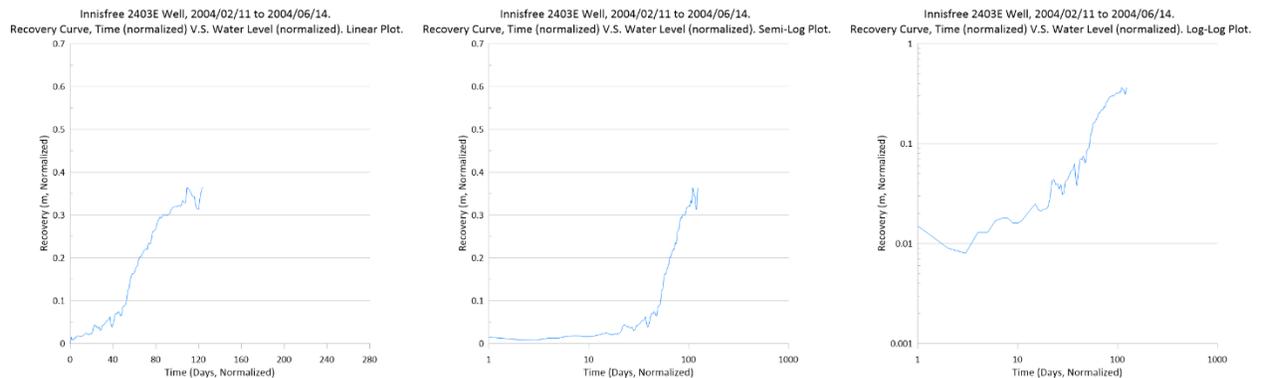


Figure 623: Recovery curve plots for Innisfree 2403E_0235 well, 2004/02/11 to 2004/06/14. Surficial aquifer.

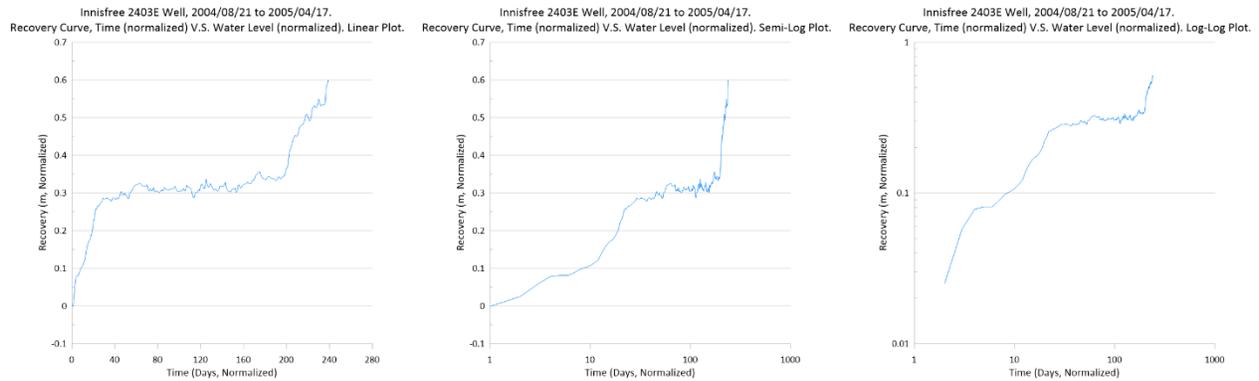


Figure 624: Recovery curve plots for Innisfree 2403E_0235 well, 2004/08/21 to 2005/04/17. Surficial aquifer.

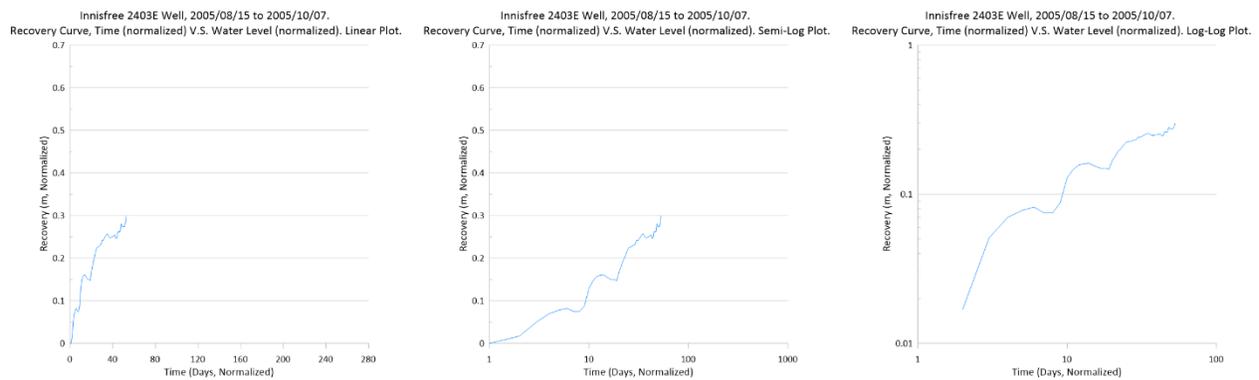


Figure 625: Recovery curve plots for Innisfree 2403E_0235 well, 2005/08/15 to 2005/10/07. Surficial aquifer.

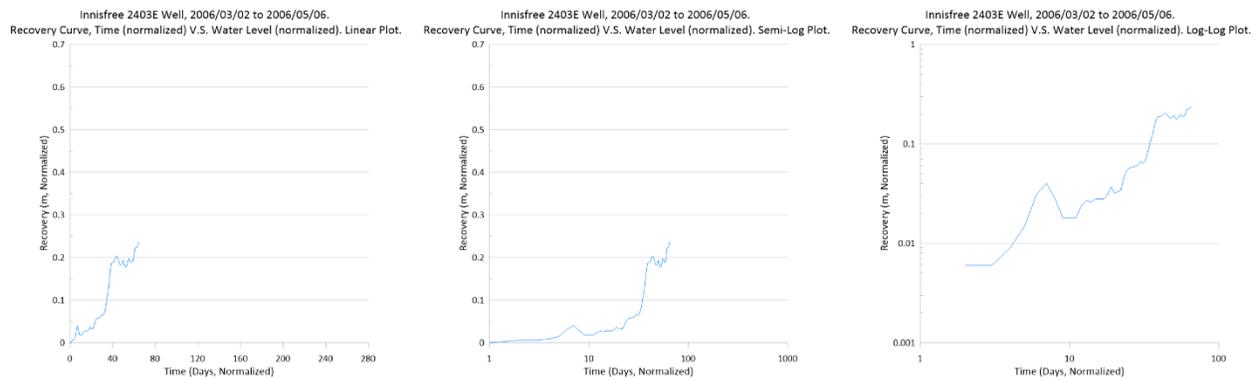


Figure 626: Recovery curve plots for Innisfree 2403E_0235 well, 2006/03/02 to 2006/05/06. Surficial aquifer.

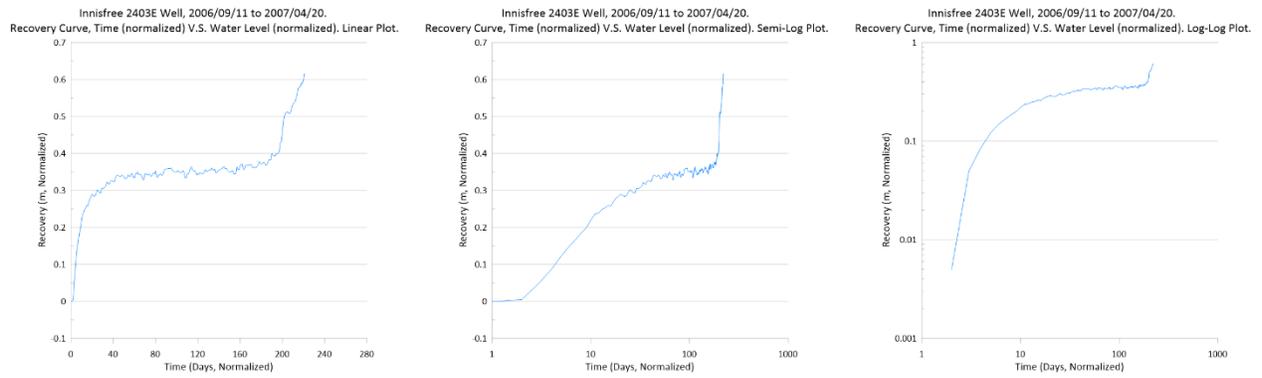


Figure 627: Recovery curve plots for Innisfree 2403E_0235 well, 2006/09/11 to 2007/04/20. Surficial aquifer.

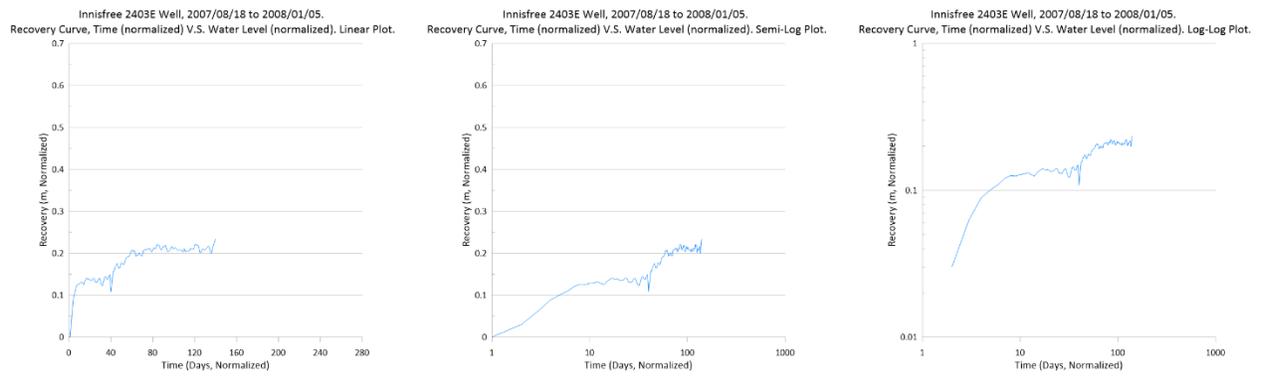


Figure 628: Recovery curve plots for Innisfree 2403E_0235 well, 2007/08/18 to 2008/01/05. Surficial aquifer.

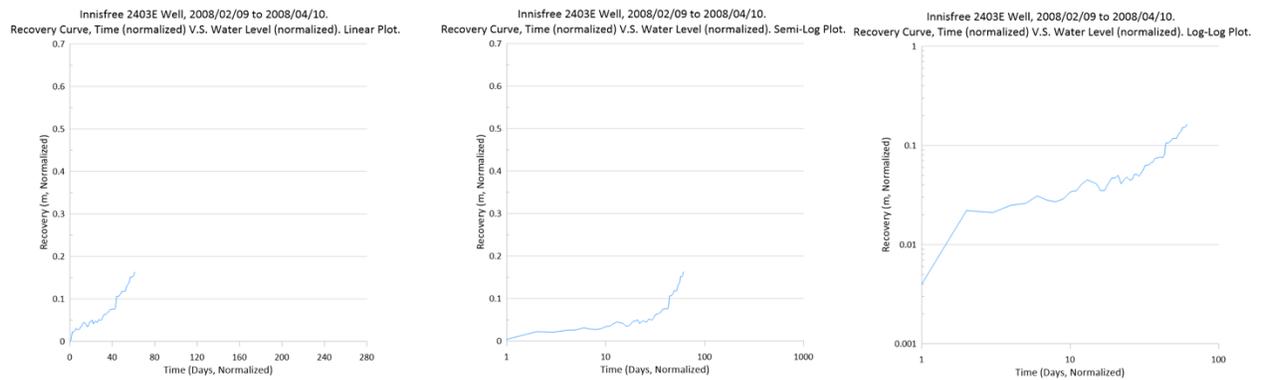


Figure 629: Recovery curve plots for Innisfree 2403E_0235 well, 2008/02/09 to 2008/04/10. Surficial aquifer.

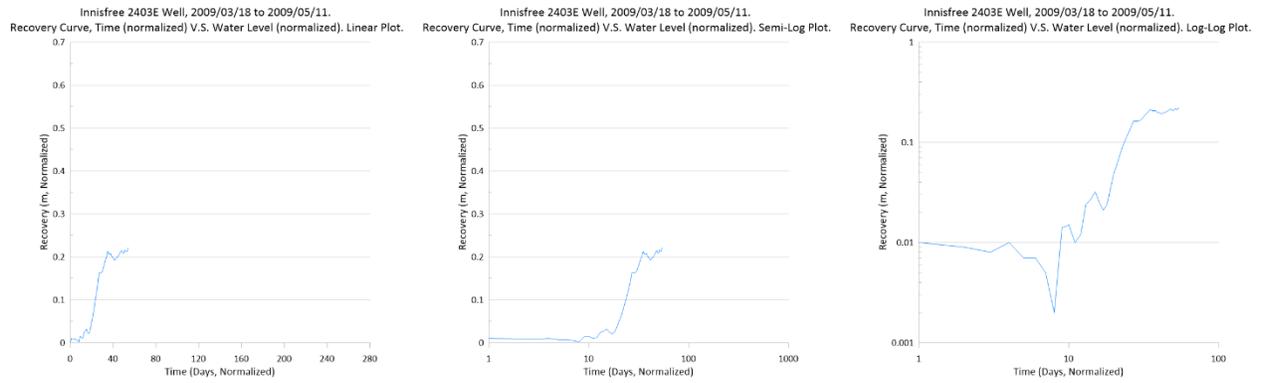


Figure 630: Recovery curve plots for Innisfree 2403E_0235 well, 2009/03/18 to 2009/05/11. Surficial aquifer.

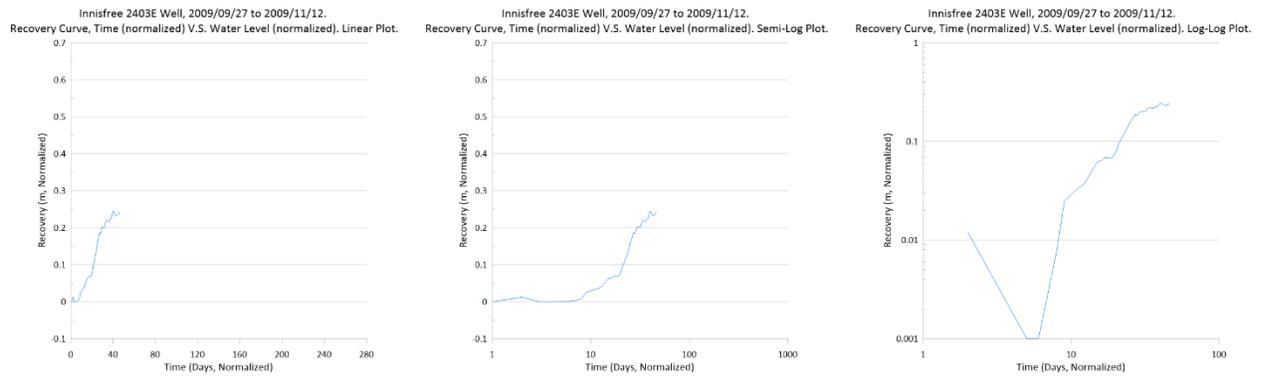


Figure 631: Recovery curve plots for Innisfree 2403E_0235 well, 2009/09/27 to 2009/11/12. Surficial aquifer.

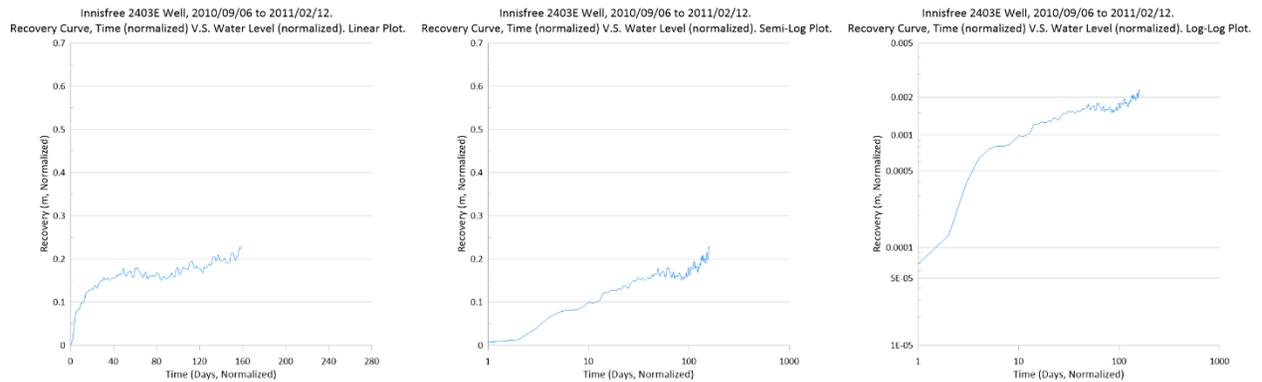


Figure 632: Recovery curve plots for Innisfree 2403E_0235 well, 2010/09/06 to 2011/02/12. Surficial aquifer.

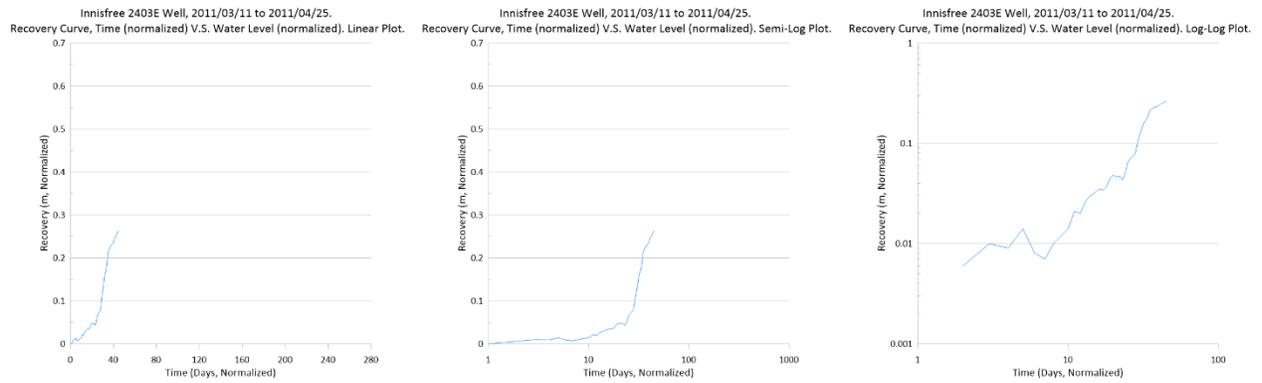


Figure 633: Recovery curve plots for Innisfree 2403E_0235 well, 2011/03/11 to 2011/04/25. Surficial aquifer.

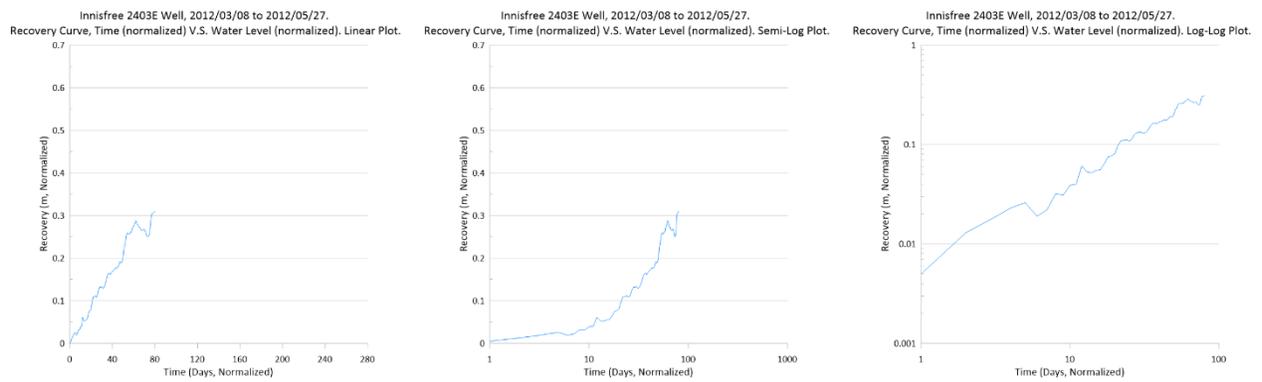


Figure 634: Recovery curve plots for Innisfree 2403E_0235 well, 2012/03/08 to 2012/05/27. Surficial aquifer.

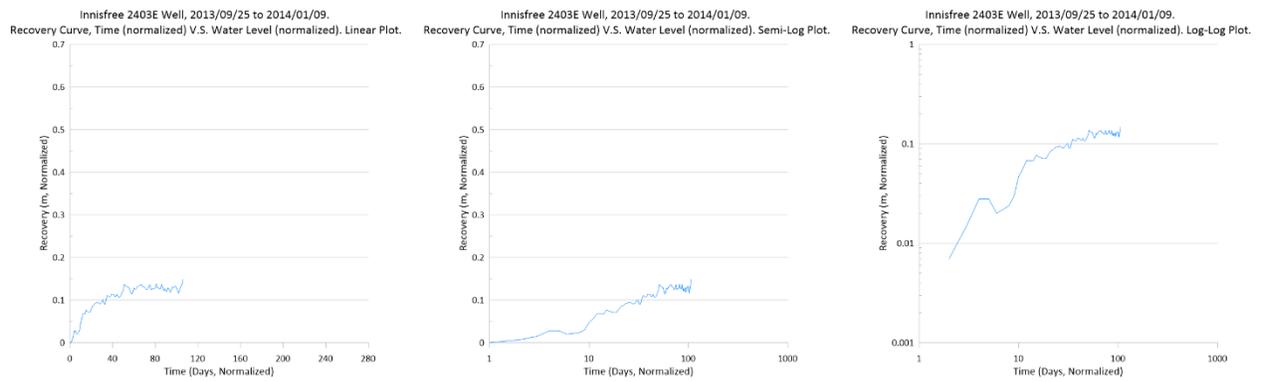


Figure 635: Recovery curve plots for Innisfree 2403E_0235 well, 2013/09/25 to 2014/01/09. Surficial aquifer.

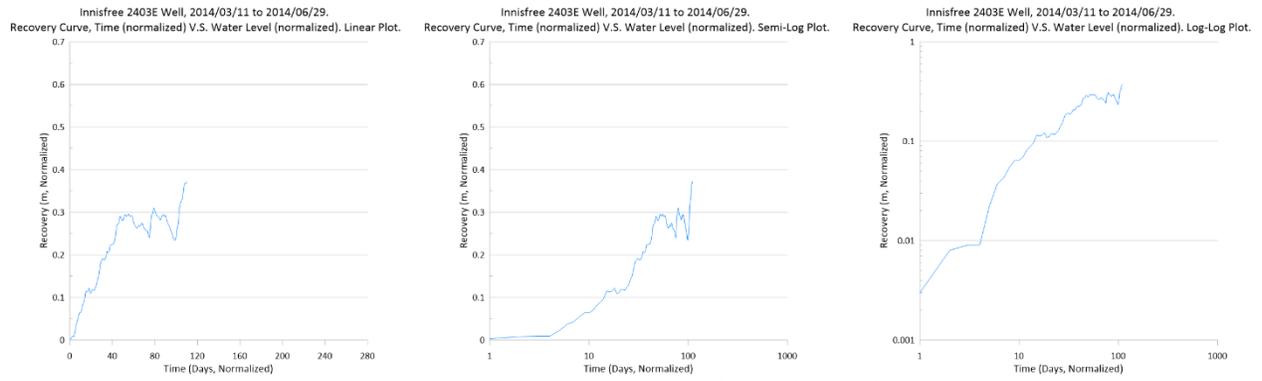


Figure 636: Recovery curve plots for Innisfree 2403E_0235 well, 2014/03/11 to 2014/06/29. Surficial aquifer.

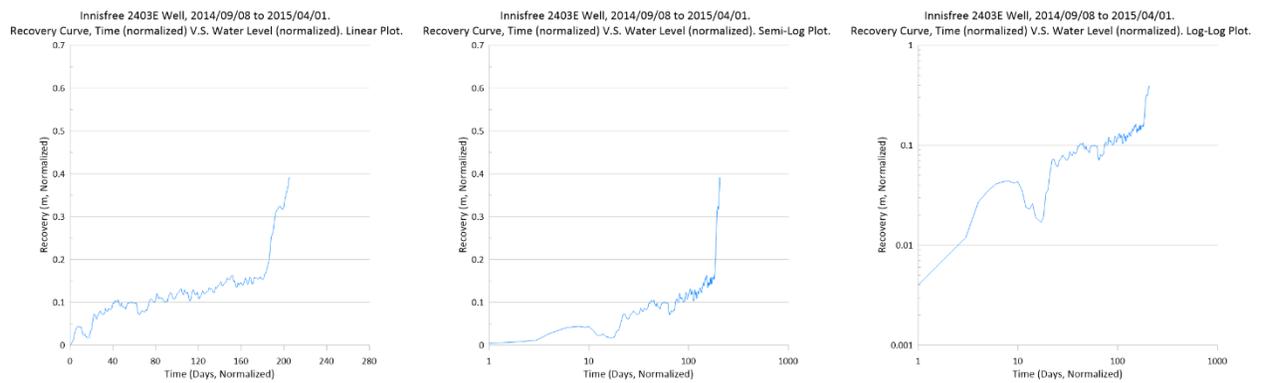


Figure 637: Recovery curve plots for Innisfree 2403E_0235 well, 2014/09/08 to 2015/04/01. Surficial aquifer.

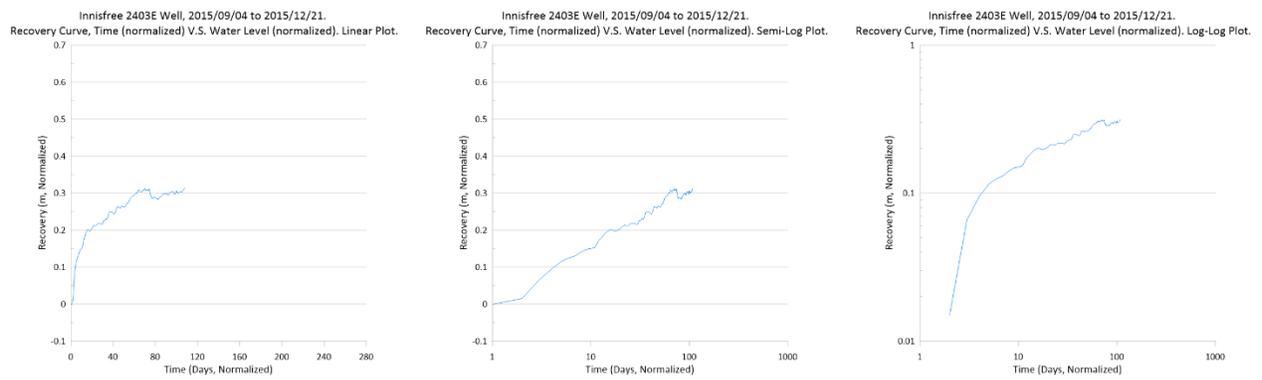


Figure 638: Recovery curve plots for Innisfree 2403E_0235 well, 2015/09/04 to 2015/12/21. Surficial aquifer.

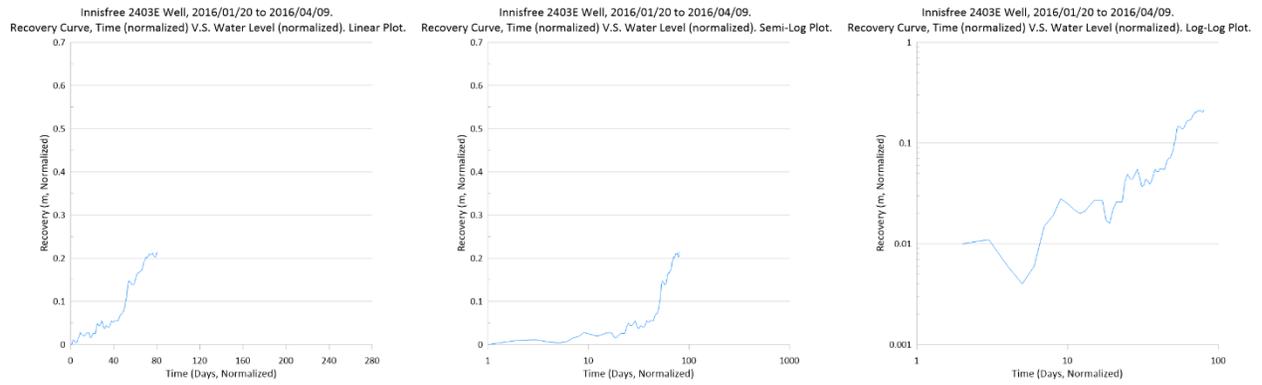


Figure 639: Recovery curve plots for Innisfree 2403E_0235 well, 2016/01/20 to 2016/04/09. Surficial aquifer.

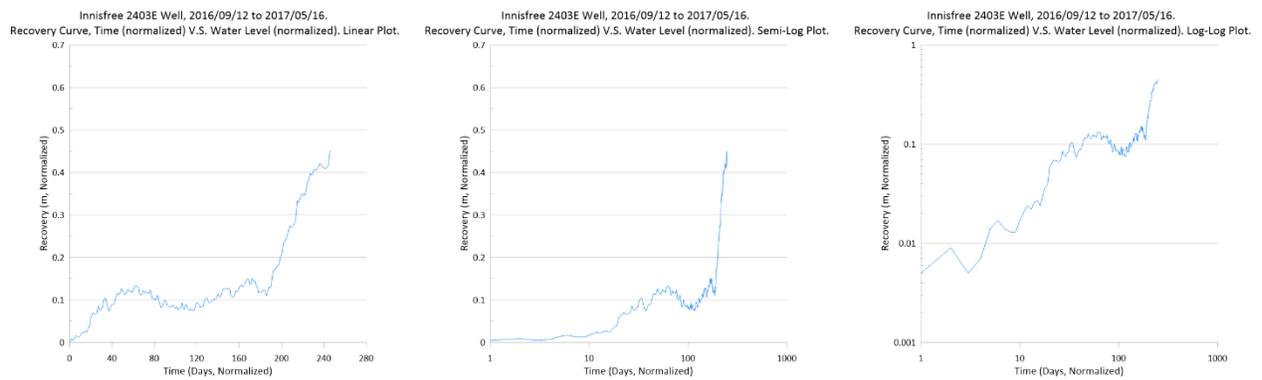


Figure 640: Recovery curve plots for Innisfree 2403E_0235 well, 2016/09/12 to 2017/05/16. Surficial aquifer.

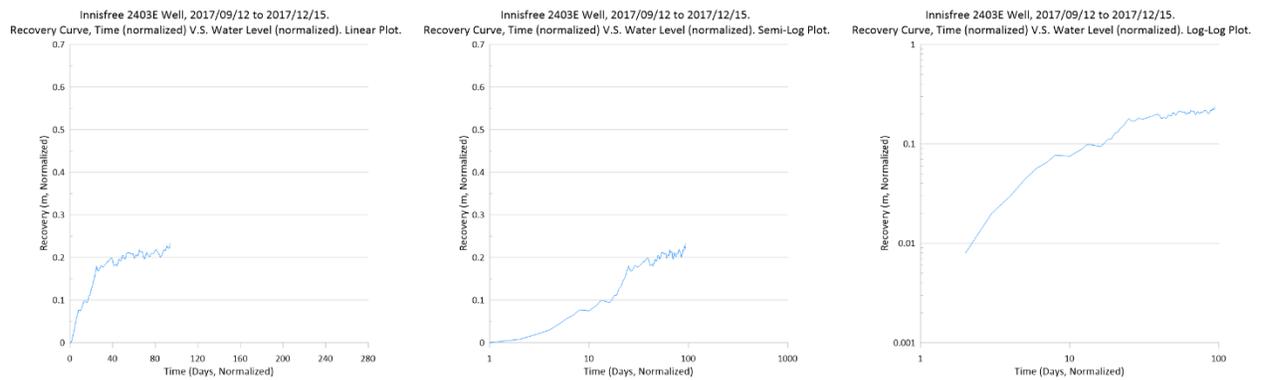


Figure 641: Recovery curve plots for Innisfree 2403E_0235 well, 2017/09/12 to 2017/12/15. Surficial aquifer.

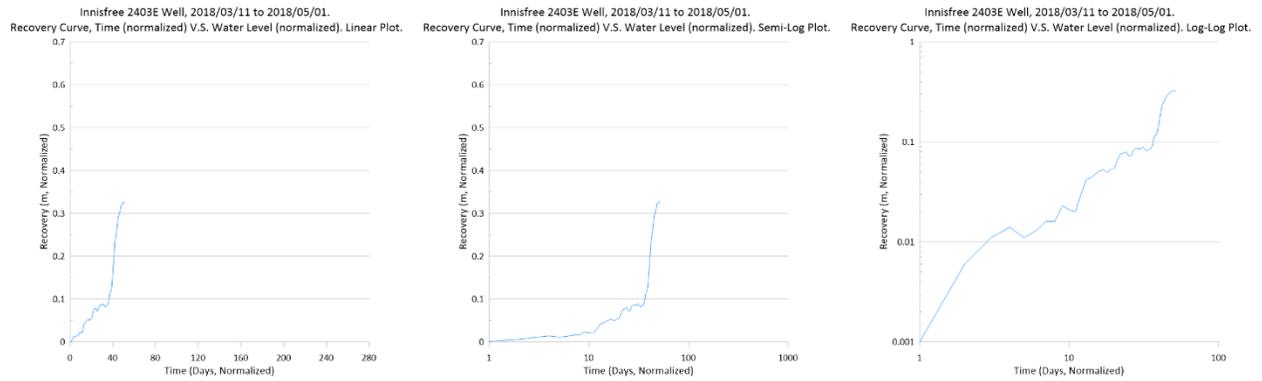


Figure 642: Recovery curve plots for Innisfree 2403E_0235 well, 2018/03/11 to 2018/05/01. Surficial aquifer.

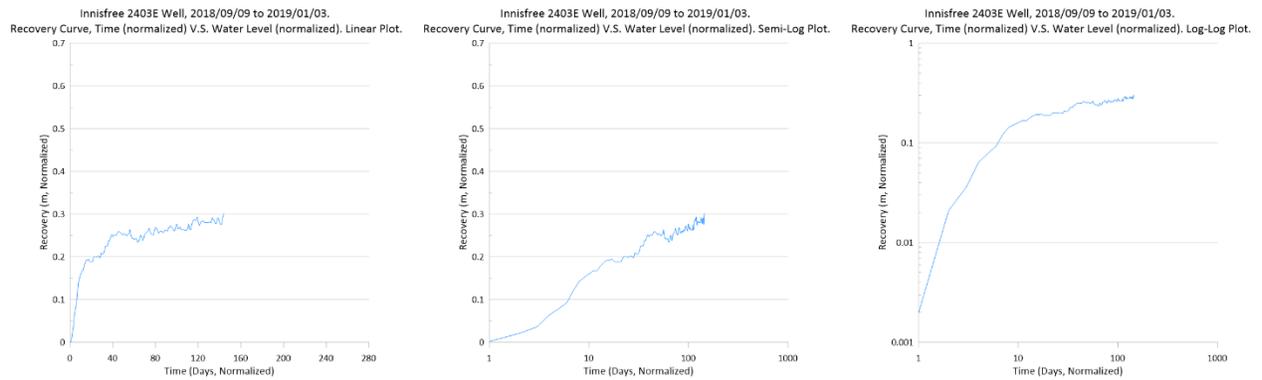


Figure 643: Recovery curve plots for Innisfree 2403E_0235 well, 2018/09/09 to 2019/01/03. Surficial aquifer.

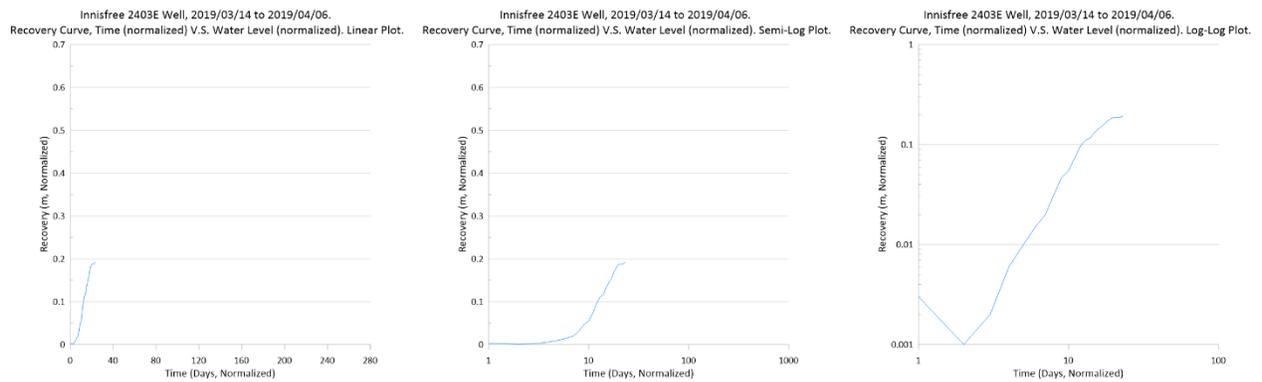


Figure 644: Recovery curve plots for Innisfree 2403E_0235 well, 2019/03/14 to 2019/04/06. Surficial aquifer.

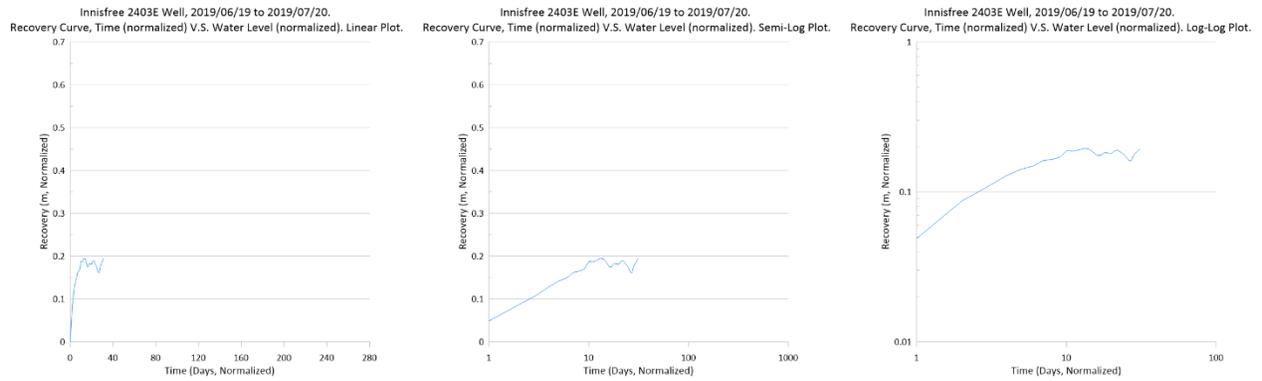


Figure 645: Recovery curve plots for Innisfree 2403E_0235 well, 2019/06/19 to 2019/07/20. Surficial aquifer.

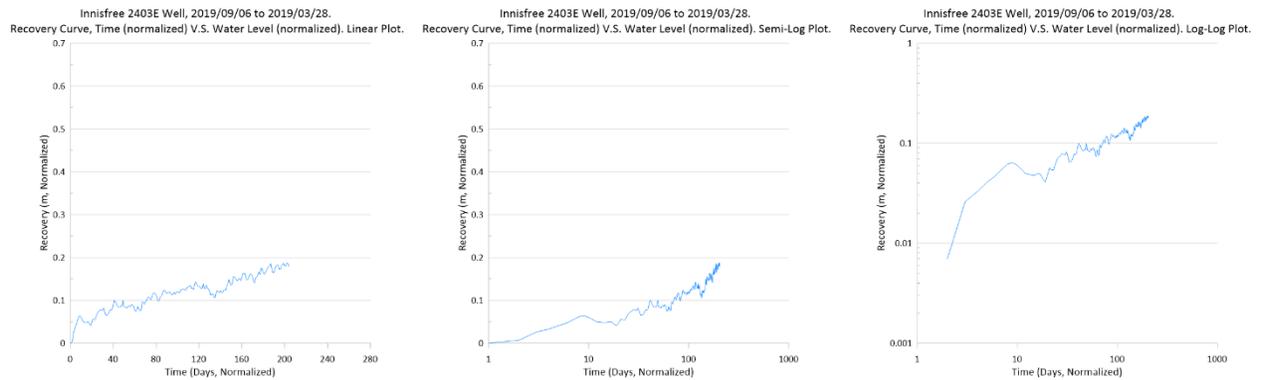


Figure 646: Recovery curve plots for Innisfree 2403E_0235 well, 2019/09/06 to 2019/03/28. Surficial aquifer.

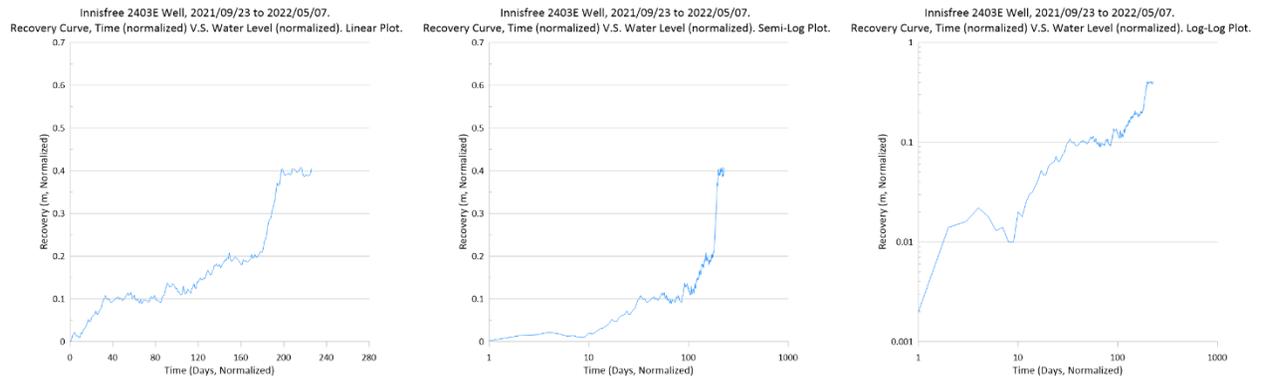


Figure 647: Recovery curve plots for Innisfree 2403E_0235 well, 2021/09/23 to 2022/05/07. Surficial aquifer.

Appendix I13: GOWN Monitoring Well Recovery Curve Plots for Leedale Shallow_3022 Well

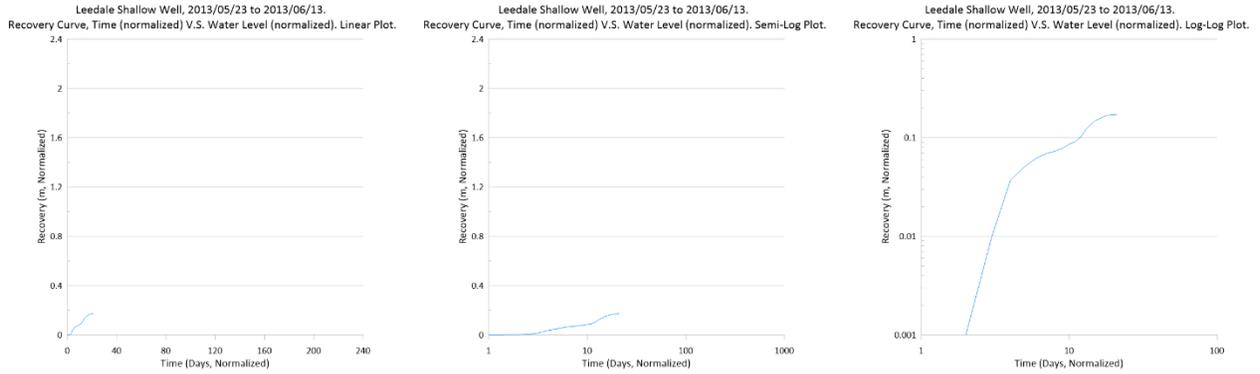


Figure 648: Recovery curve plots for Leedale Shallow_3022 well, 2013/05/23 to 2013/06/13. Surficial aquifer.

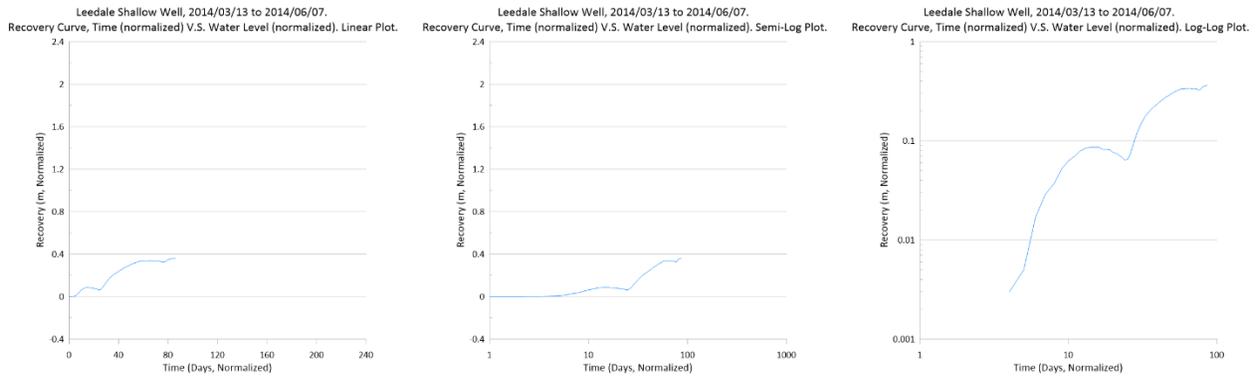


Figure 649: Recovery curve plots for Leedale Shallow_3022 well, 2014/03/13 to 2014/06/07. Surficial aquifer.

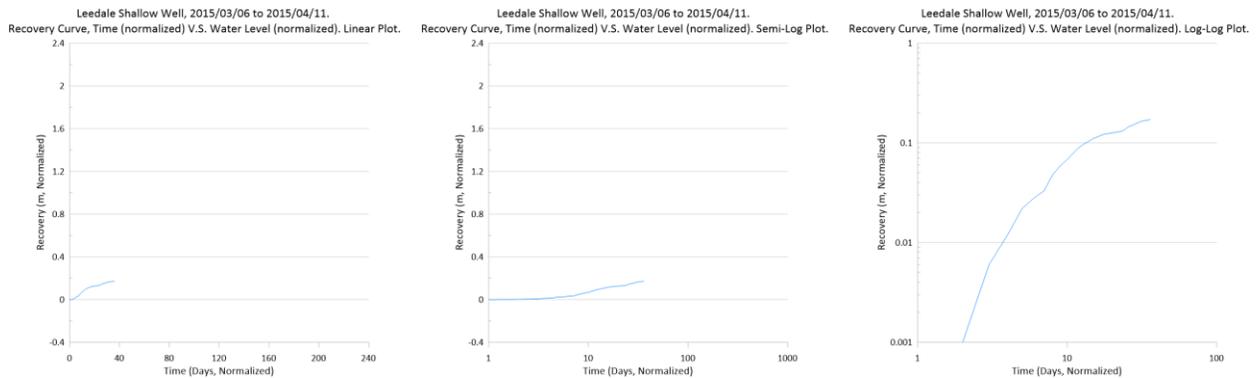


Figure 650: Recovery curve plots for Leedale Shallow_3022 well, 2015/03/06 to 2015/04/11. Surficial aquifer.

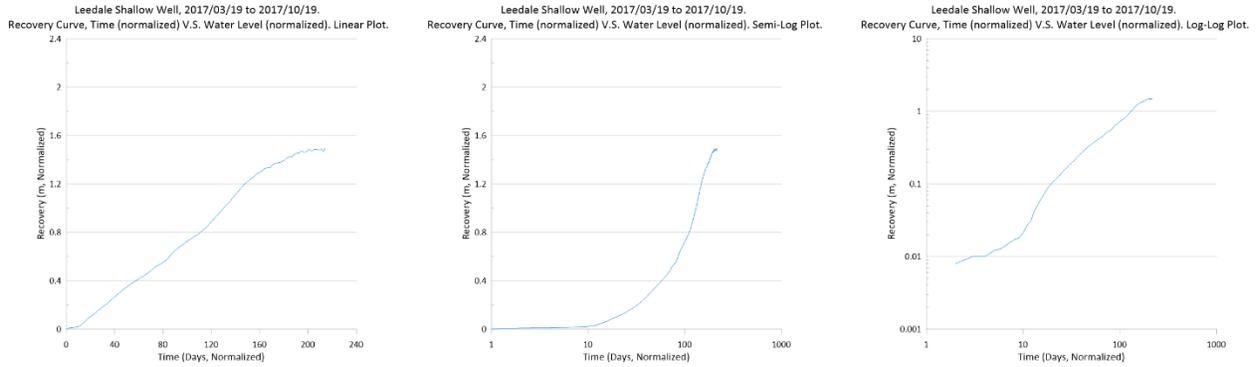


Figure 651: Recovery curve plots for Leedale Shallow_3022 well, 2017/03/19 to 2017/10/19. Surficial aquifer.

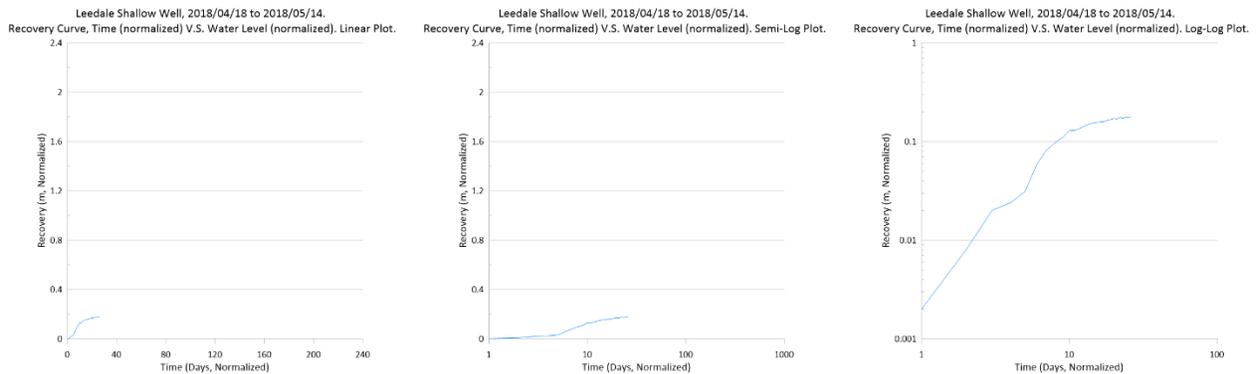


Figure 652: Recovery curve plots for Leedale Shallow_3022 well, 2018/04/18 to 2018/05/14. Surficial aquifer.

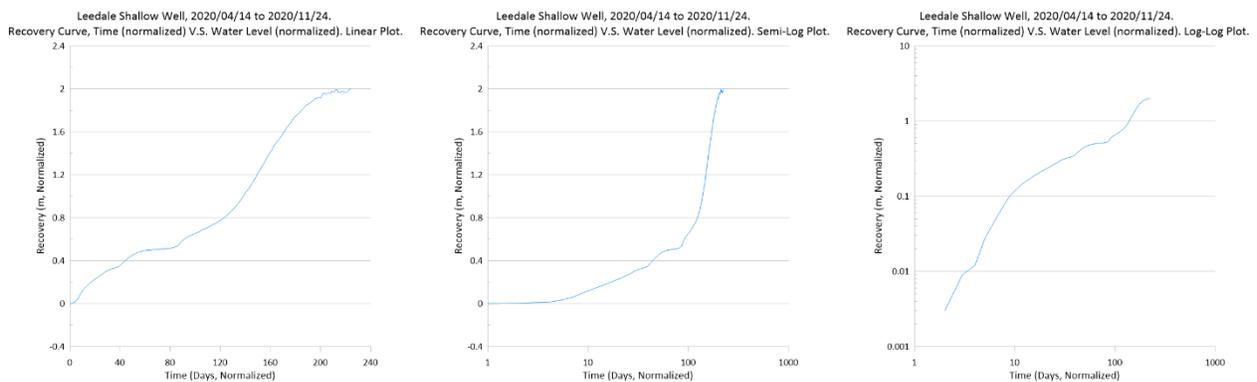


Figure 653: Recovery curve plots for Leedale Shallow_3022 well, 2020/04/14 to 2020/11/24. Surficial aquifer.

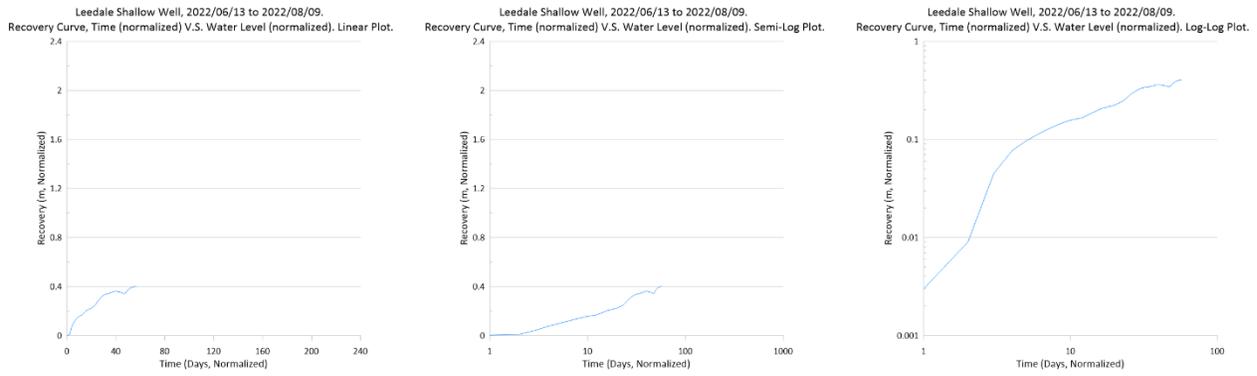


Figure 654: Recovery curve plots for Leedale Shallow_3022 well, 2022/06/13 to 2022/08/09. Surficial aquifer.

Appendix I14: GOWN Monitoring Well Recovery Curve Plots for Bruderheim 2343E #1 North_0178 Well

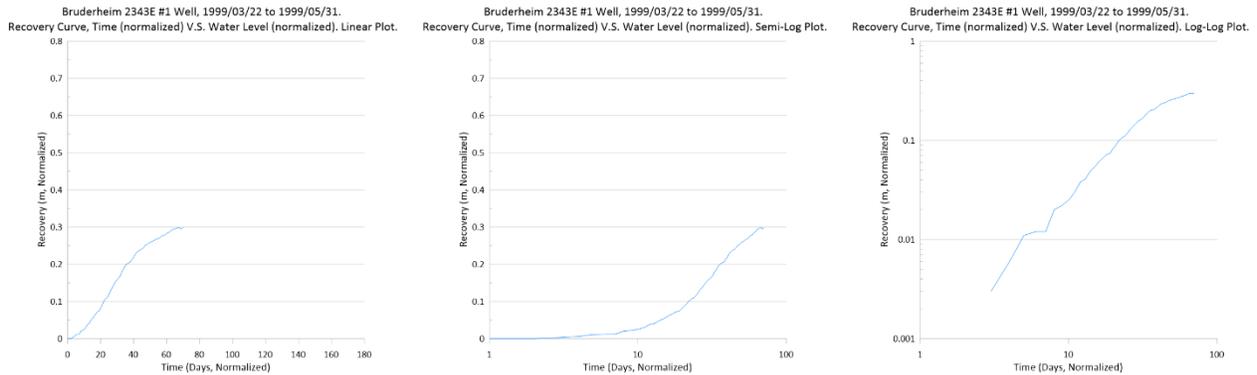


Figure 655: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 1999/03/22 to 1999/05/31. Surficial aquifer.

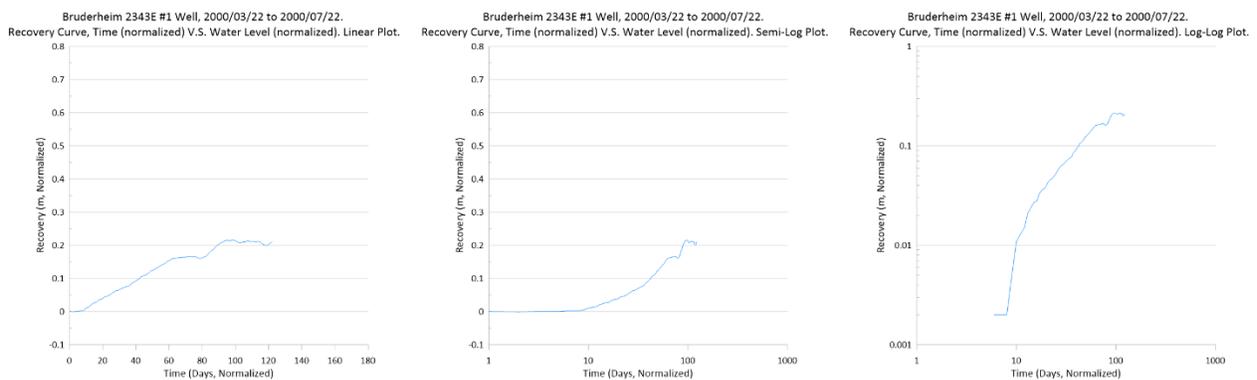


Figure 656: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2000/03/22 to 2000/07/22. Surficial aquifer.

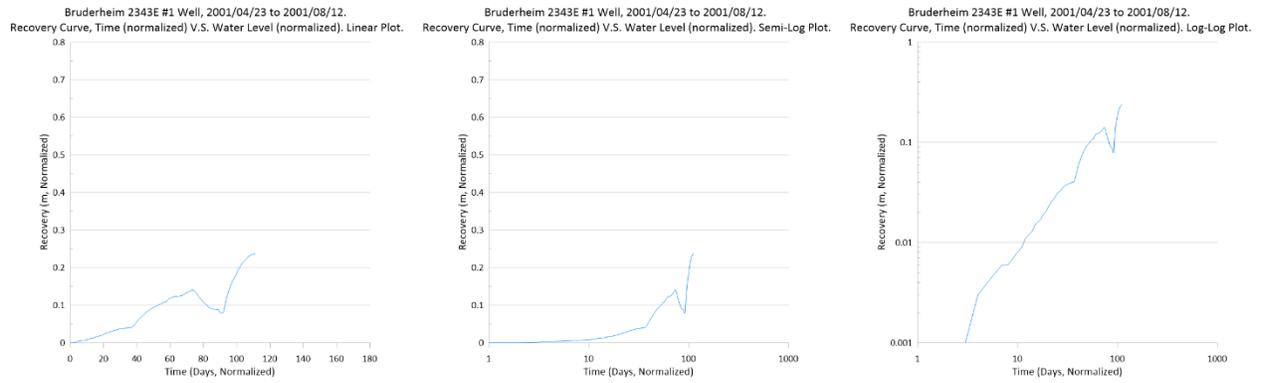


Figure 657: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2001/04/23 to 2001/08/12. Surficial aquifer.

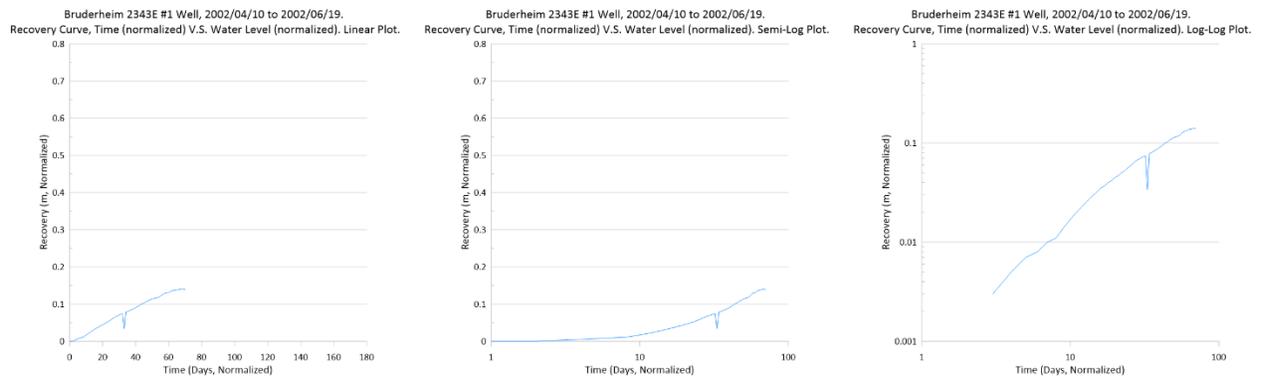


Figure 658: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2002/04/10 to 2002/06/19. Surficial aquifer.

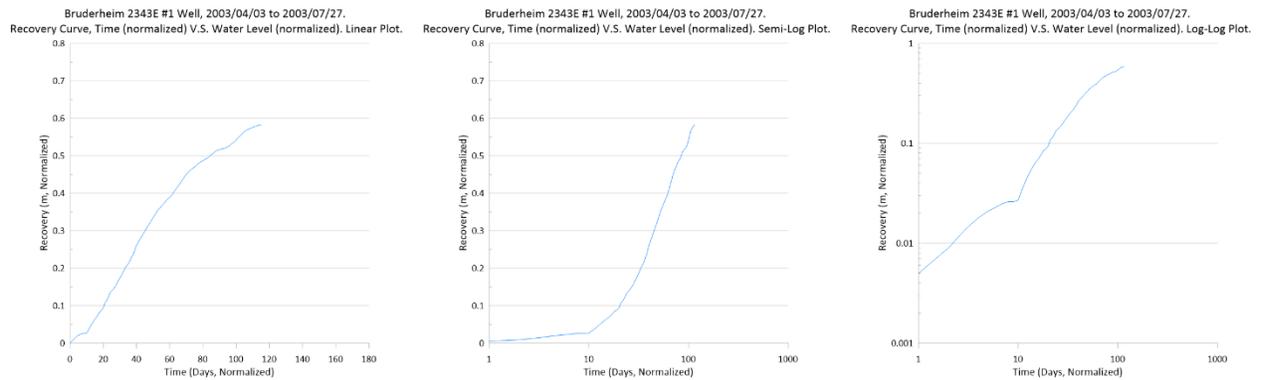


Figure 659: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2003/04/03 to 2003/07/27. Surficial aquifer.

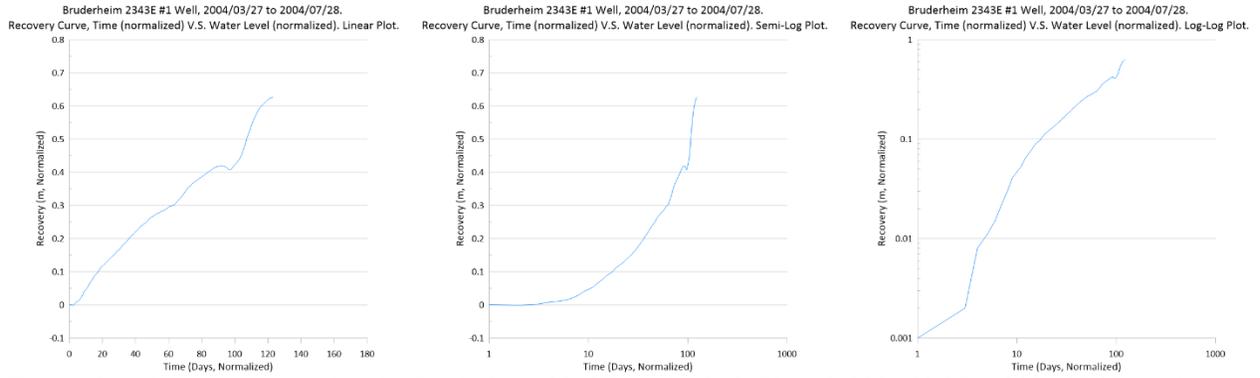


Figure 660: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2004/03/27 to 2004/07/28. Surficial aquifer.

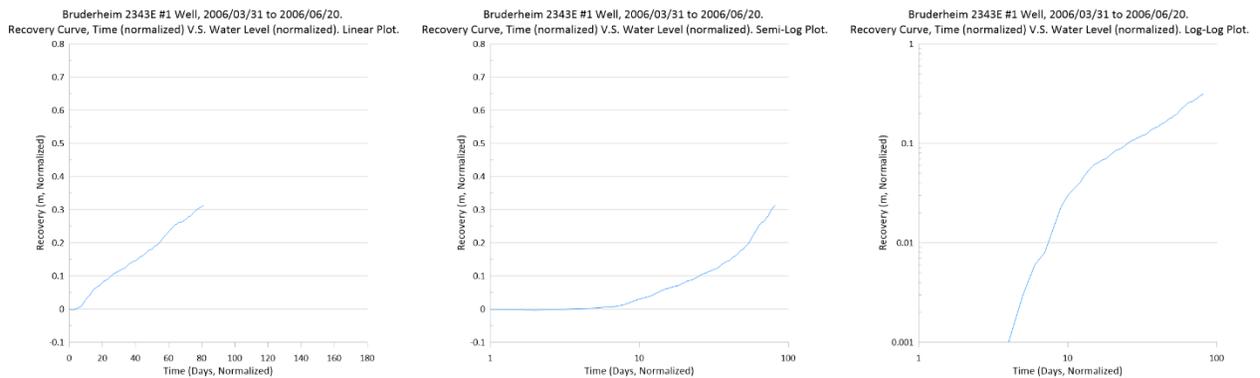


Figure 661: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2006/03/31 to 2006/06/20. Surficial aquifer.

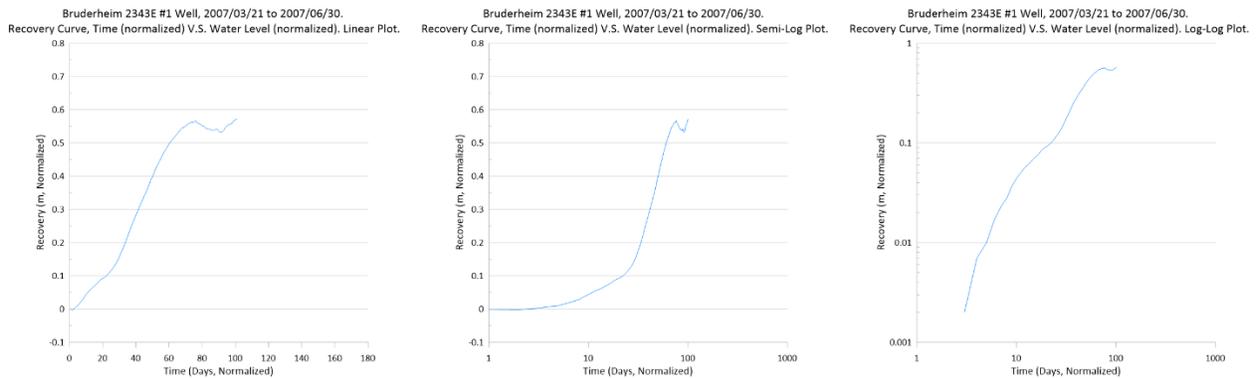


Figure 662: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2007/03/21 to 2007/06/30. Surficial aquifer.

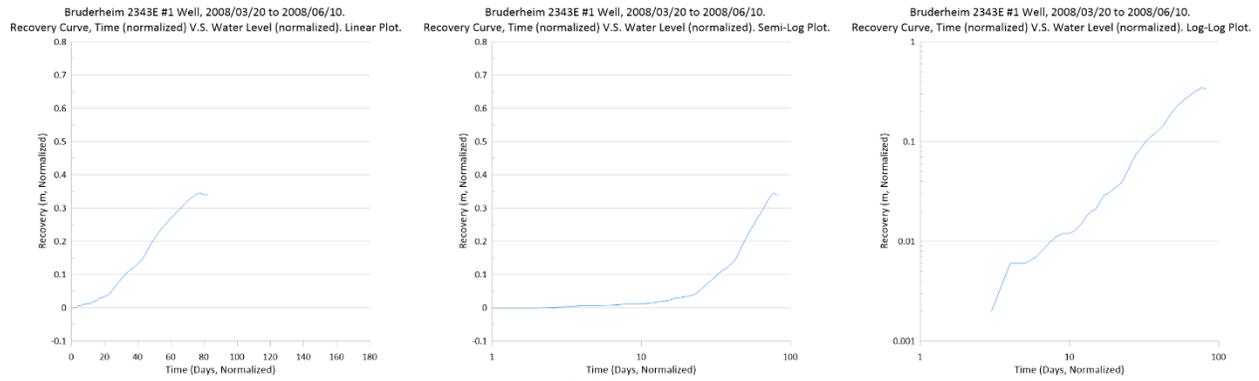


Figure 663: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2008/03/20 to 2008/06/10. Surficial aquifer.

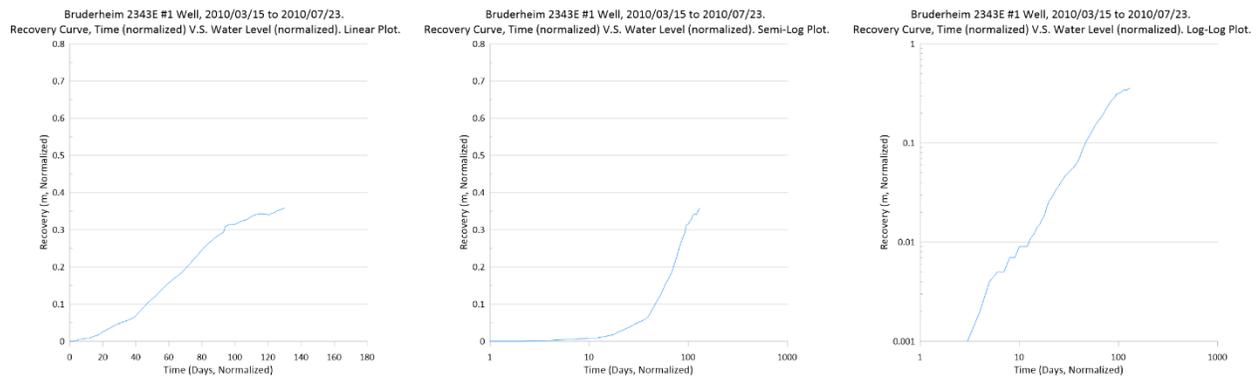


Figure 664: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2010/03/15 to 2010/07/23. Surficial aquifer.

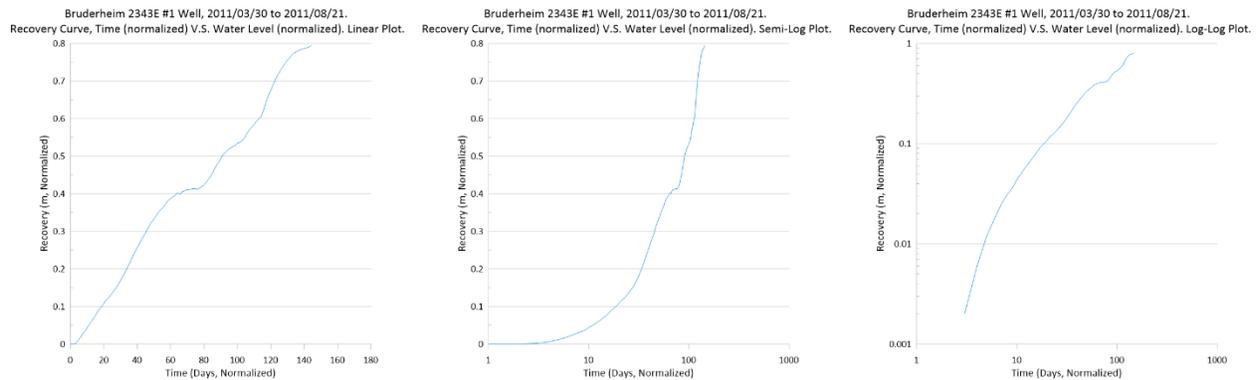


Figure 665: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2011/03/30 to 2011/08/21. Surficial aquifer.

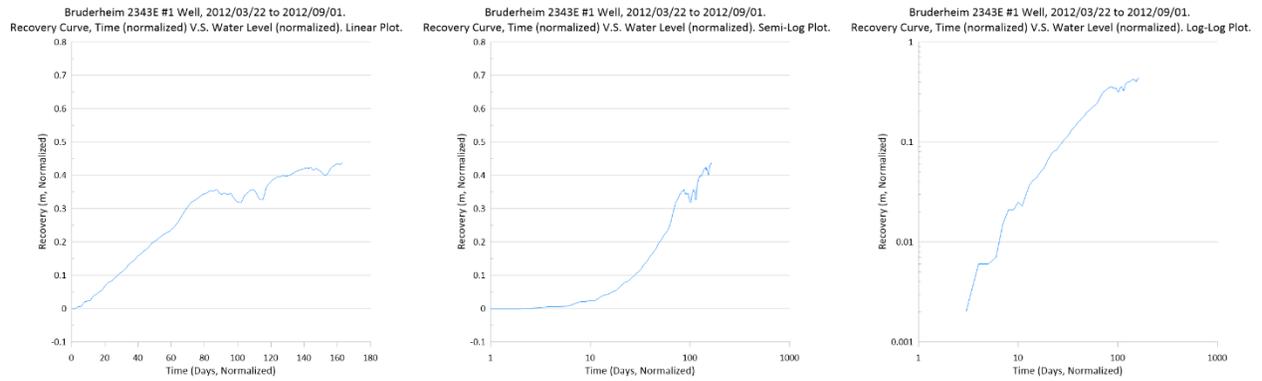


Figure 666: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2012/03/22 to 2012/09/01. Surficial aquifer.

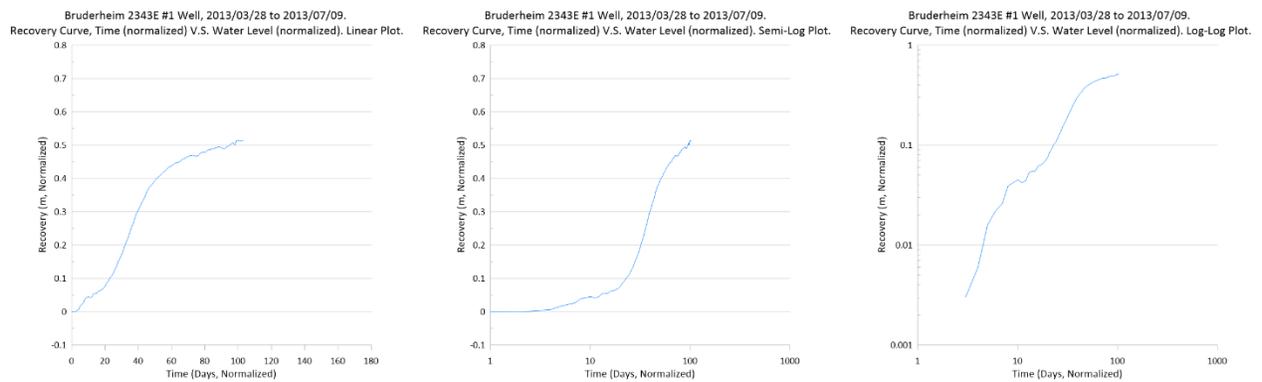


Figure 667: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2013/03/28 to 2013/07/09. Surficial aquifer.

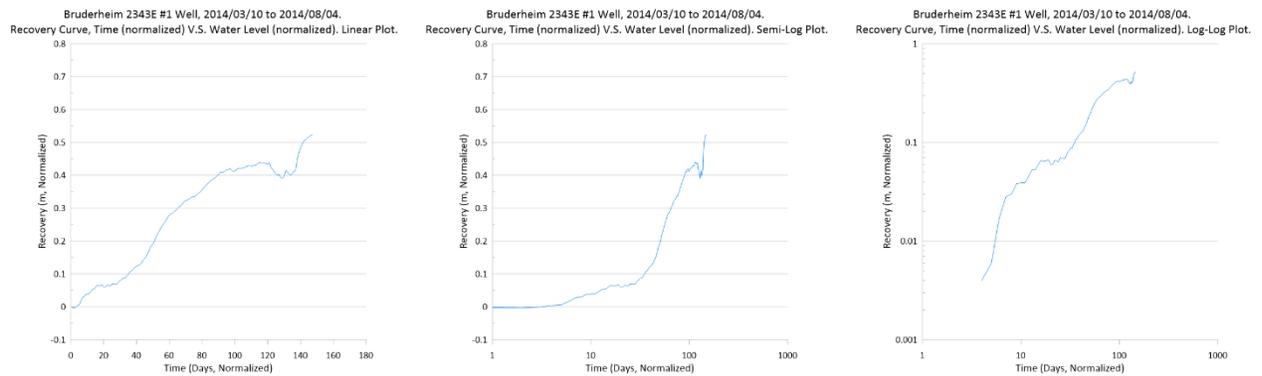


Figure 668: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2014/03/10 to 2014/08/04. Surficial aquifer.

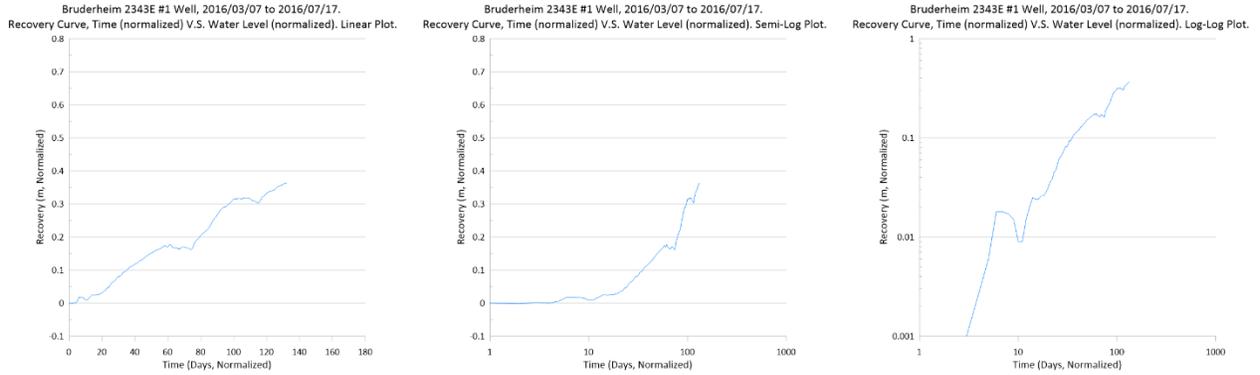


Figure 669: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2016/03/07 to 2016/07/17. Surficial aquifer.

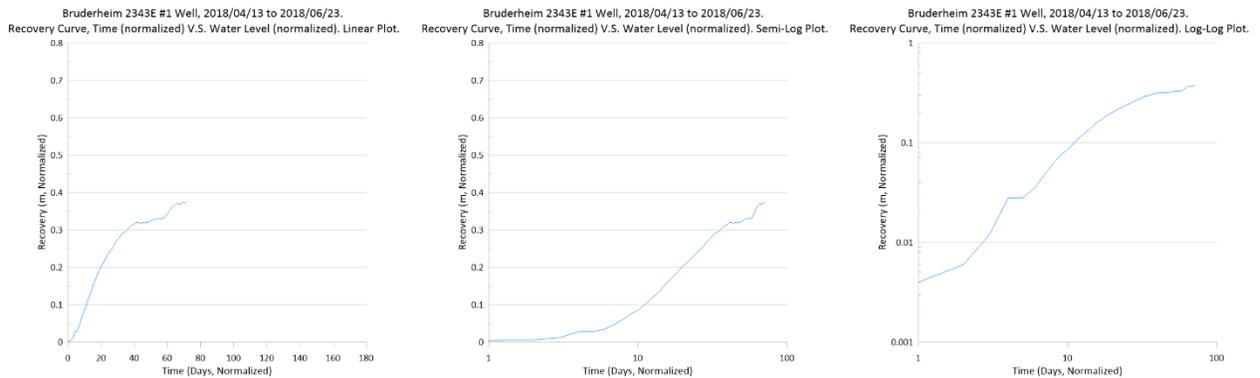


Figure 670: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2018/04/13 to 2018/06/23. Surficial aquifer.

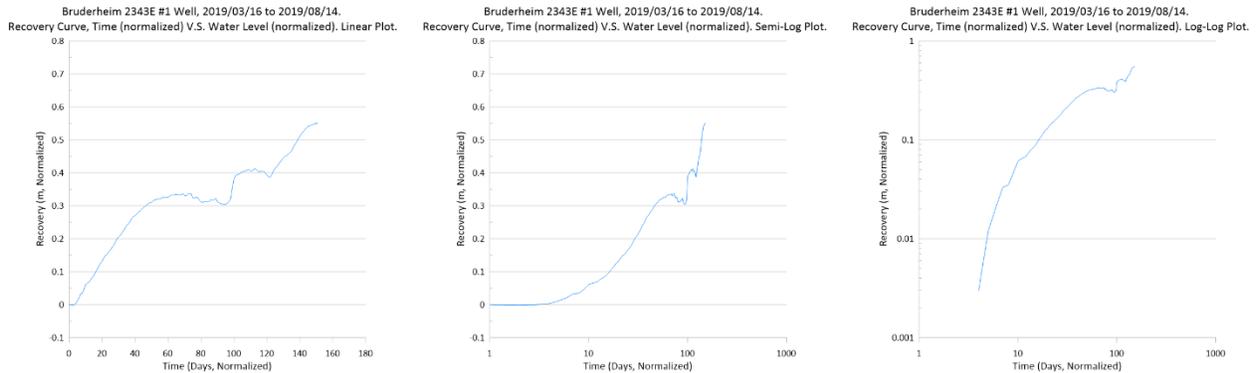


Figure 671: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2019/03/16 to 2019/08/14. Surficial aquifer.

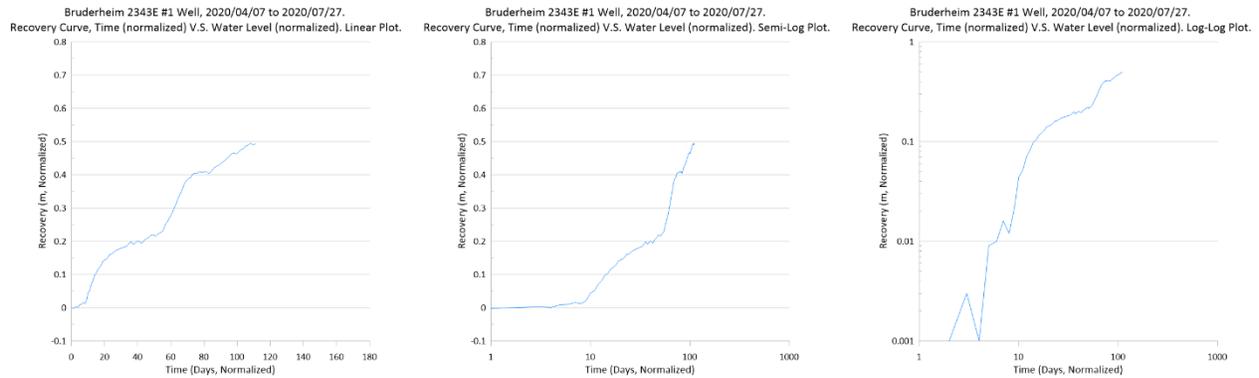


Figure 672: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2020/04/07 to 2020/07/27. Surficial aquifer.

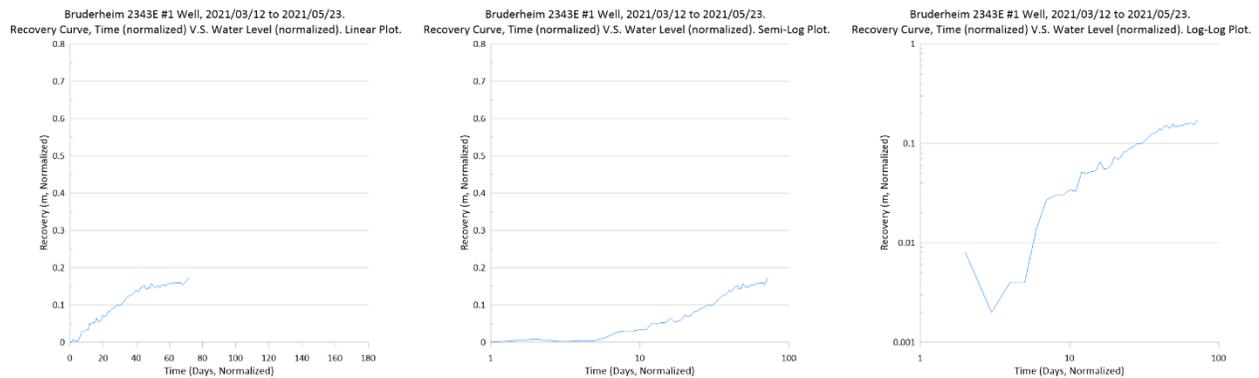


Figure 673: Recovery curve plots for Bruderheim 2343E #1 North_0178 well, 2021/03/12 to 2021/05/23. Surficial aquifer.

Appendix I15: GOWN Monitoring Well Recovery Curve Plots for Bruderheim North_3069 Well

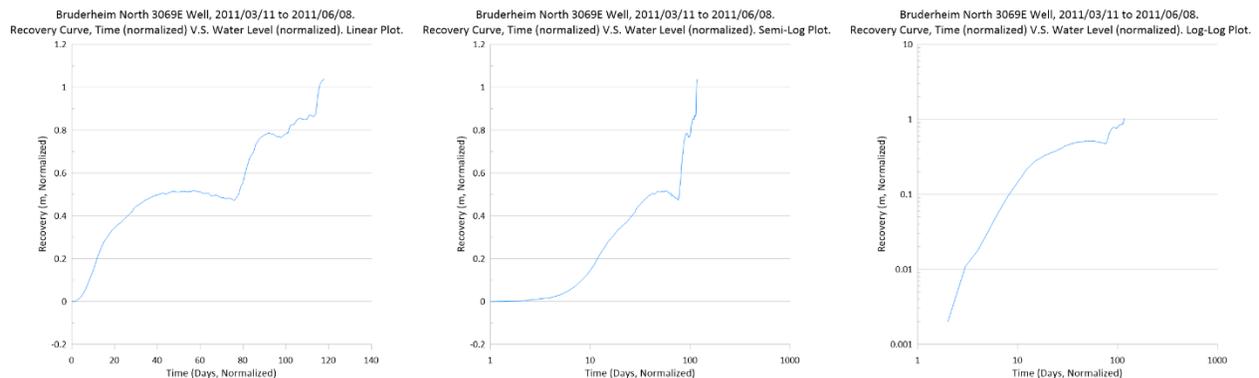


Figure 674: Recovery curve plots for Bruderheim North_3069 well, 2011/03/11 to 2011/06/08. Surficial aquifer.

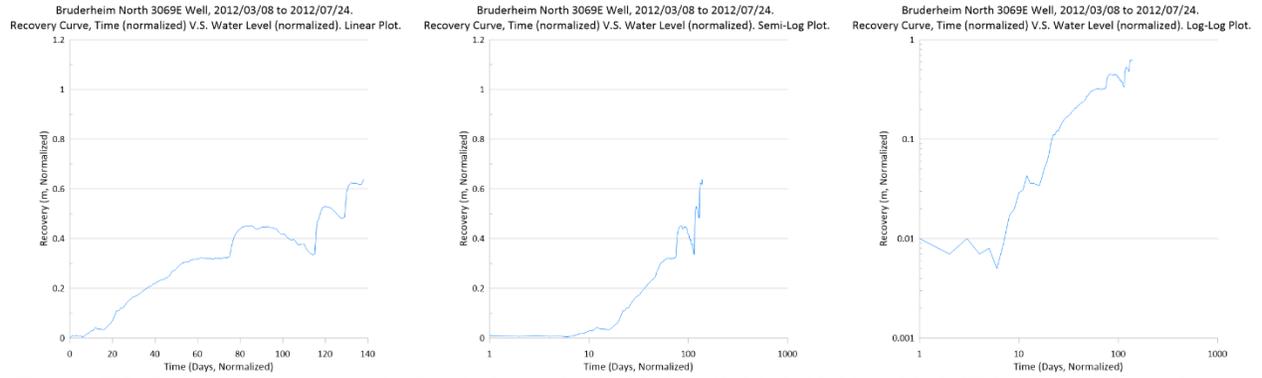


Figure 675: Recovery curve plots for Bruderheim North_3069 well, 2012/03/08 to 2012/07/24. Surficial aquifer.

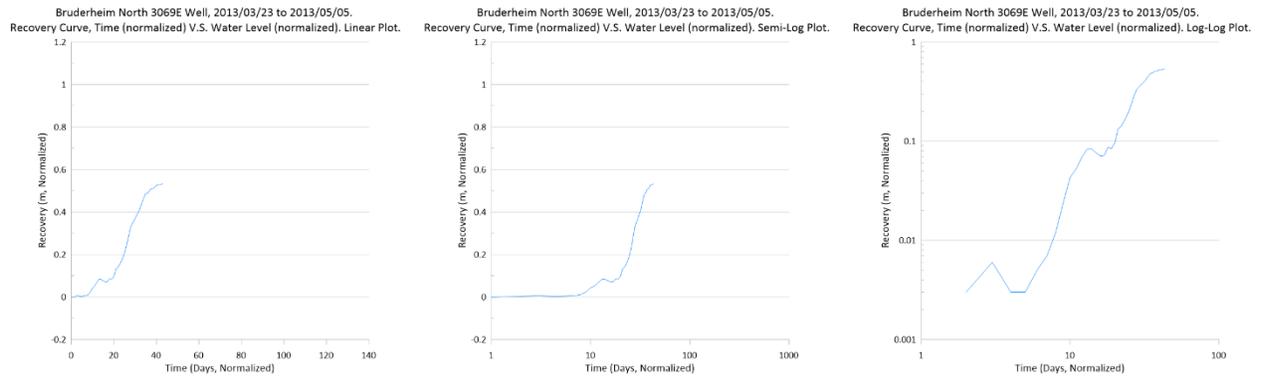


Figure 676: Recovery curve plots for Bruderheim North_3069 well, 2013/03/23 to 2013/05/05. Surficial aquifer.

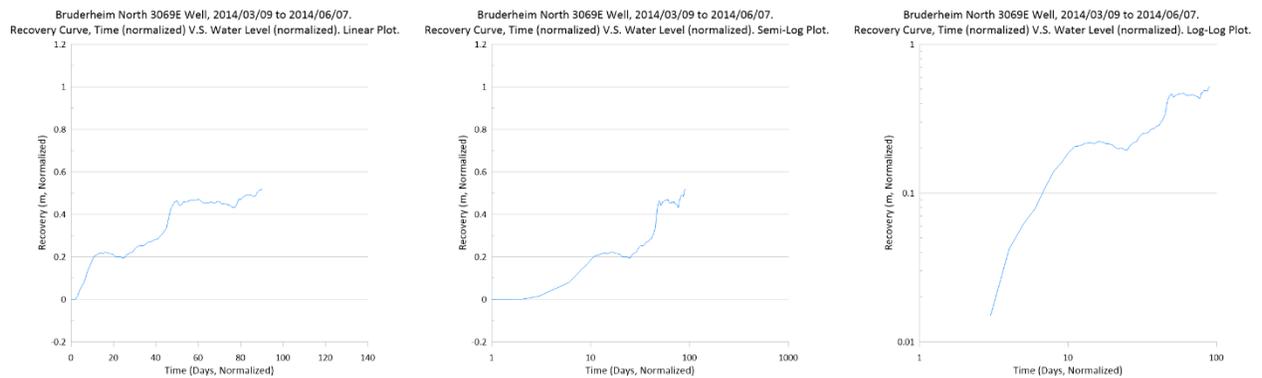


Figure 677: Recovery curve plots for Bruderheim North_3069 well, 2014/03/09 to 2014/06/07. Surficial aquifer.

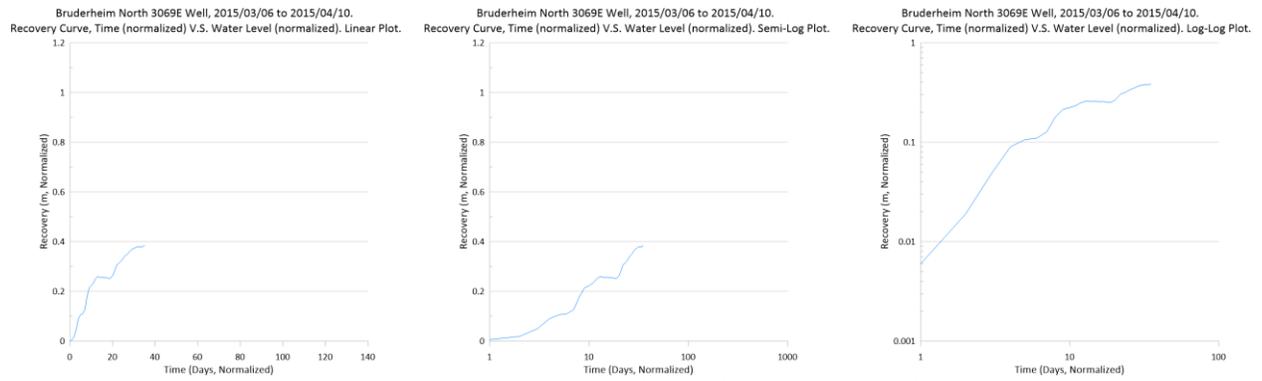


Figure 678: Recovery curve plots for Bruderheim North_3069 well, 2015/03/06 to 2015/04/10. Surficial aquifer.

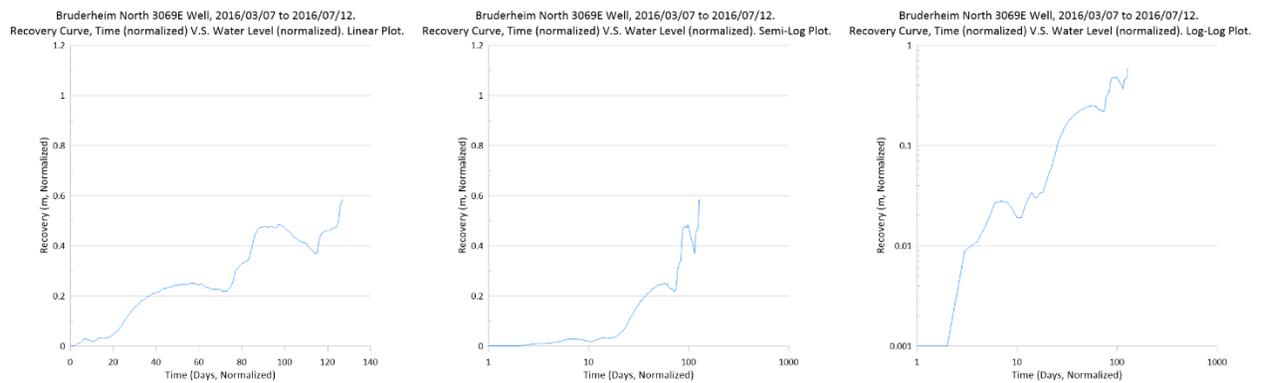


Figure 679: Recovery curve plots for Bruderheim North_3069 well, 2016/03/07 to 2016/07/12. Surficial aquifer.

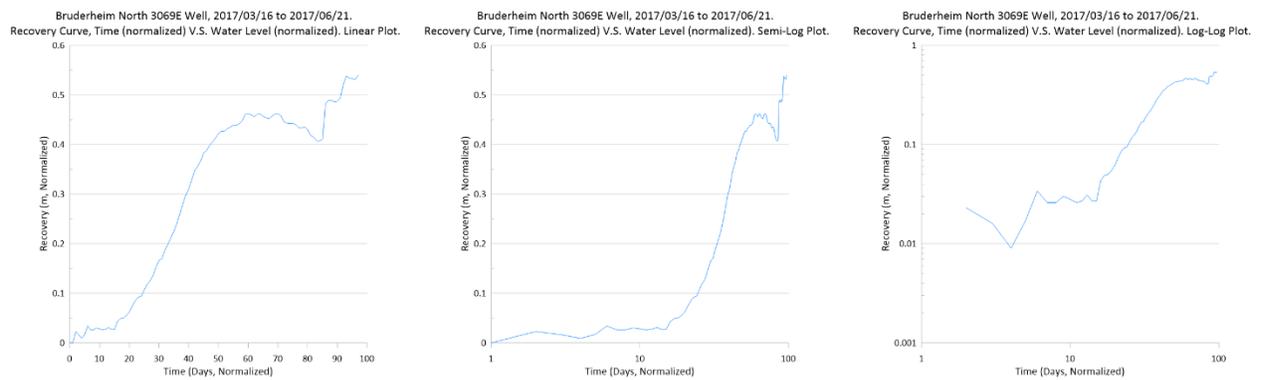


Figure 680: Recovery curve plots for Bruderheim North_3069 well, 2017/03/16 to 2017/06/21. Surficial aquifer.

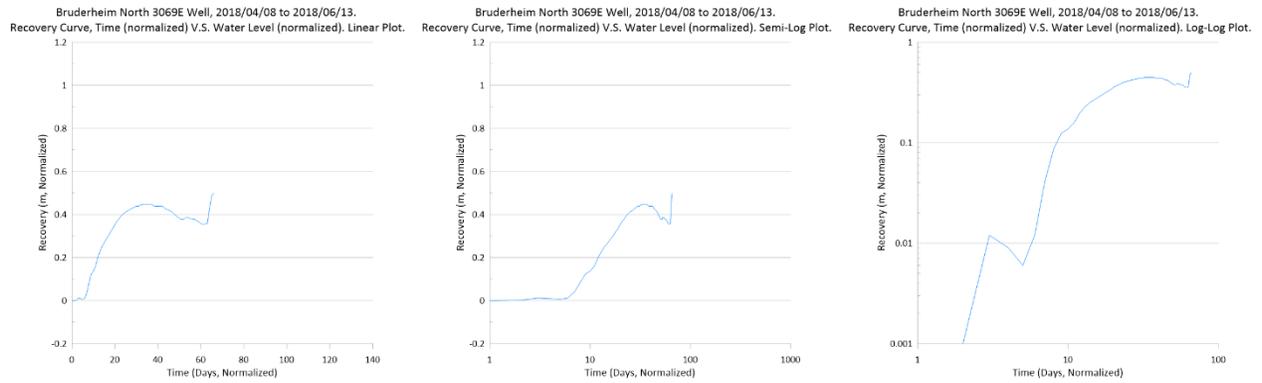


Figure 681: Recovery curve plots for Bruderheim North_3069 well, 2018/04/08 to 2018/06/13. Surficial aquifer.

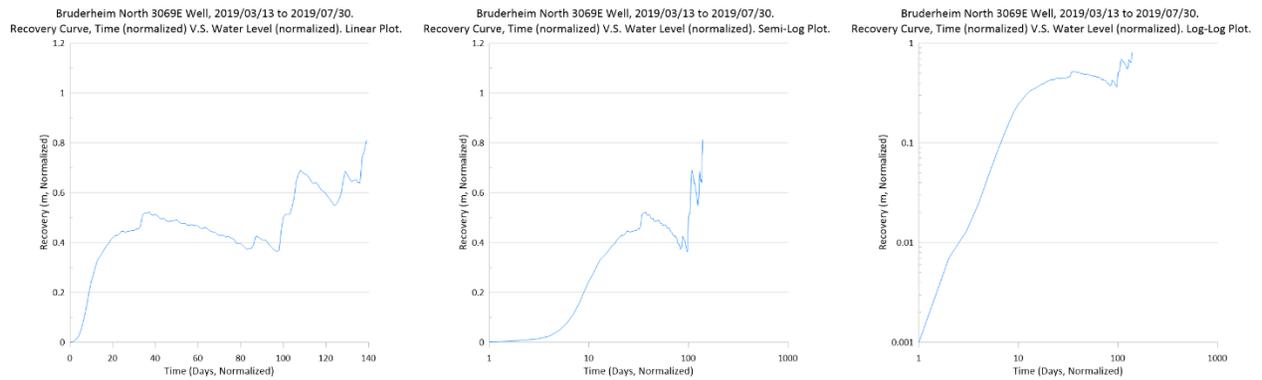


Figure 682: Recovery curve plots for Bruderheim North_3069 well, 2019/03/13 to 2019/07/30. Surficial aquifer.

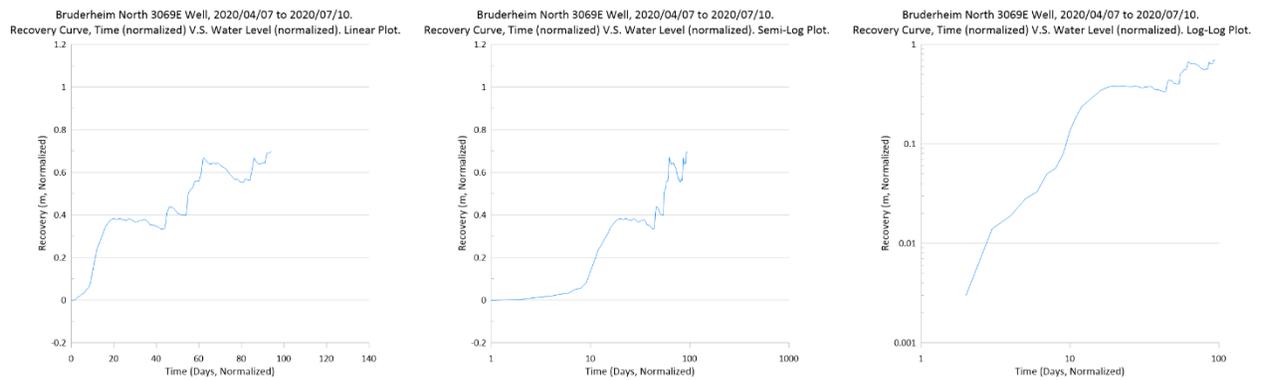


Figure 683: Recovery curve plots for Bruderheim North_3069 well, 2020/04/07 to 2020/07/10. Surficial aquifer.

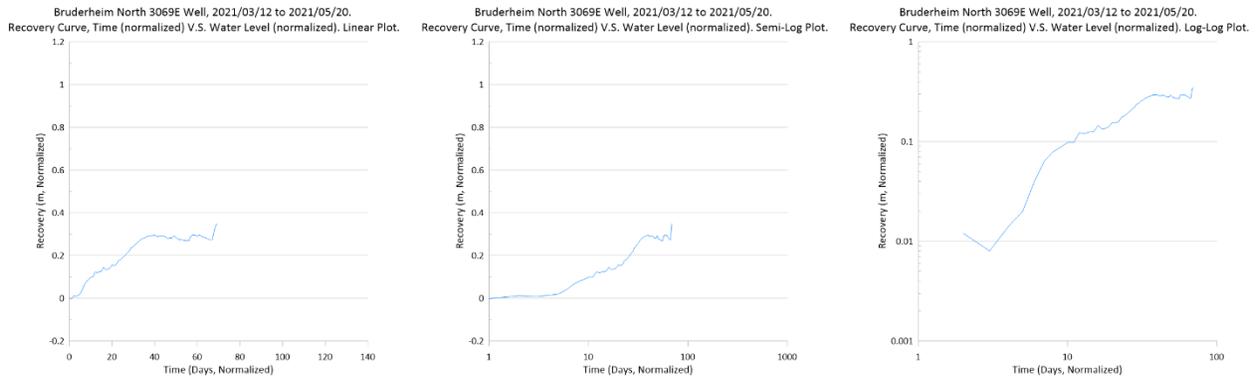


Figure 684: Recovery curve plots for Bruderheim North_3069 well, 2021/03/12 to 2021/05/20. Surficial aquifer.

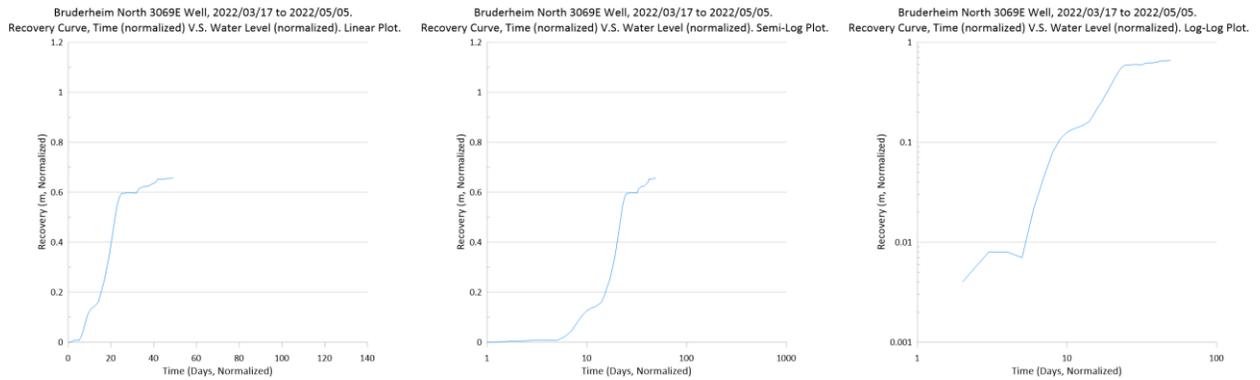


Figure 685: Recovery curve plots for Bruderheim North_3069 well, 2022/03/17 to 2022/05/05. Surficial aquifer.

Appendix II6: GOWN Monitoring Well Recovery Curve Plots for Cooking Lake 1348E North_0157 Well

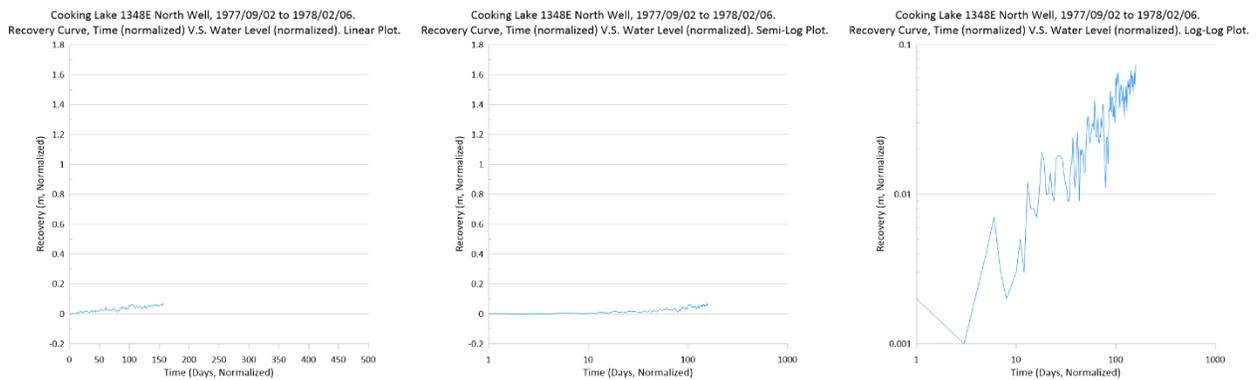


Figure 686: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1977/09/02 to 1978/02/06. Surficial aquifer.

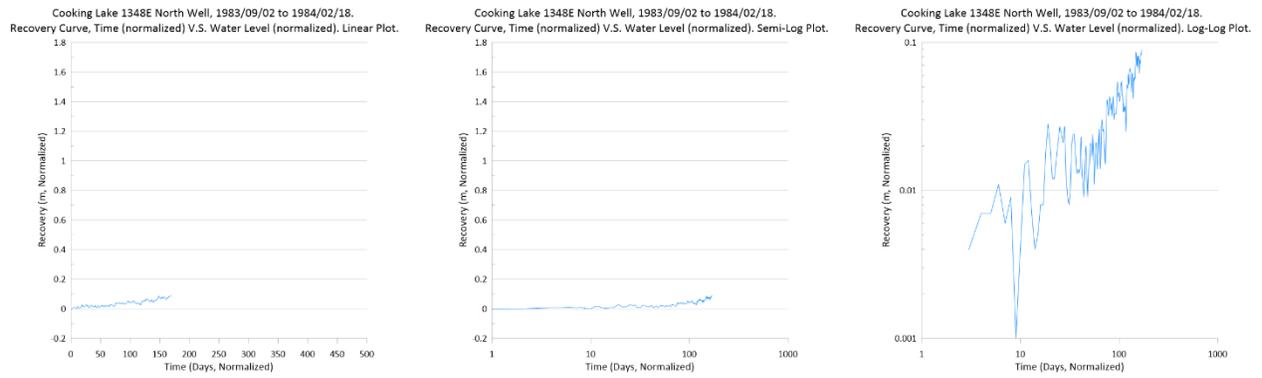


Figure 687: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1983/09/02 to 1984/02/18. Surficial aquifer.

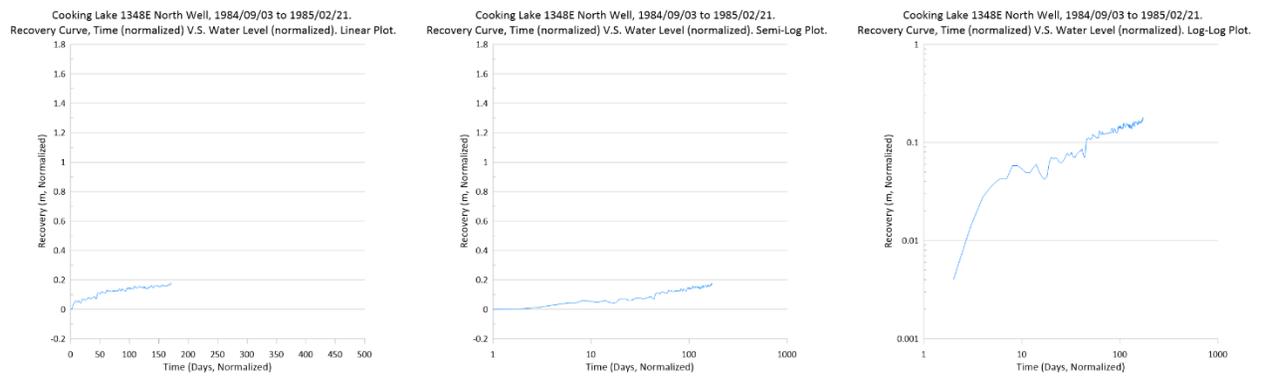


Figure 688: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1984/09/03 to 1985/02/21. Surficial aquifer.

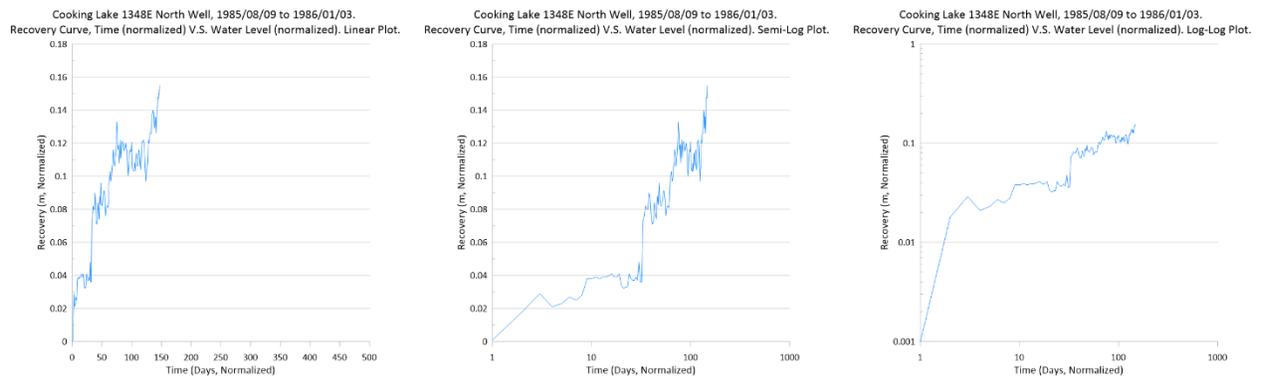


Figure 689: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1985/08/09 to 1986/01/03. Surficial aquifer.

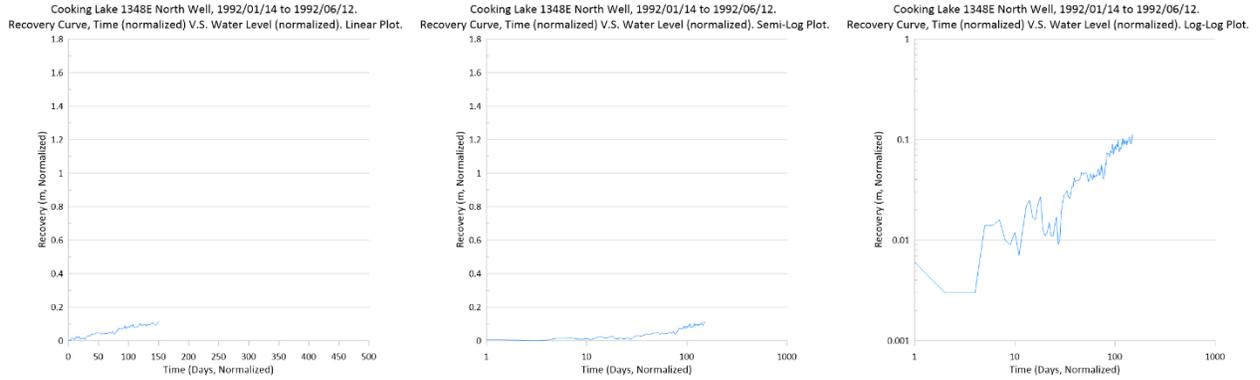


Figure 690: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1992/01/14 to 1992/06/12. Surficial aquifer.

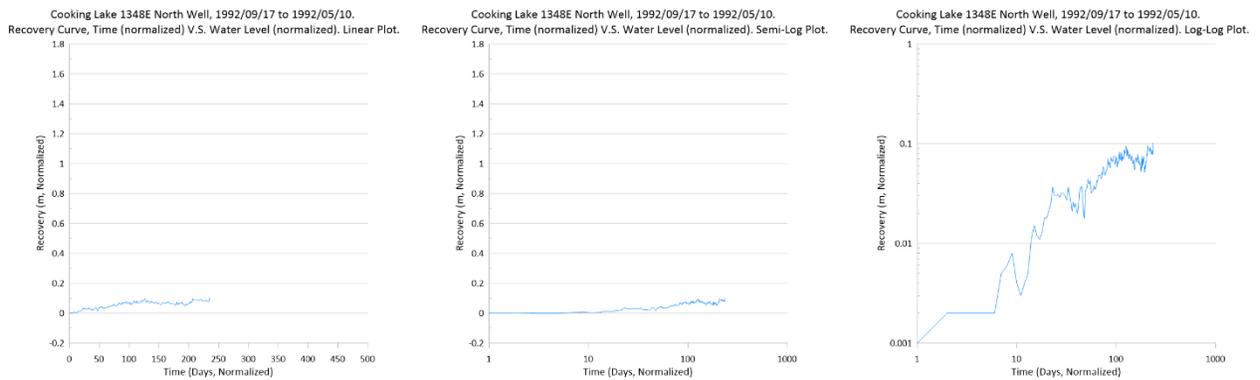


Figure 691: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1992/09/17 to 1992/05/10. Surficial aquifer.

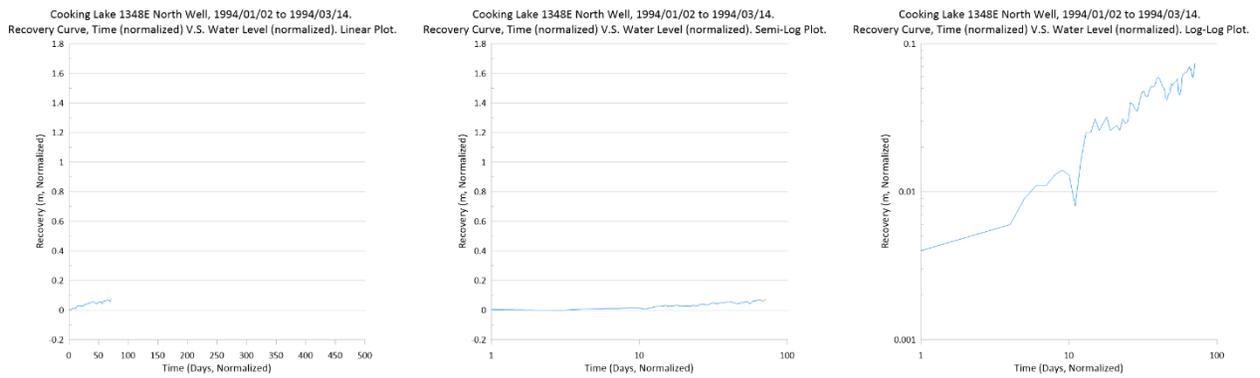


Figure 692: Recovery curve plots for Cooking Lake 1348E North_0157 well, 1994/01/02 to 1994/03/14. Surficial aquifer.

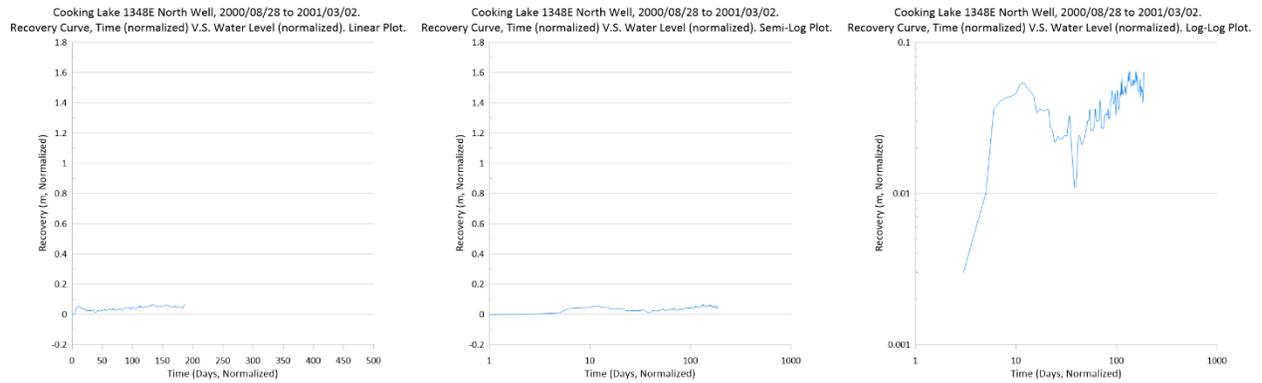


Figure 693: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2000/08/28 to 2001/03/02. Surficial aquifer.

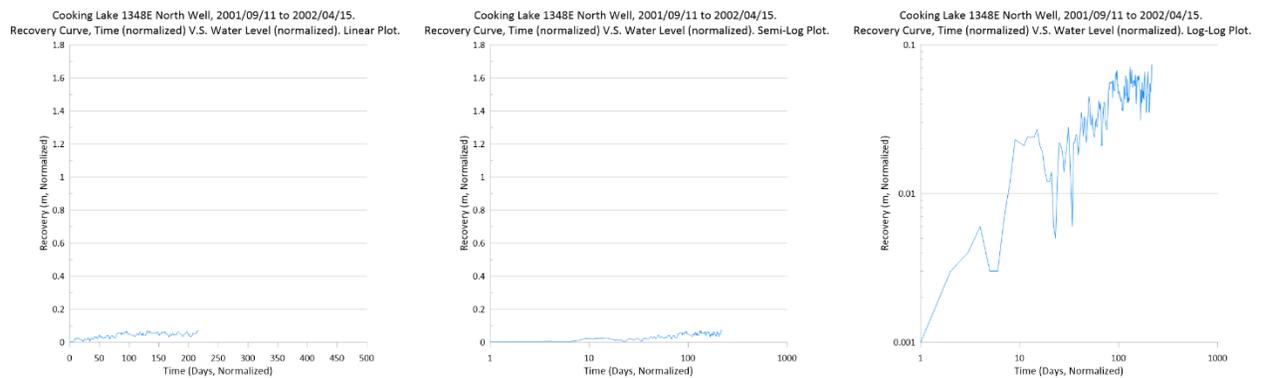


Figure 694: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2001/09/11 to 2002/04/15. Surficial aquifer.

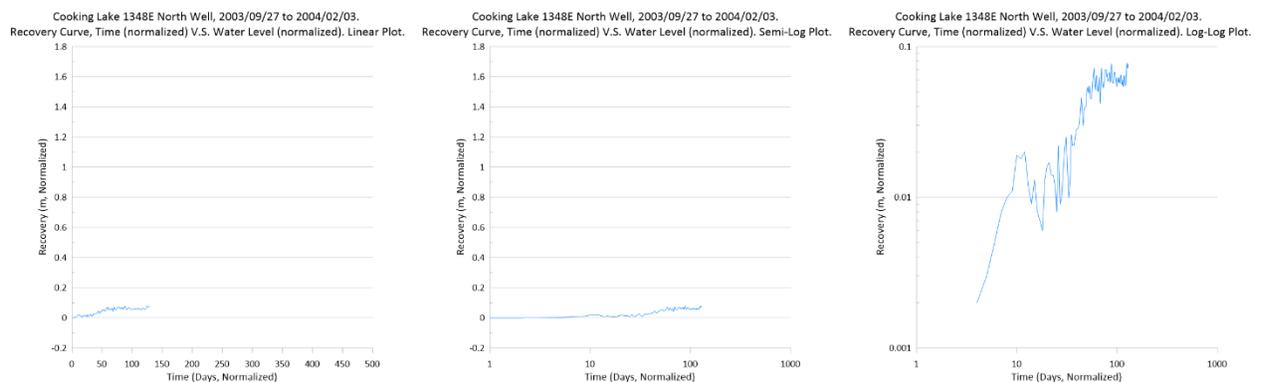


Figure 695: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2003/09/27 to 2004/02/03. Surficial aquifer.

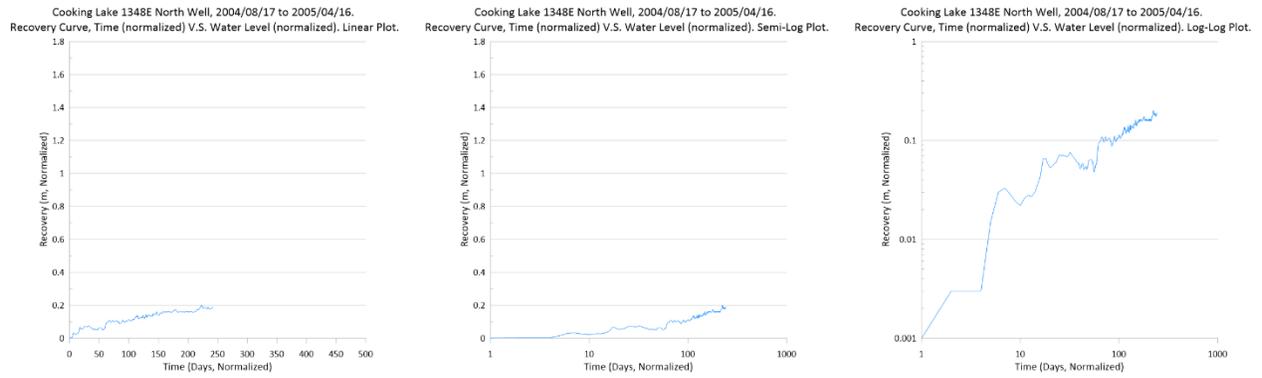


Figure 696: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2004/08/17 to 2005/04/16. Surficial aquifer.

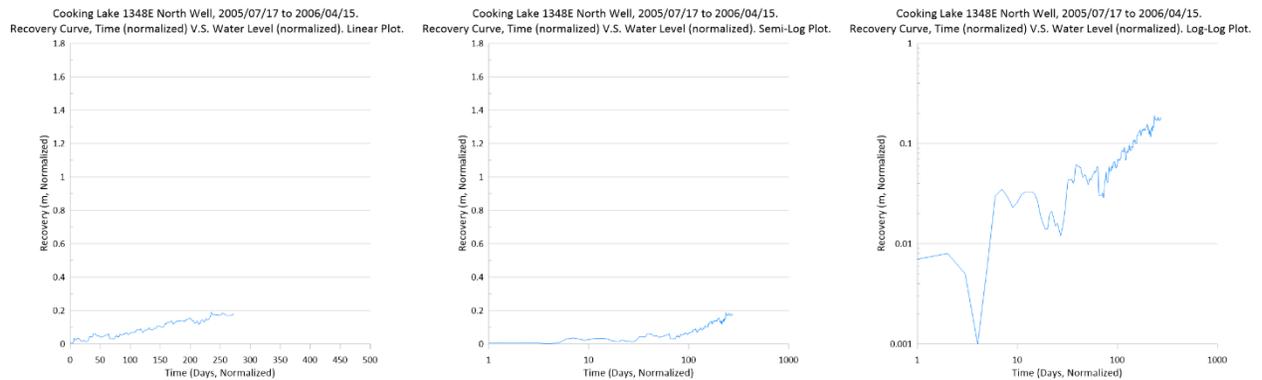


Figure 697: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2005/07/17 to 2006/04/15. Surficial aquifer.

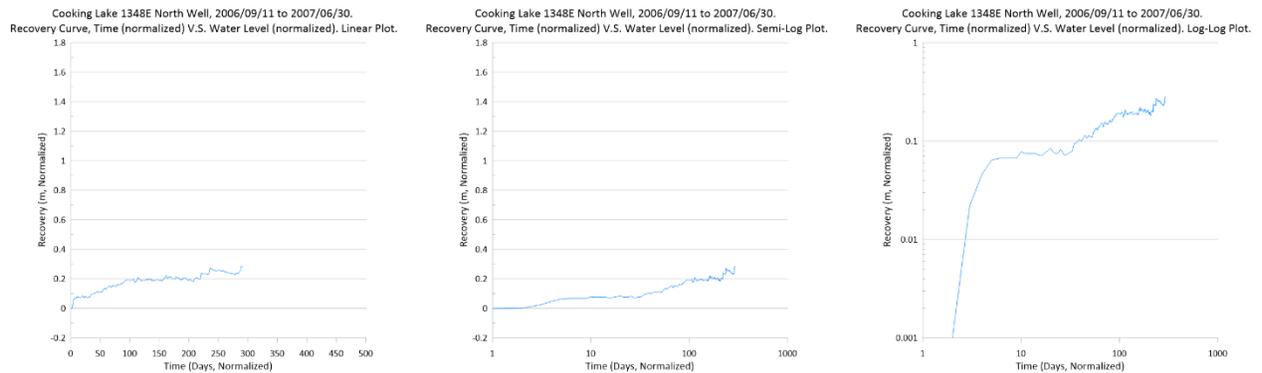


Figure 698: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2006/09/11 to 2007/06/30. Surficial aquifer.

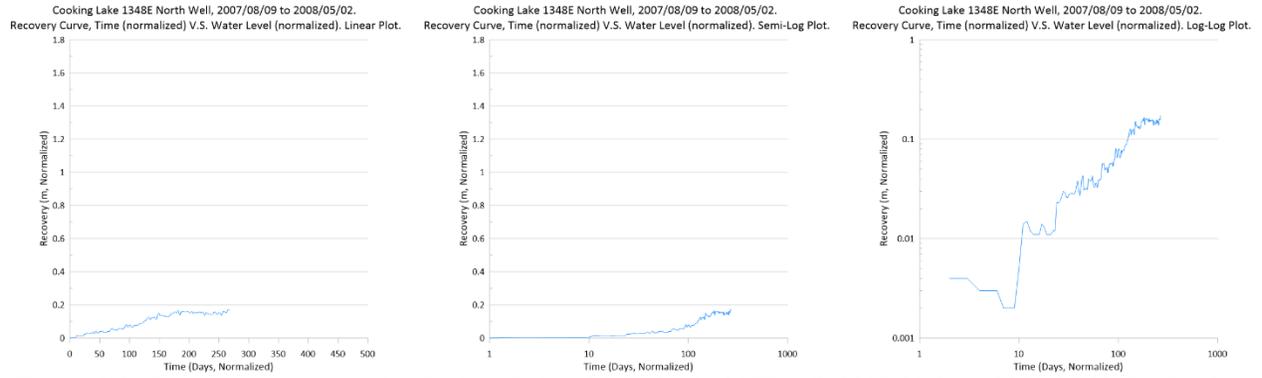


Figure 699: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2007/08/09 to 2008/05/02. Surficial aquifer.

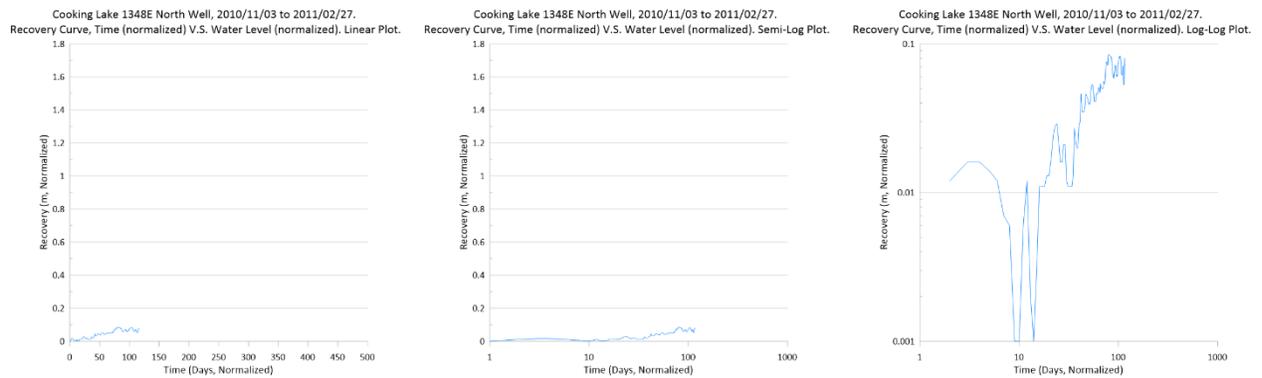


Figure 700: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2010/11/03 to 2011/02/27. Surficial aquifer.

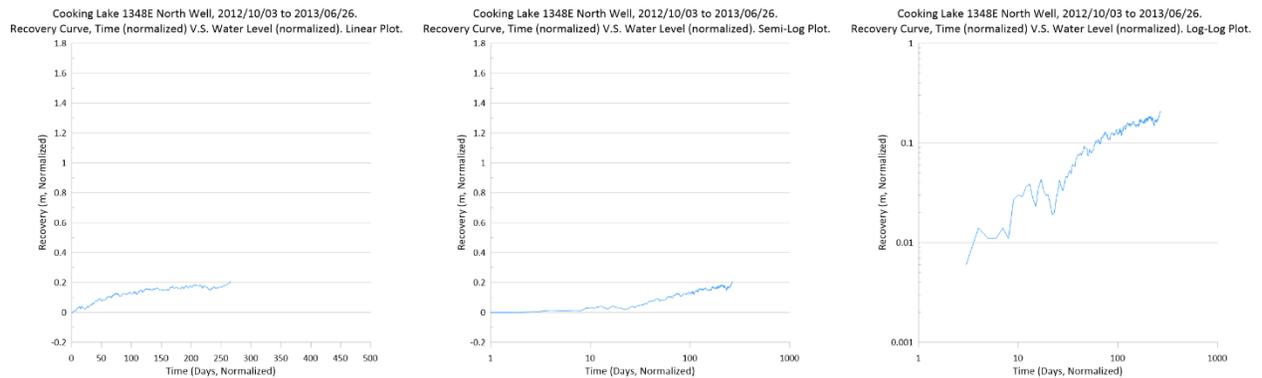


Figure 701: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2012/10/03 to 2013/06/26. Surficial aquifer.

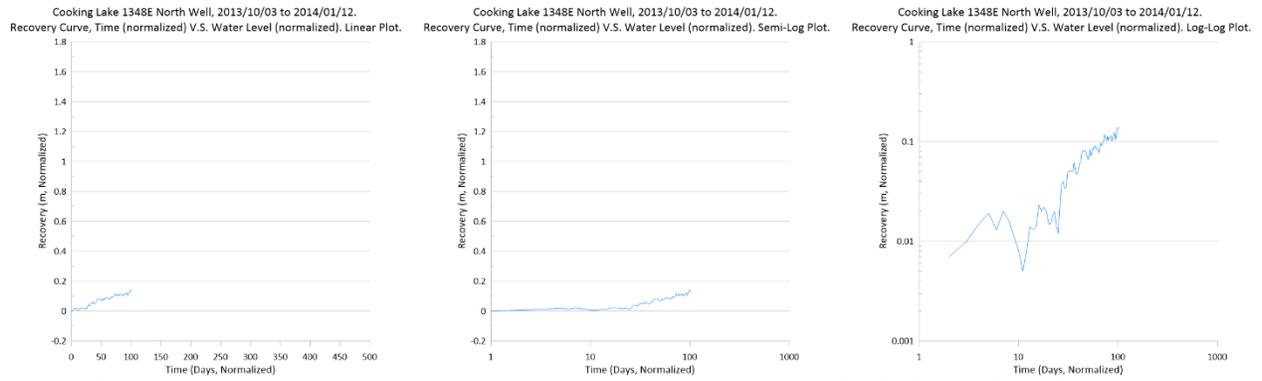


Figure 702: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2013/10/03 to 2014/01/12. Surficial aquifer.

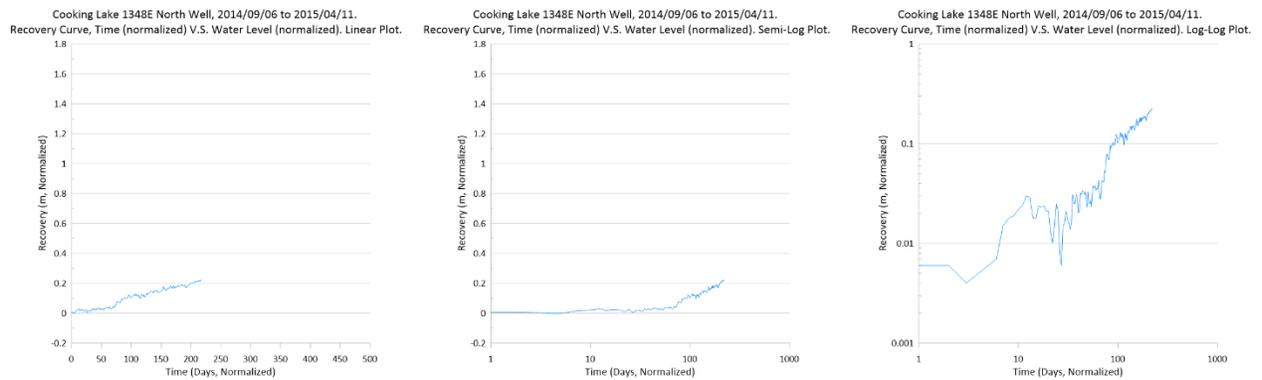


Figure 703: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2014/09/06 to 2015/04/11. Surficial aquifer.

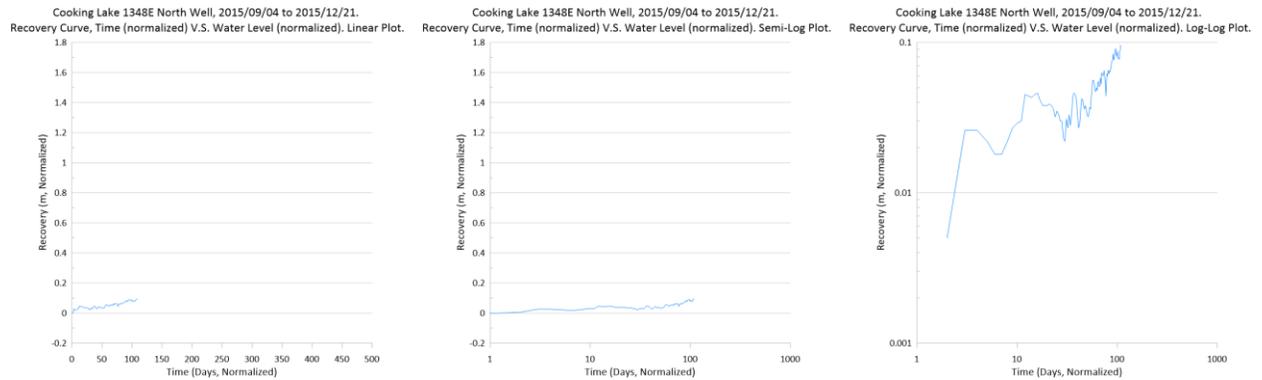


Figure 704: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2015/09/04 to 2015/12/21. Surficial aquifer.

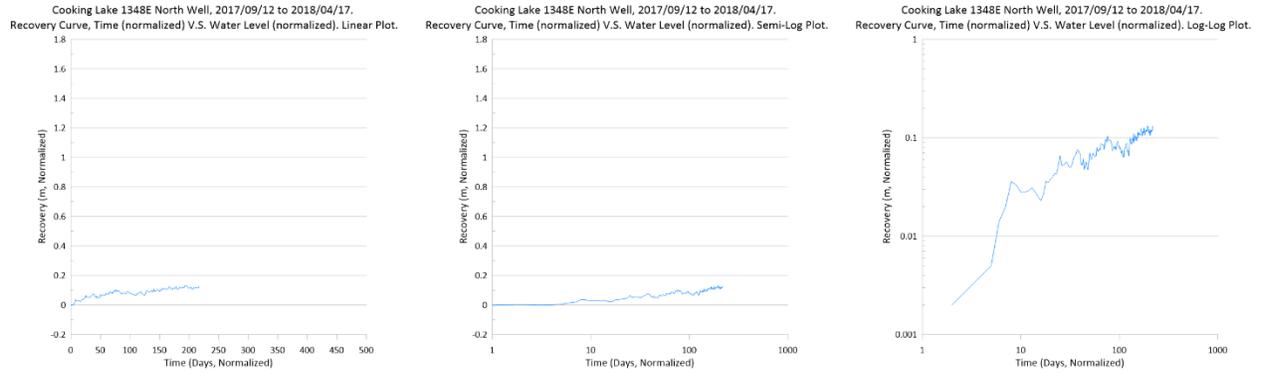


Figure 705: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2017/09/12 to 2018/04/17. Surficial aquifer.

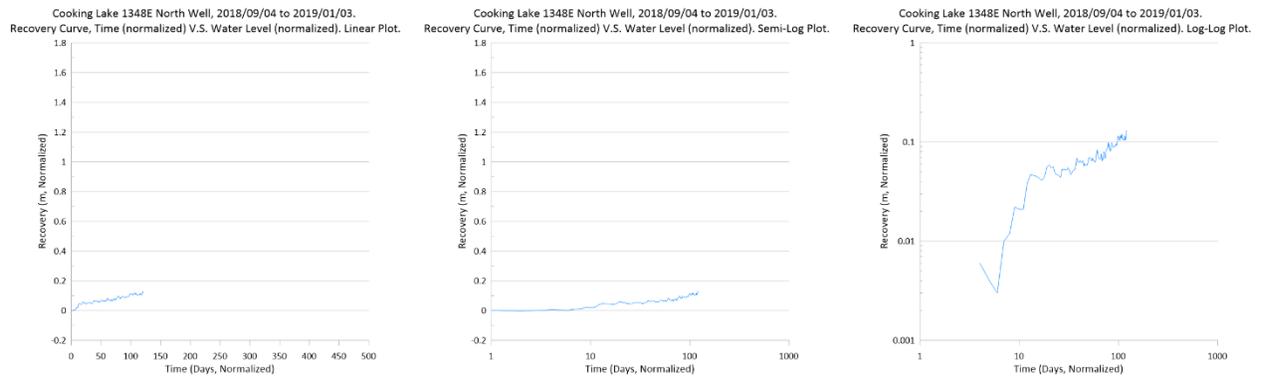


Figure 706: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2018/09/04 to 2019/01/03. Surficial aquifer.

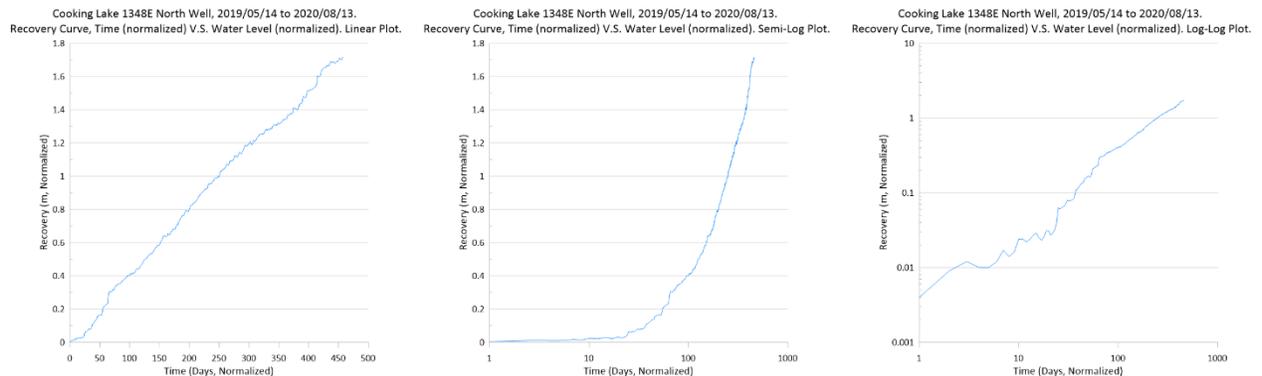


Figure 707: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2019/05/14 to 2020/08/13. Surficial aquifer.

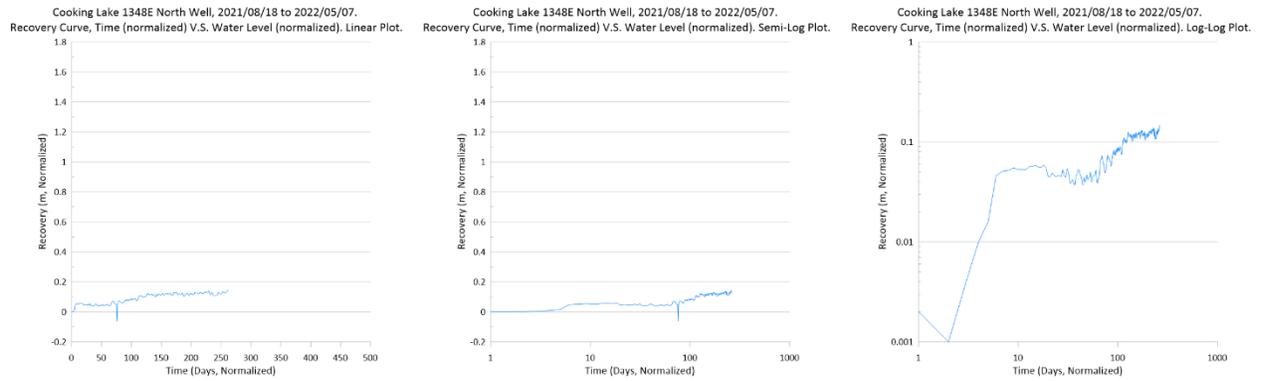


Figure 708: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2021/08/18 to 2022/05/07. Surficial aquifer.

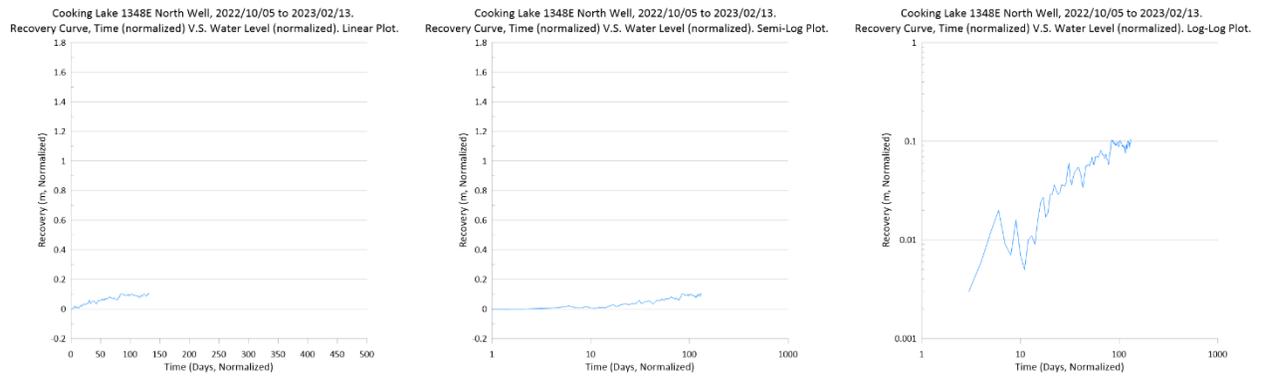


Figure 709: Recovery curve plots for Cooking Lake 1348E North_0157 well, 2022/10/05 to 2023/02/13. Surficial aquifer.

Appendix I17: GOWN Monitoring Well Recovery Curve Plots for Devon #2 North_0159 Well

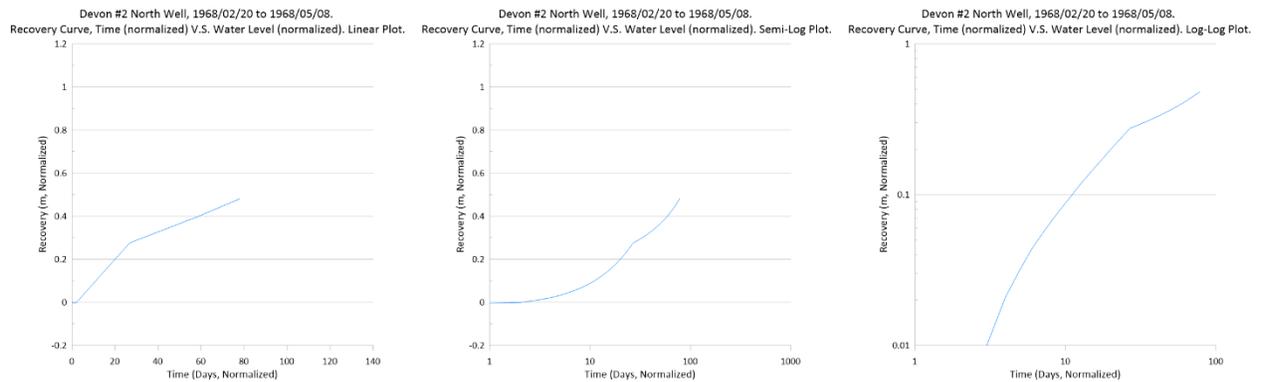


Figure 710: Recovery curve plots for Devon #2 North_0159 well, 1968/02/20 to 1968/05/08. Surficial aquifer.

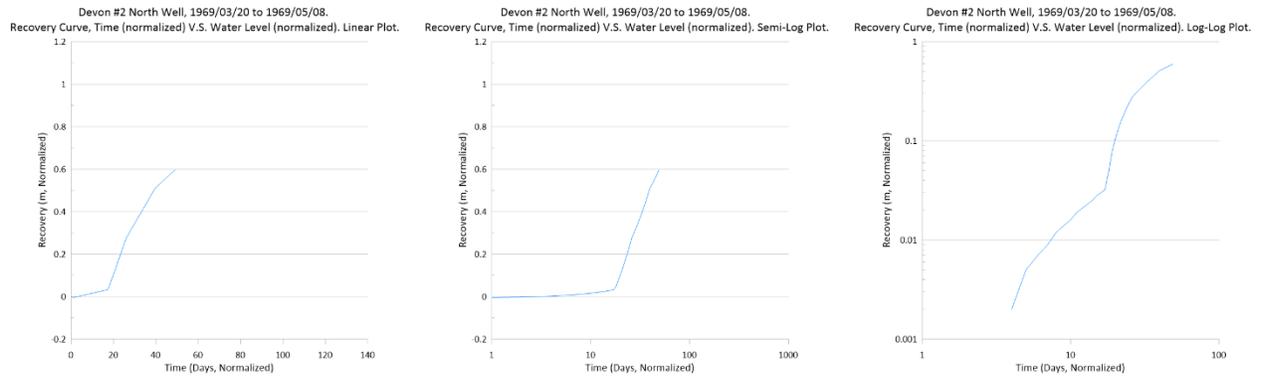


Figure 711: Recovery curve plots for Devon #2 North_0159 well, 1969/03/20 to 1969/05/08. Surficial aquifer.

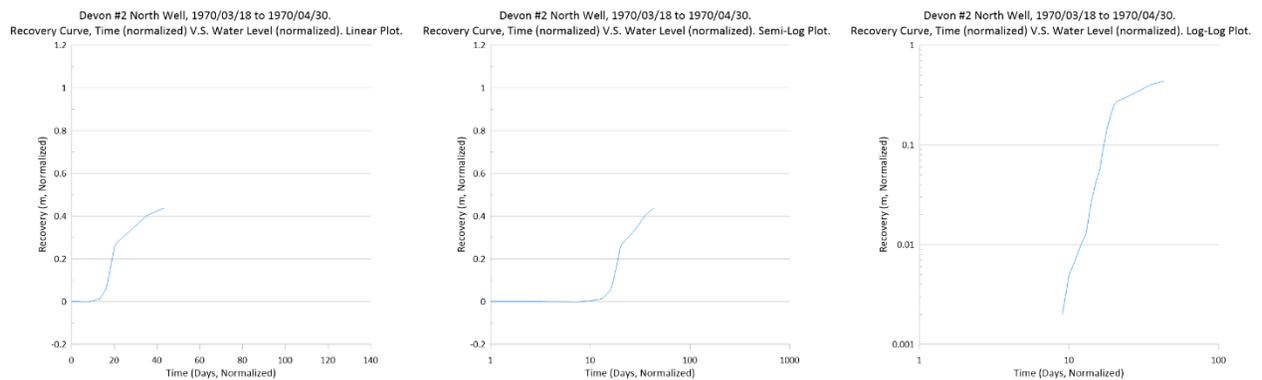


Figure 712: Recovery curve plots for Devon #2 North_0159 well, 1970/03/18 to 1970/04/30. Surficial aquifer.

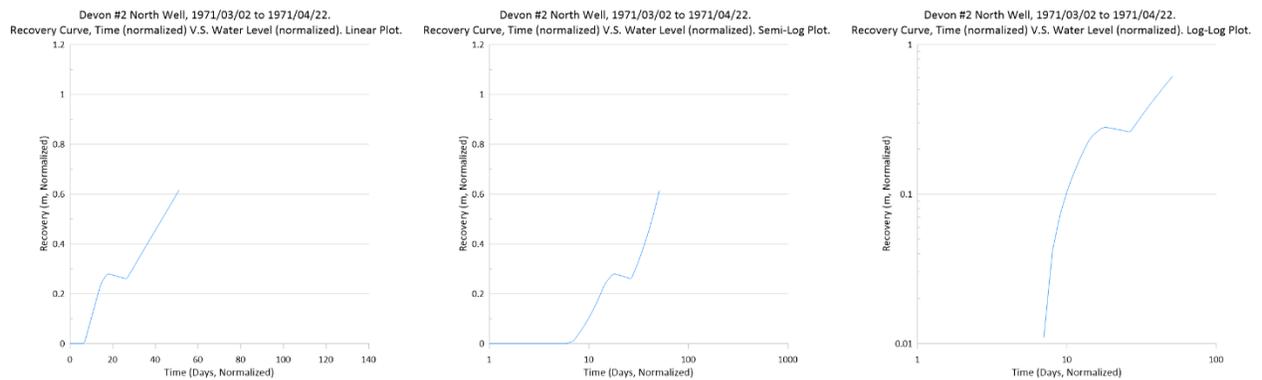


Figure 713: Recovery curve plots for Devon #2 North_0159 well, 1971/03/02 to 1971/04/22. Surficial aquifer.

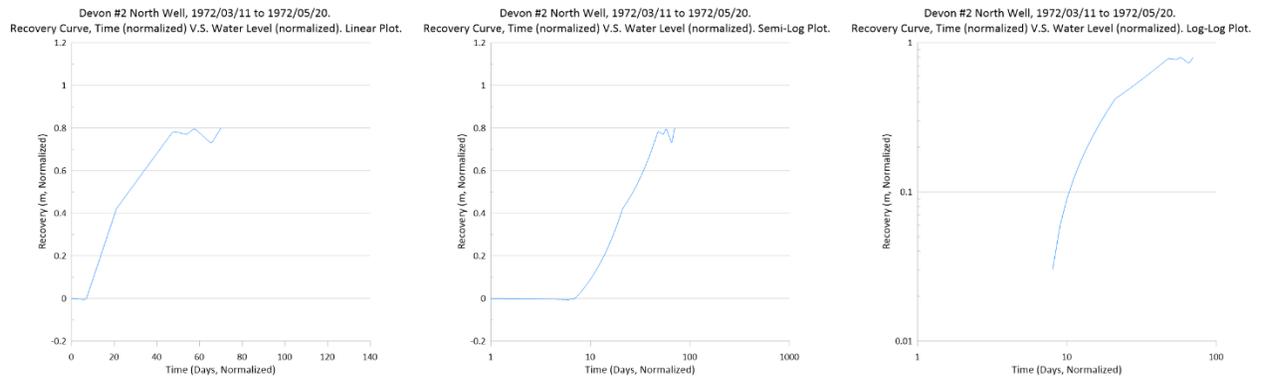


Figure 714: Recovery curve plots for Devon #2 North_0159 well, 1972/03/11 to 1972/05/20. Surficial aquifer.

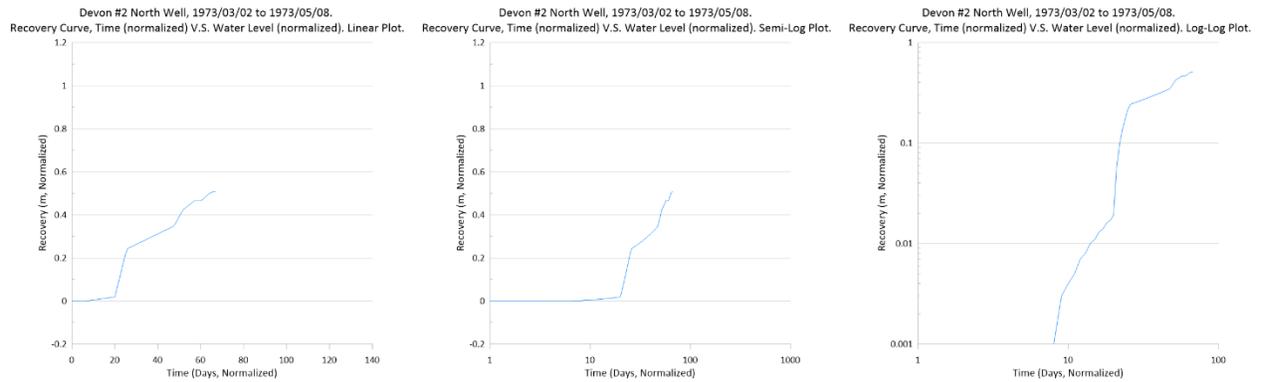


Figure 715: Recovery curve plots for Devon #2 North_0159 well, 1973/03/02 to 1973/05/08. Surficial aquifer.

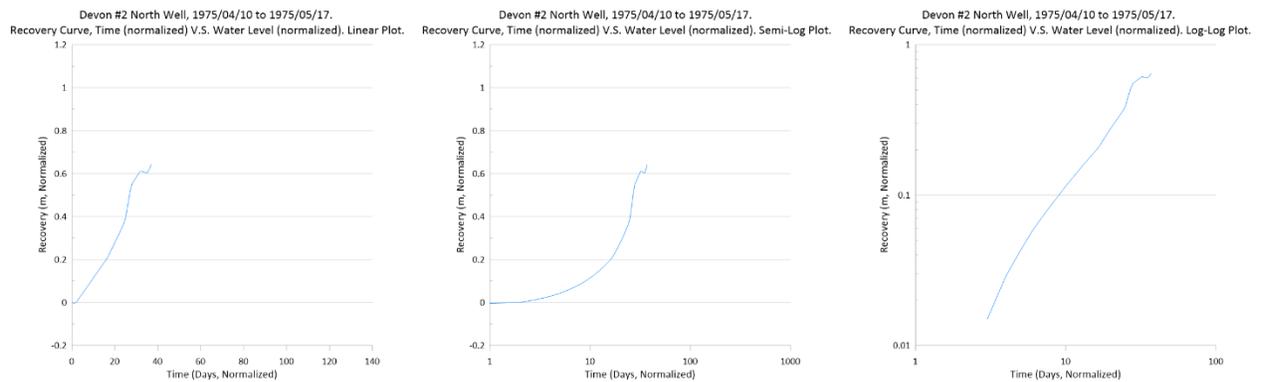


Figure 716: Recovery curve plots for Devon #2 North_0159 well, 1975/04/10 to 1975/05/17. Surficial aquifer.

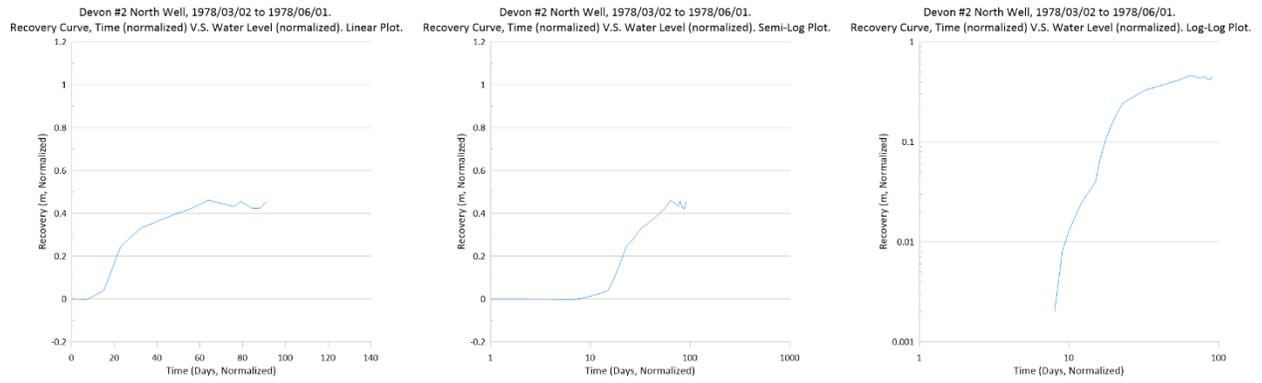


Figure 717: Recovery curve plots for Devon #2 North_0159 well, 1978/03/02 to 1978/06/01. Surficial aquifer.

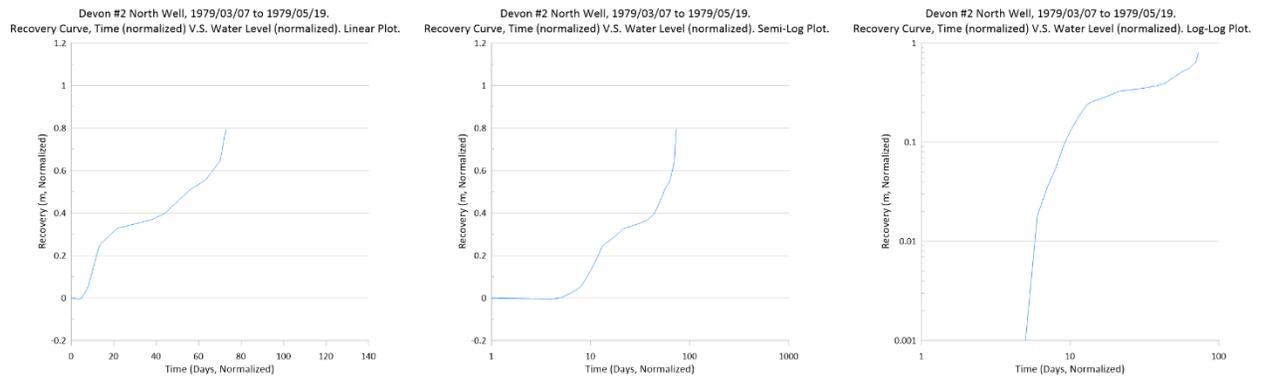


Figure 718: Recovery curve plots for Devon #2 North_0159 well, 1979/03/07 to 1979/05/19. Surficial aquifer.

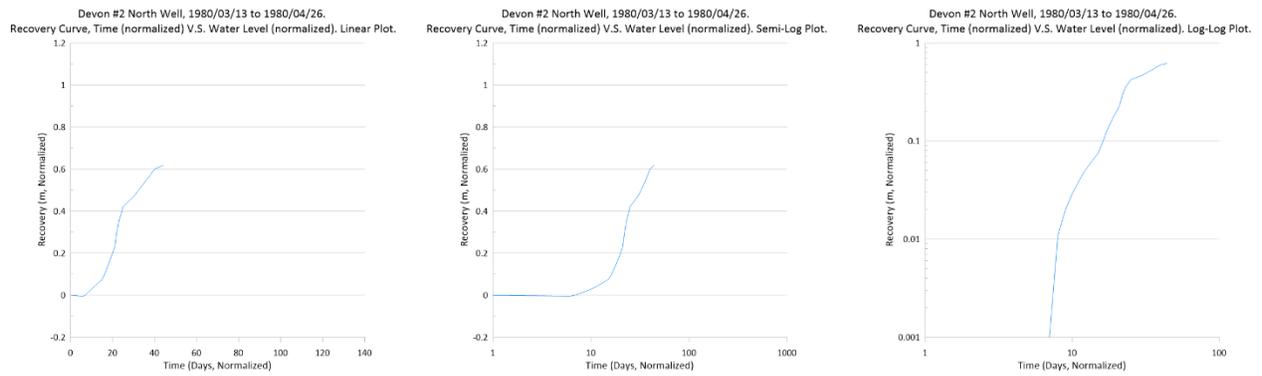


Figure 719: Recovery curve plots for Devon #2 North_0159 well, 1980/03/13 to 1980/04/26. Surficial aquifer.

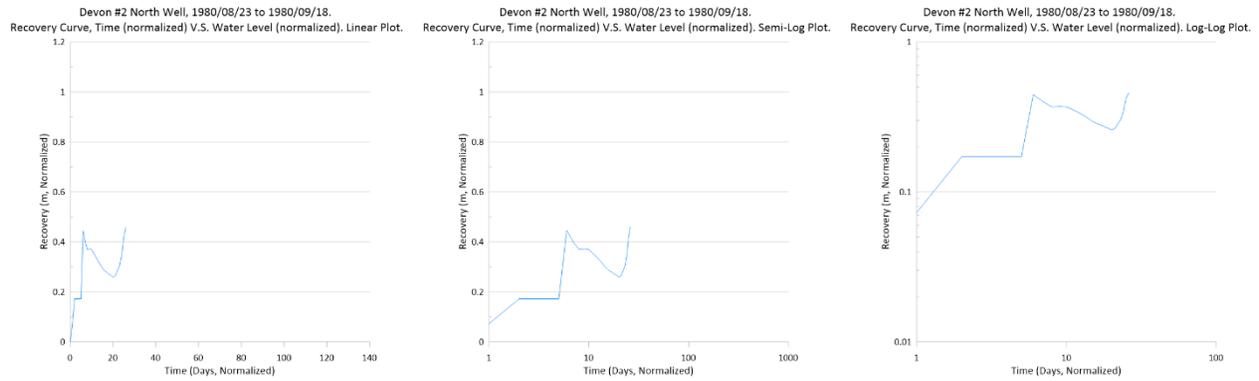


Figure 720: Recovery curve plots for Devon #2 North_0159 well, 1980/08/23 to 1980/09/18. Surficial aquifer.

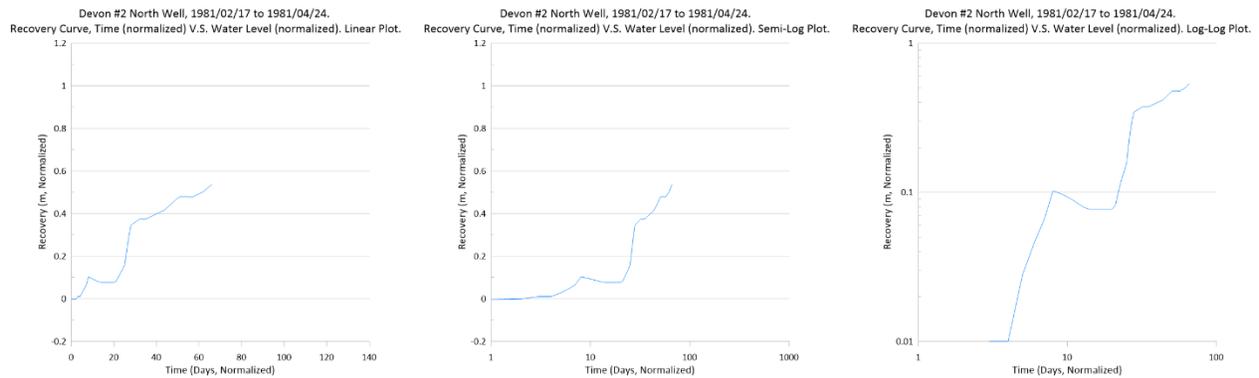


Figure 721: Recovery curve plots for Devon #2 North_0159 well, 1981/02/17 to 1981/04/24. Surficial aquifer.

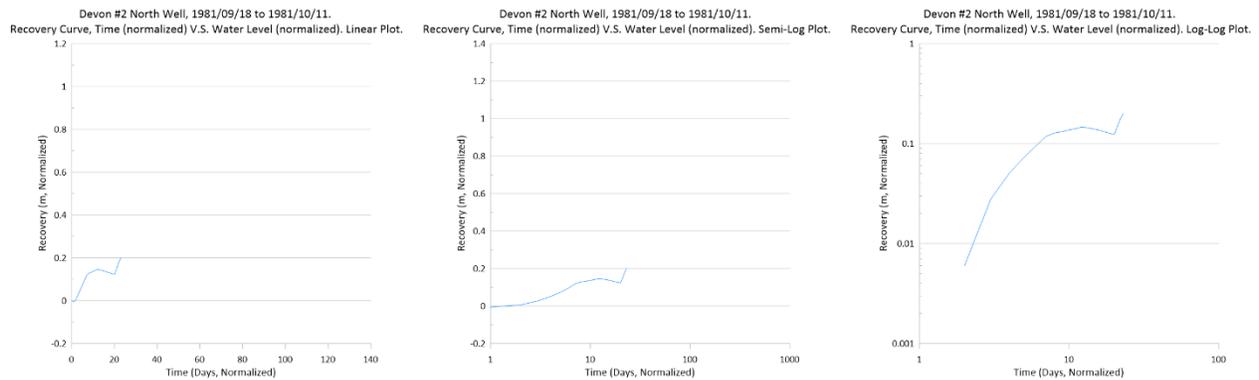


Figure 722: Recovery curve plots for Devon #2 North_0159 well, 1981/09/18 to 1981/10/11. Surficial aquifer.

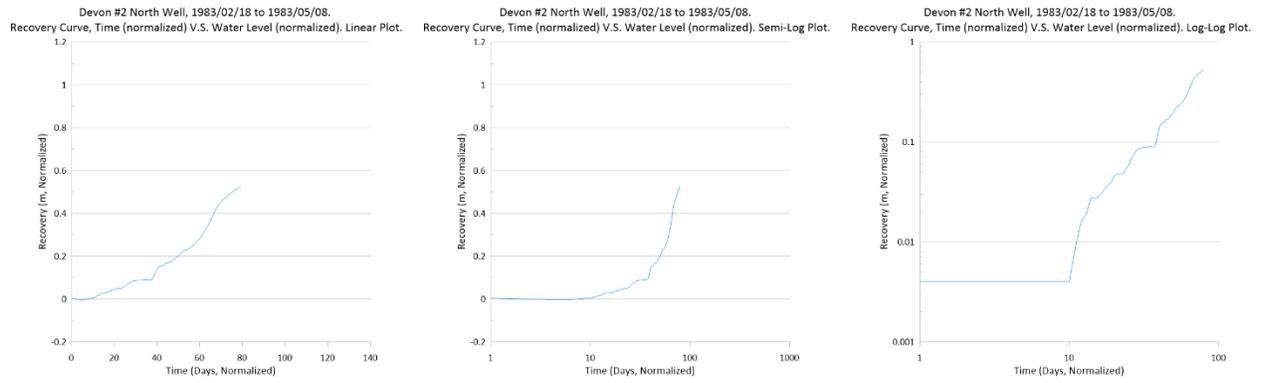


Figure 723: Recovery curve plots for Devon #2 North_0159 well, 1983/02/18 to 1983/05/08. Surficial aquifer.

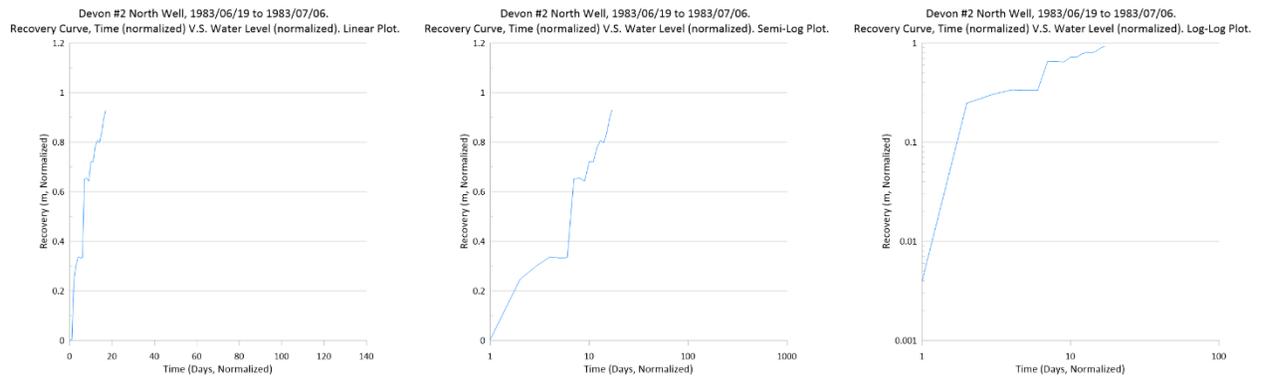


Figure 724: Recovery curve plots for Devon #2 North_0159 well, 1983/06/19 to 1983/07/06. Surficial aquifer.

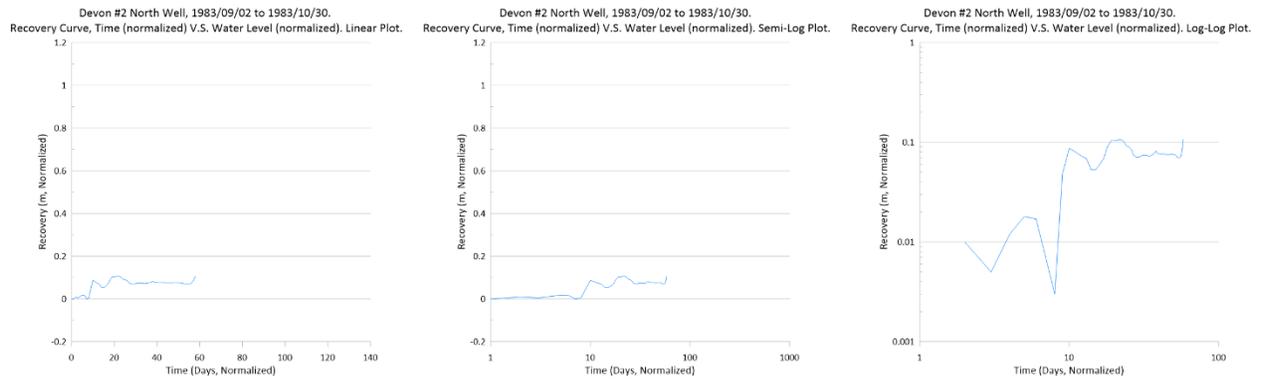


Figure 725: Recovery curve plots for Devon #2 North_0159 well, 1983/09/02 to 1983/10/30. Surficial aquifer.

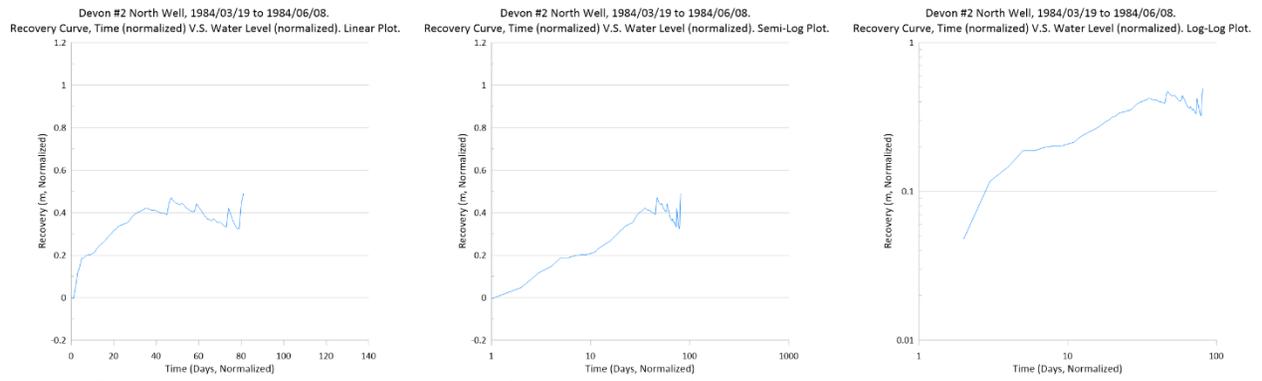


Figure 726: Recovery curve plots for Devon #2 North_0159 well, 1984/03/19 to 1984/06/08. Surficial aquifer.

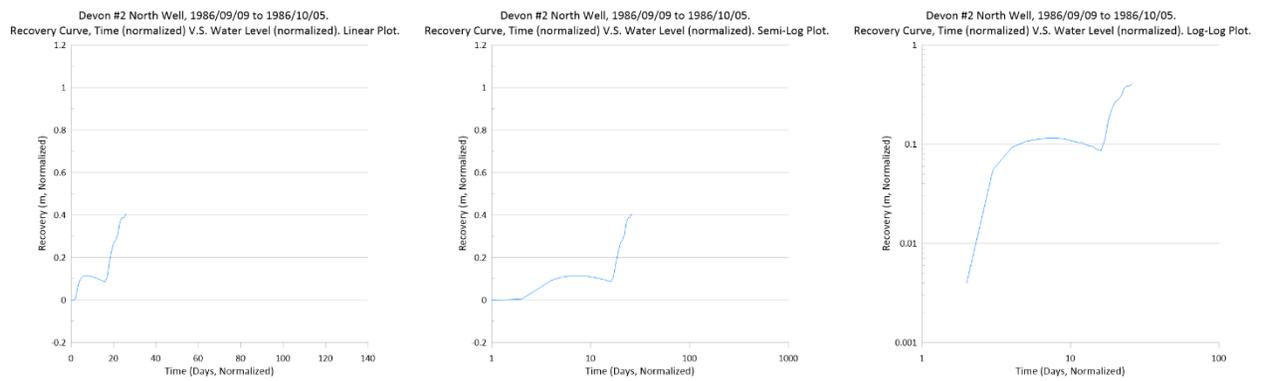


Figure 727: Recovery curve plots for Devon #2 North_0159 well, 1986/09/09 to 1986/10/05. Surficial aquifer.

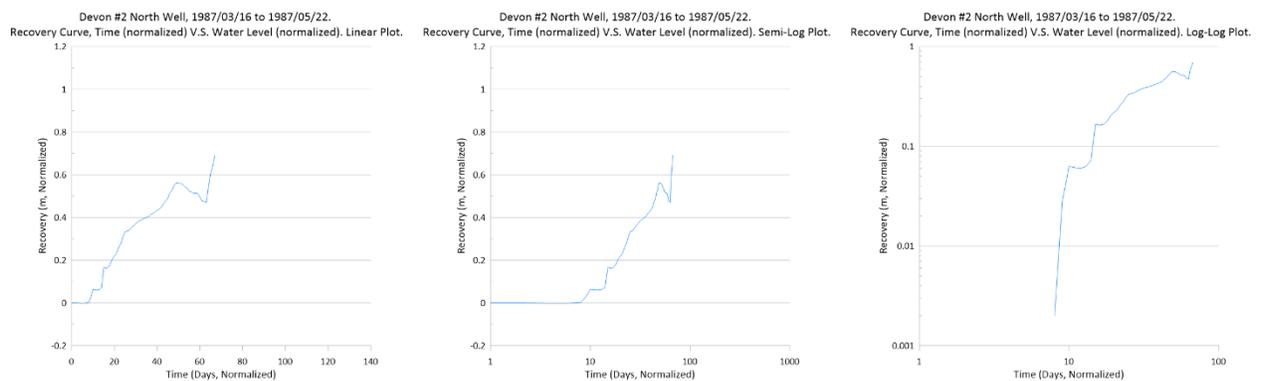


Figure 728: Recovery curve plots for Devon #2 North_0159 well, 1987/03/16 to 1987/05/22. Surficial aquifer.

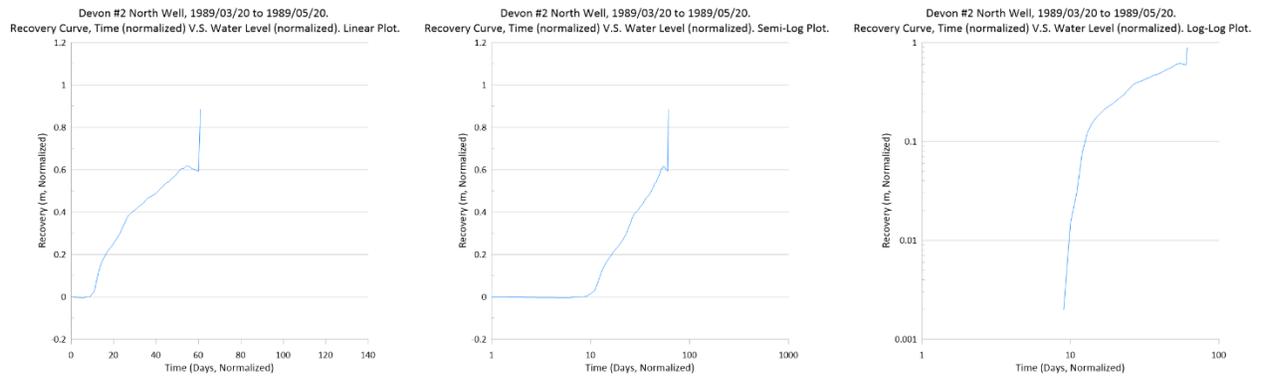


Figure 729: Recovery curve plots for Devon #2 North_0159 well, 1989/03/20 to 1989/05/20. Surficial aquifer.

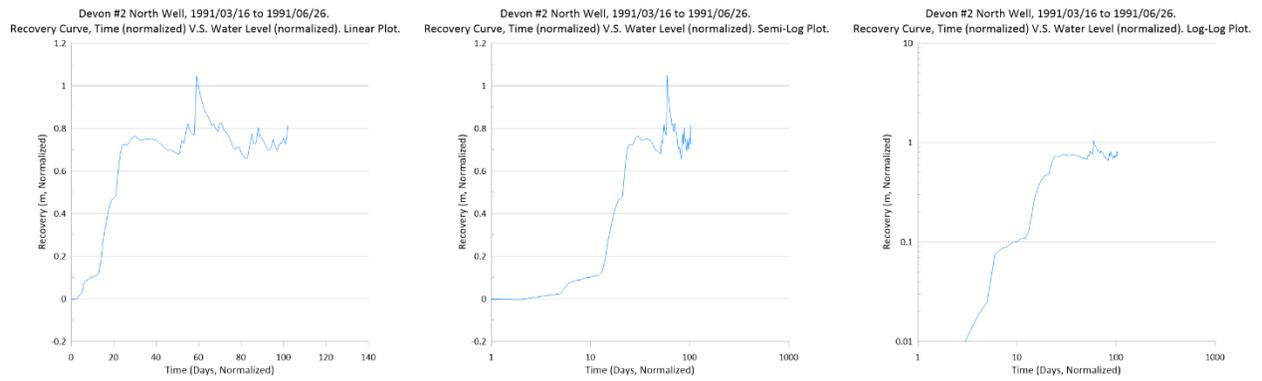


Figure 730: Recovery curve plots for Devon #2 North_0159 well, 1991/01/16 to 1991/06/26. Surficial aquifer.

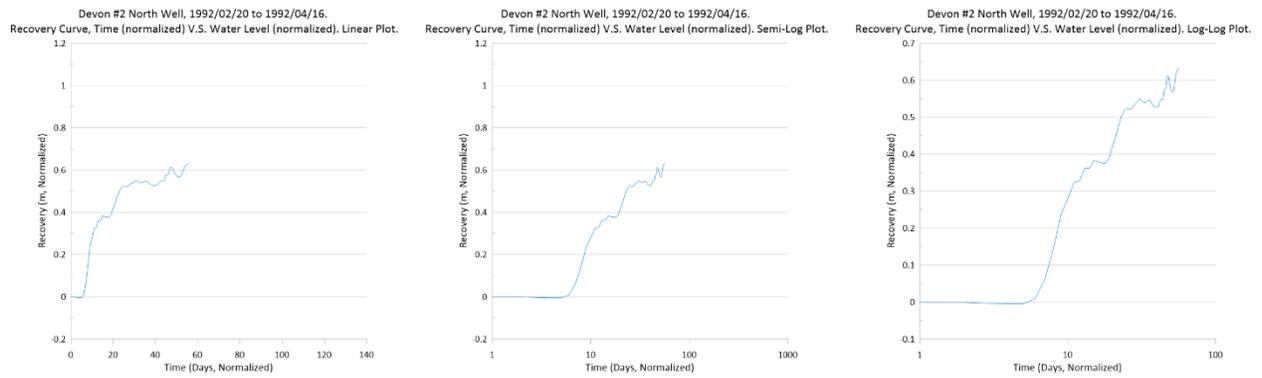


Figure 731: Recovery curve plots for Devon #2 North_0159 well, 1992/02/20 to 1992/04/16. Surficial aquifer.

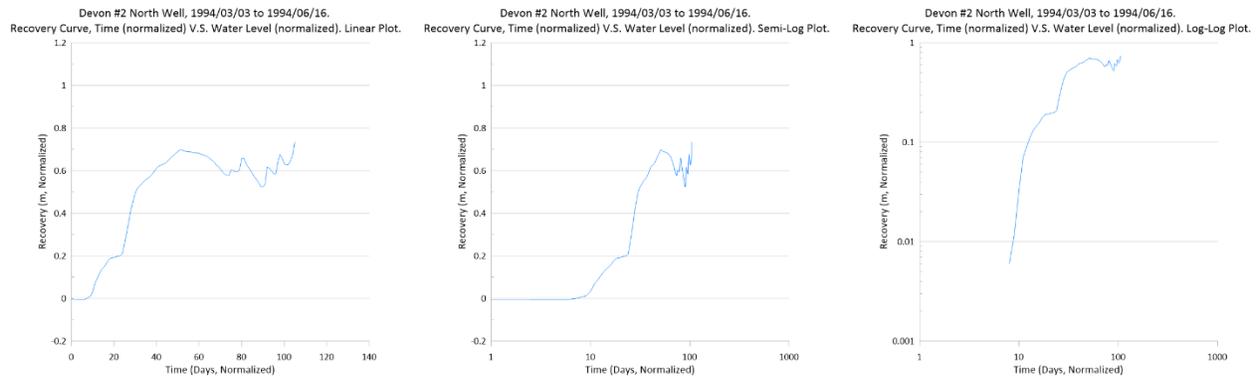


Figure 732: Recovery curve plots for Devon #2 North_0159 well, 1994/03/30 to 1994/06/16. Surficial aquifer.

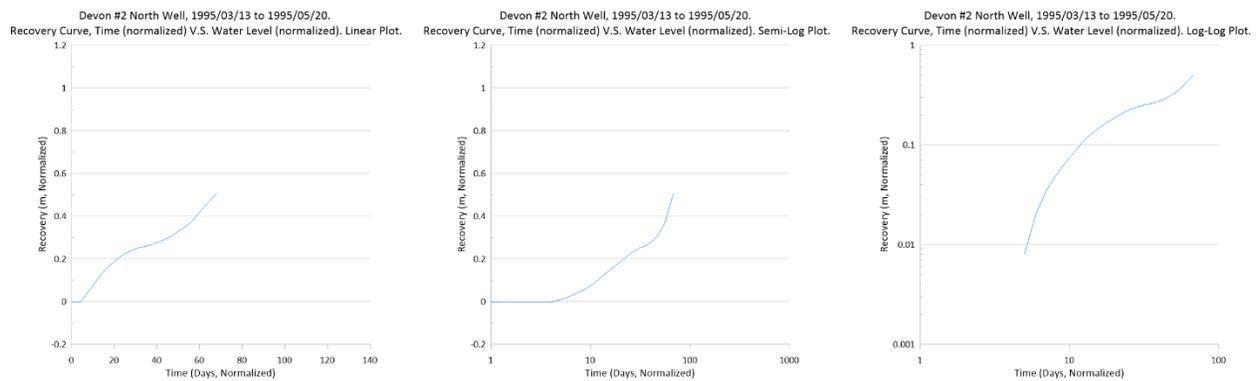


Figure 733: Recovery curve plots for Devon #2 North_0159 well, 1995/03/13 to 1995/05/20. Surficial aquifer.

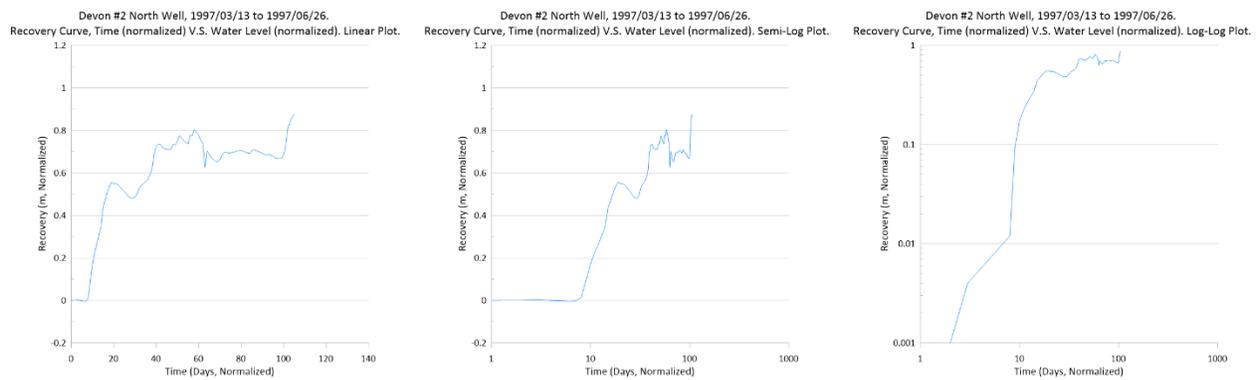


Figure 734: Recovery curve plots for Devon #2 North_0159 well, 1997/03/13 to 1997/06/26. Surficial aquifer.

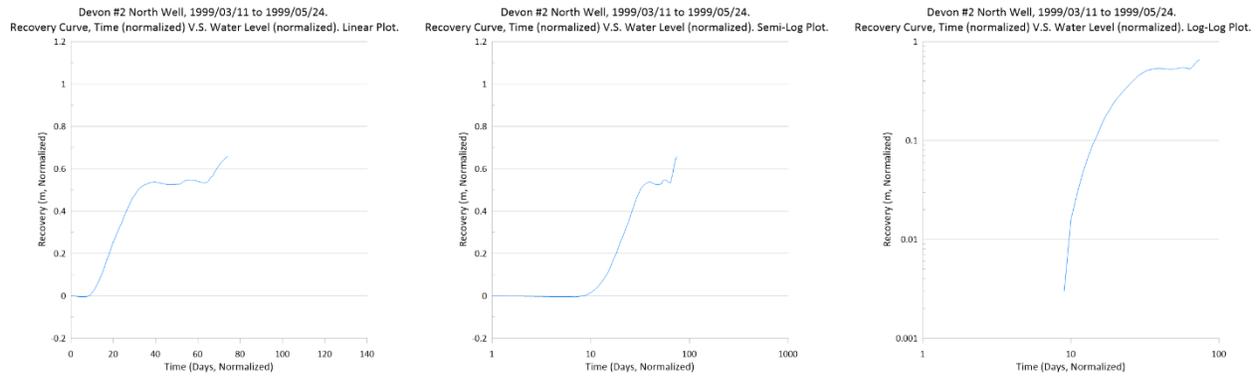


Figure 735: Recovery curve plots for Devon #2 North_0159 well, 1999/03/11 to 1999/05/24. Surficial aquifer.

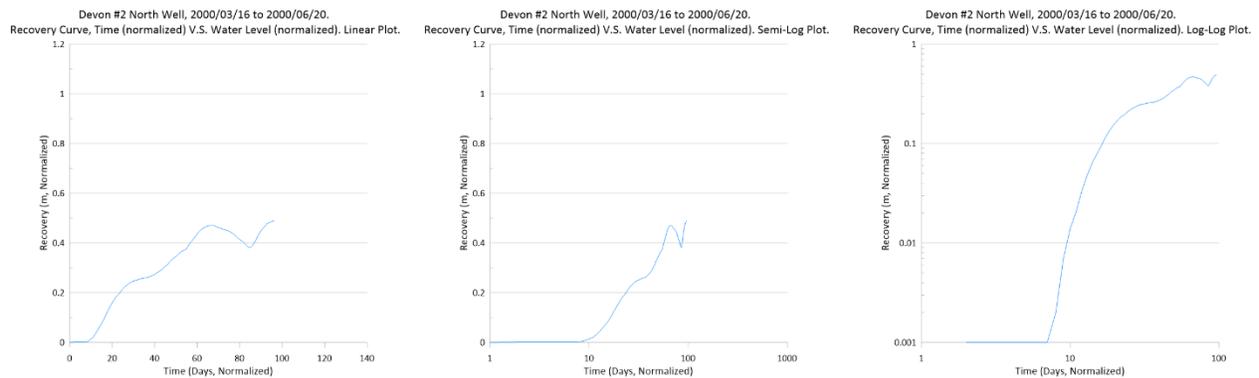


Figure 736: Recovery curve plots for Devon #2 North_0159 well, 2000/03/16 to 2000/06/20. Surficial aquifer.

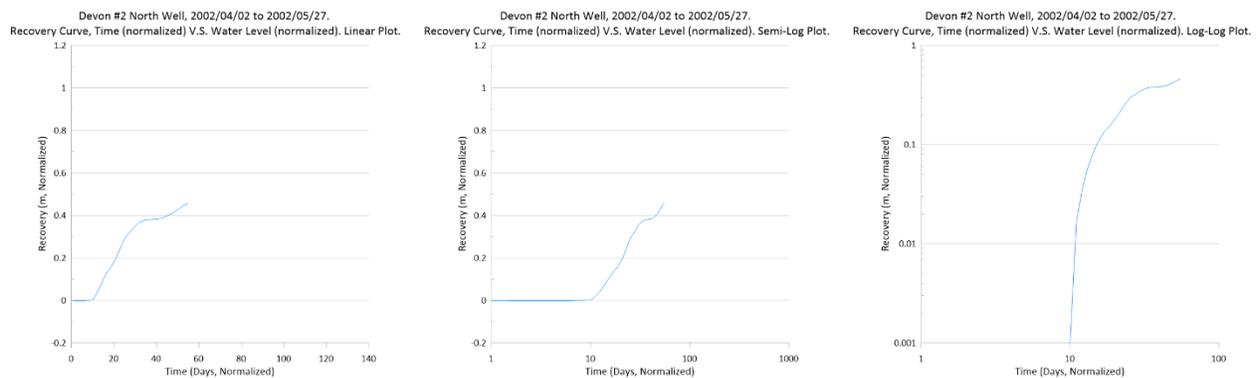


Figure 737: Recovery curve plots for Devon #2 North_0159 well, 2002/04/02 to 2002/05/27. Surficial aquifer.

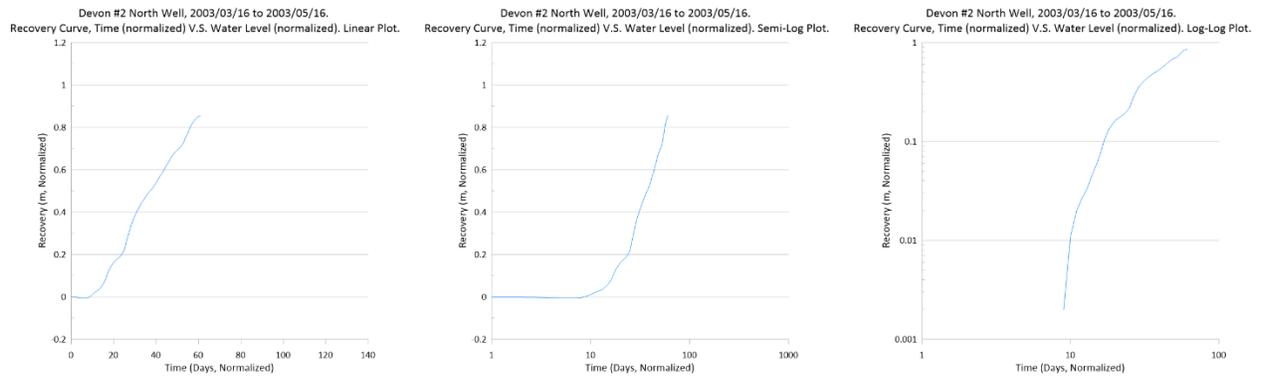


Figure 738: Recovery curve plots for Devon #2 North_0159 well, 2003/03/16 to 2003/05/16. Surficial aquifer.

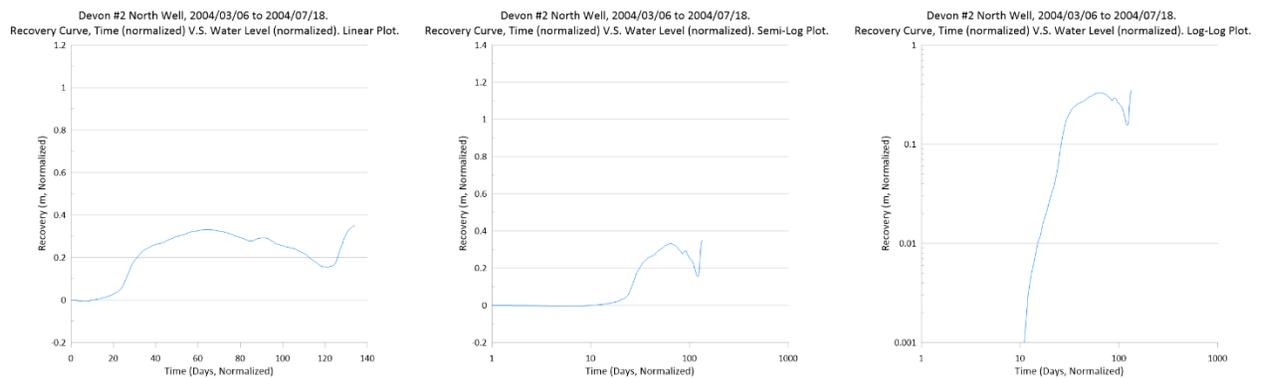


Figure 739: Recovery curve plots for Devon #2 North_0159 well, 2004/01/06 to 2004/07/18. Surficial aquifer.

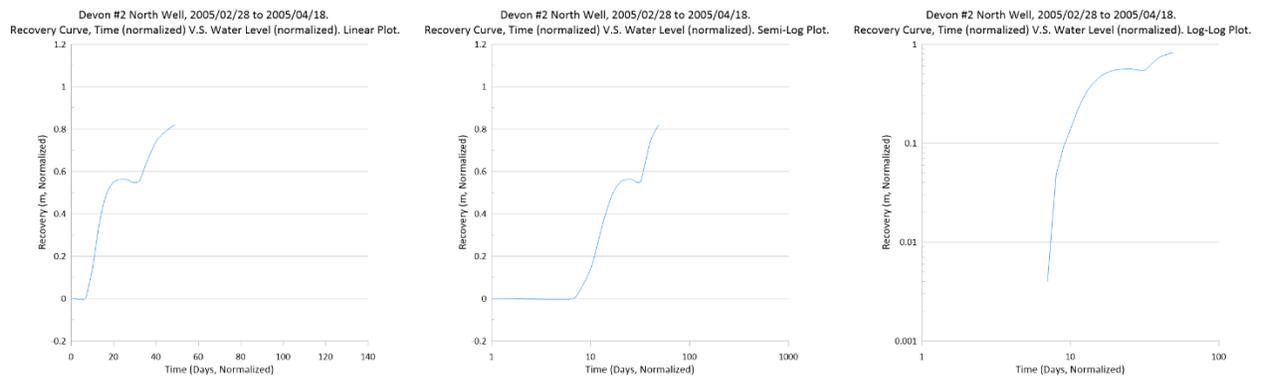


Figure 740: Recovery curve plots for Devon #2 North_0159 well, 2005/02/28 to 2005/04/18. Surficial aquifer.

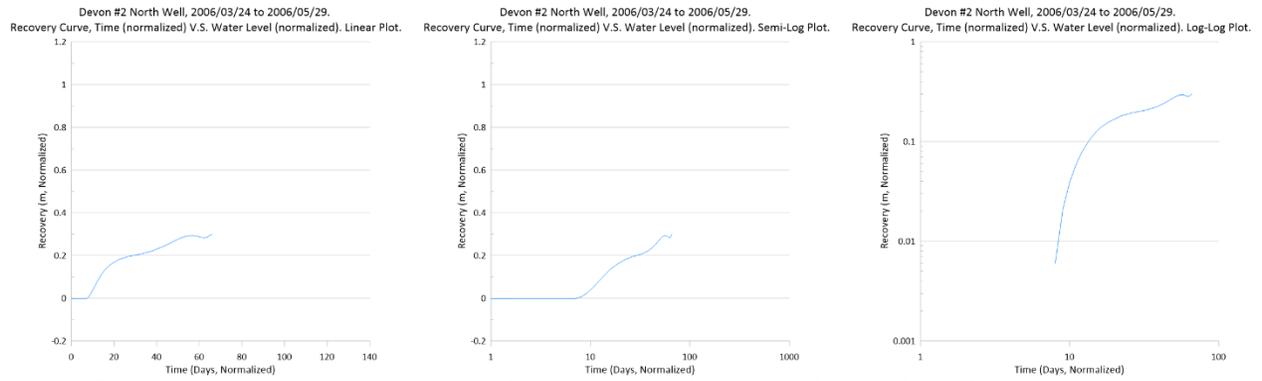


Figure 741: Recovery curve plots for Devon #2 North_0159 well, 2006/03/24 to 2004/05/29. Surficial aquifer.

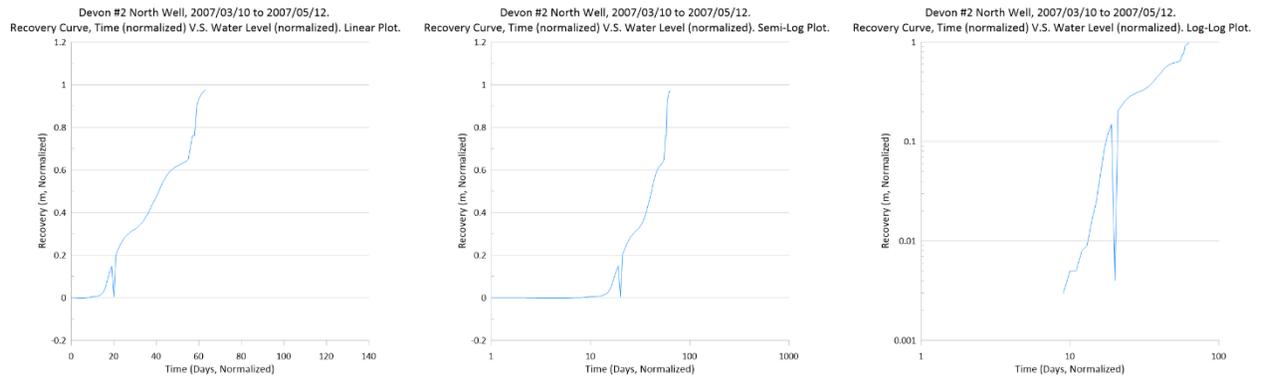


Figure 742: Recovery curve plots for Devon #2 North_0159 well, 2007/03/10 to 2007/05/12. Surficial aquifer.

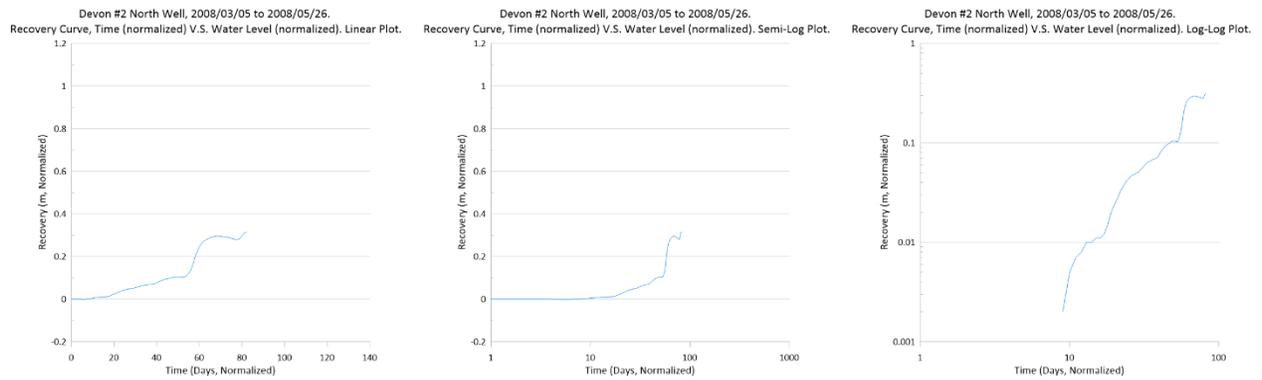


Figure 743: Recovery curve plots for Devon #2 North_0159 well, 2008/03/05 to 2008/05/26. Surficial aquifer.

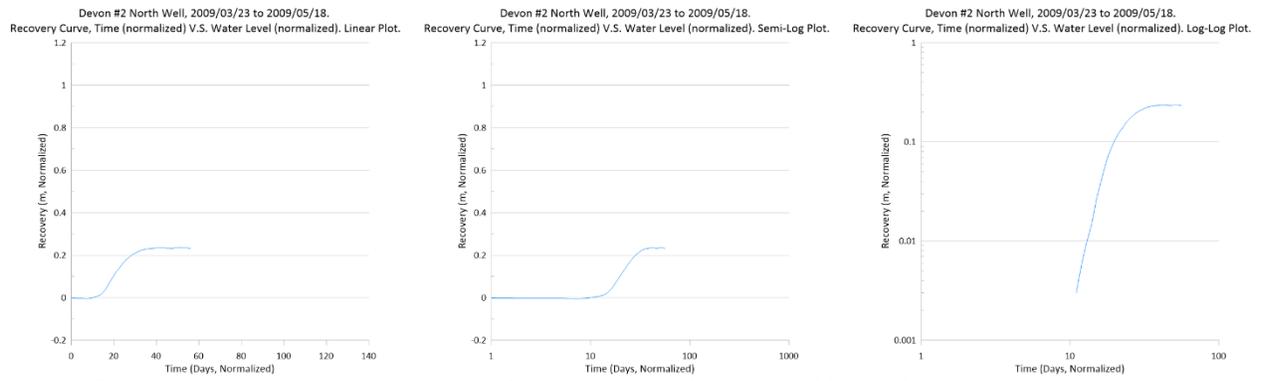


Figure 744: Recovery curve plots for Devon #2 North_0159 well, 2009/03/23 to 2009/05/18. Surficial aquifer.

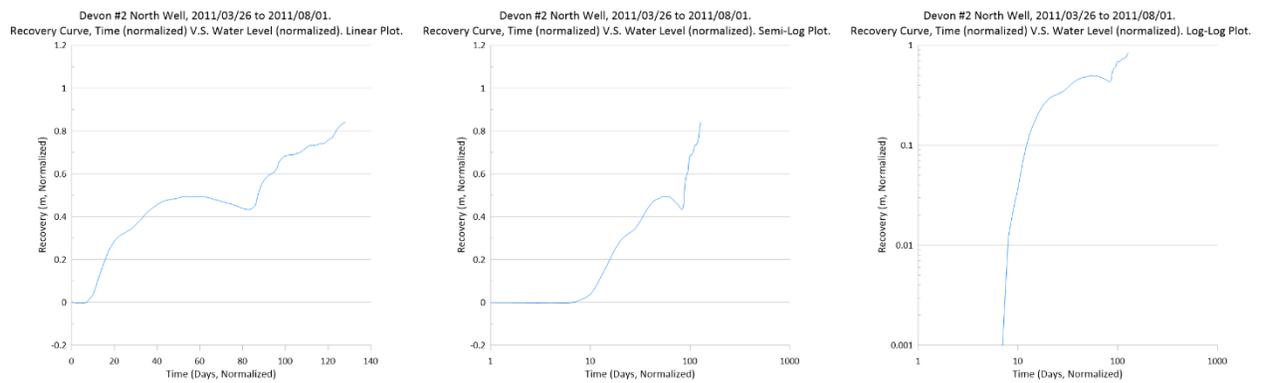


Figure 745: Recovery curve plots for Devon #2 North_0159 well, 2011/03/26 to 2011/08/01. Surficial aquifer.

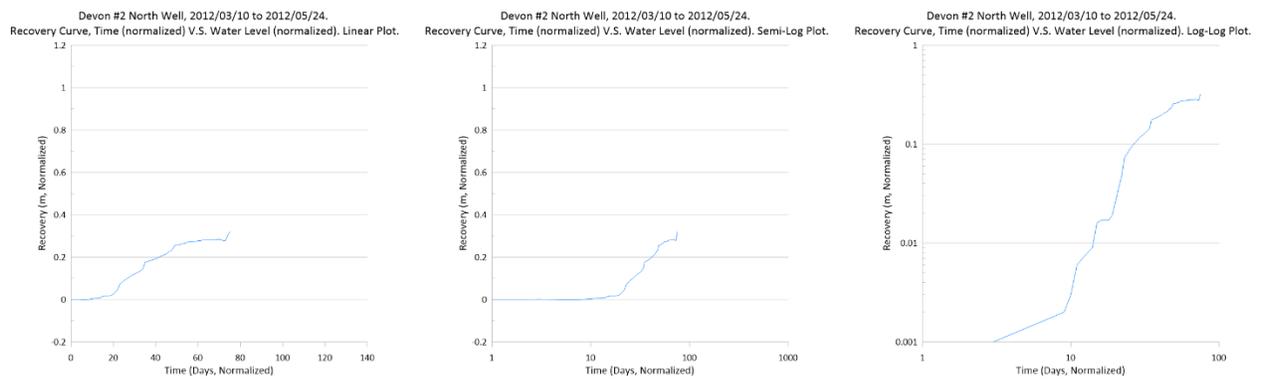


Figure 746: Recovery curve plots for Devon #2 North_0159 well, 2012/03/10 to 2012/05/24. Surficial aquifer.

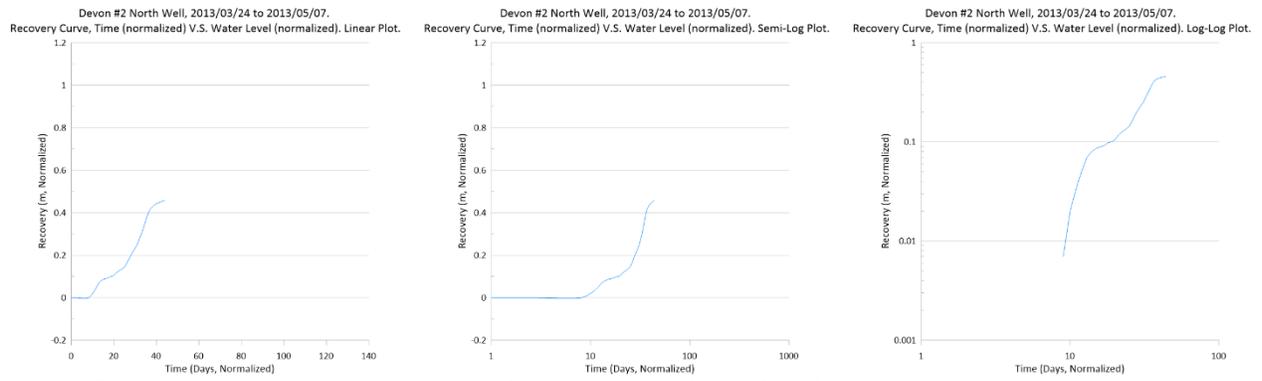


Figure 747: Recovery curve plots for Devon #2 North_0159 well, 2013/03/24 to 2013/05/07. Surficial aquifer.

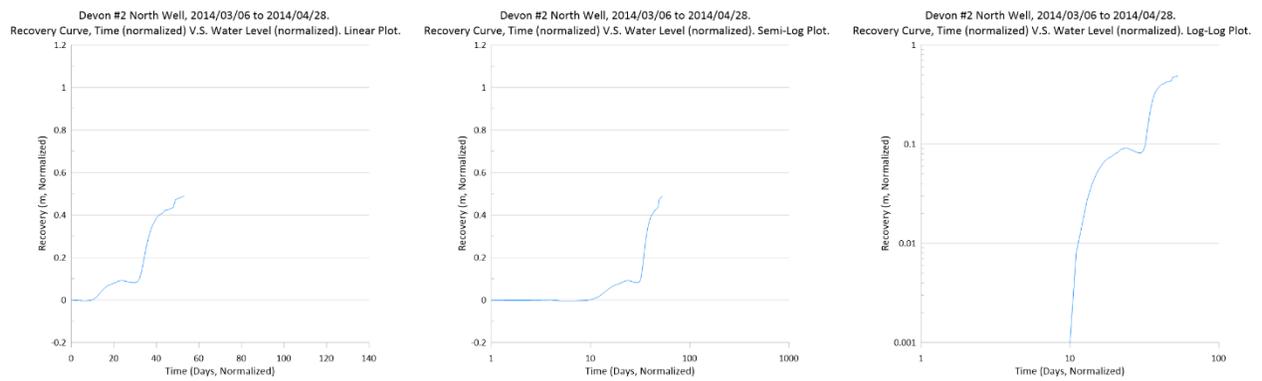


Figure 748: Recovery curve plots for Devon #2 North_0159 well, 2014/03/06 to 2014/04/28. Surficial aquifer.

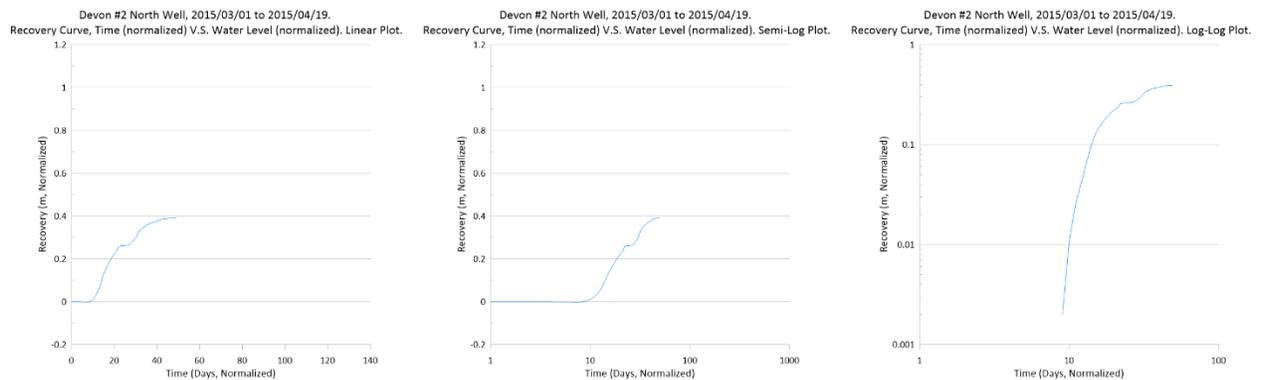


Figure 749: Recovery curve plots for Devon #2 North_0159 well, 2015/03/01 to 2015/04/19. Surficial aquifer.

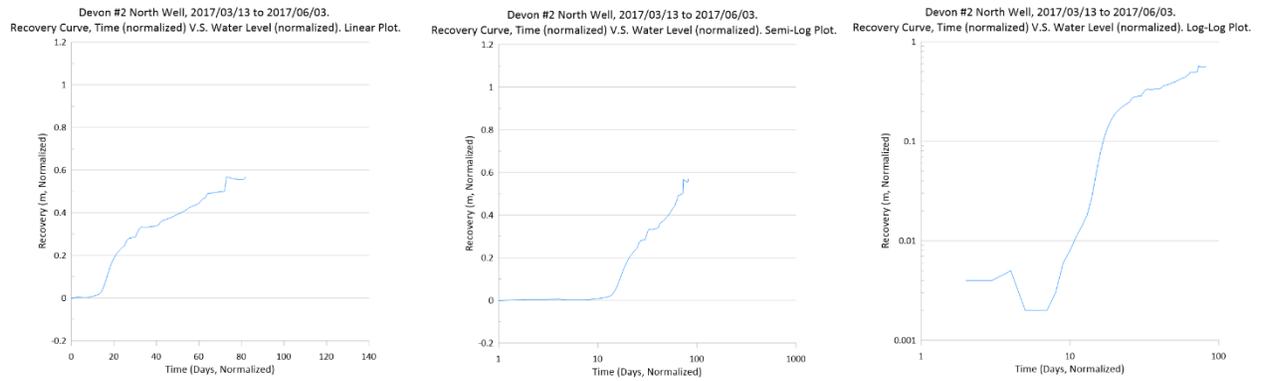


Figure 750: Recovery curve plots for Devon #2 North_0159 well, 2017/03/13 to 2017/06/03. Surficial aquifer.

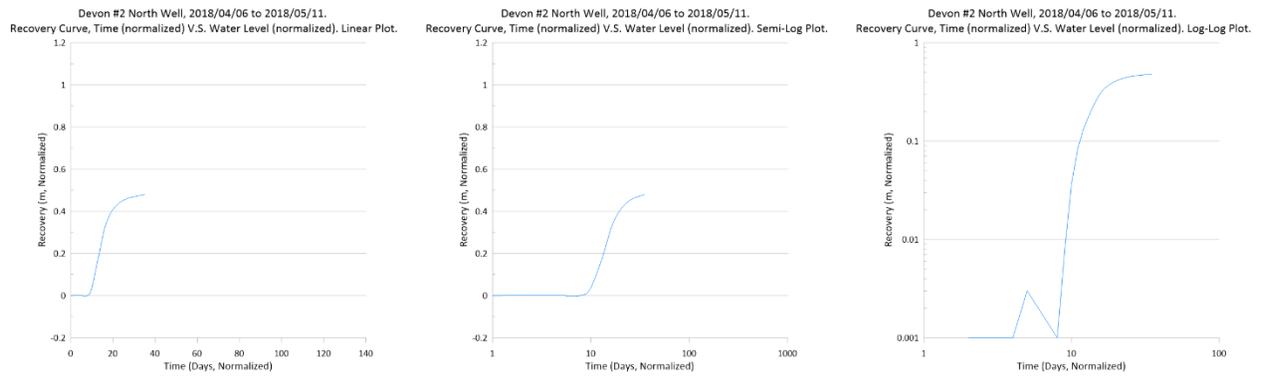


Figure 751: Recovery curve plots for Devon #2 North_0159 well, 2018/04/06 to 2018/05/11. Surficial aquifer.

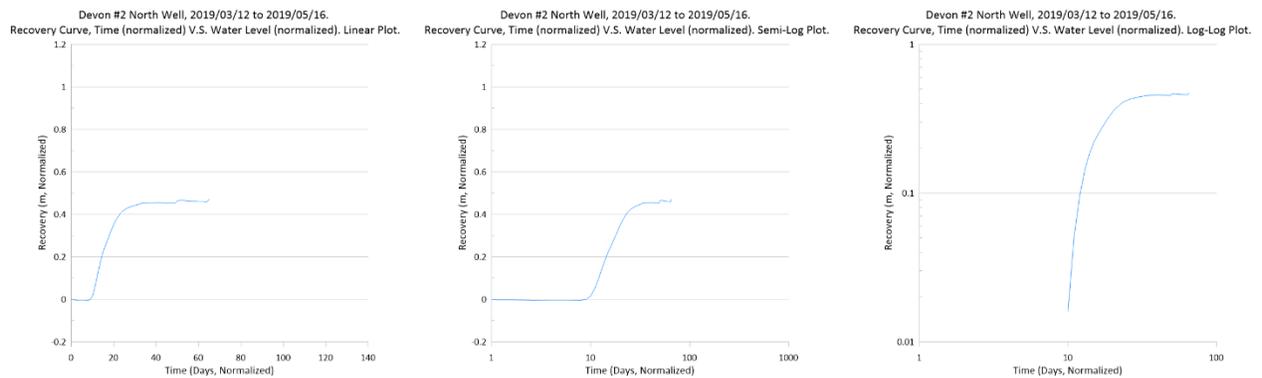


Figure 752: Recovery curve plots for Devon #2 North_0159 well, 2019/03/12 to 2019/05/16. Surficial aquifer.

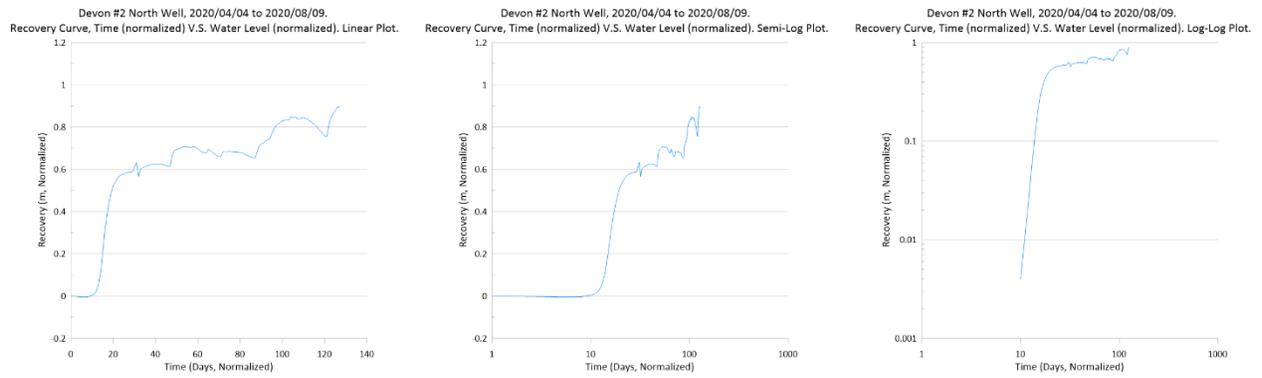


Figure 753: Recovery curve plots for Devon #2 North_0159 well, 2020/04/04 to 2020/08/09. Surficial aquifer.

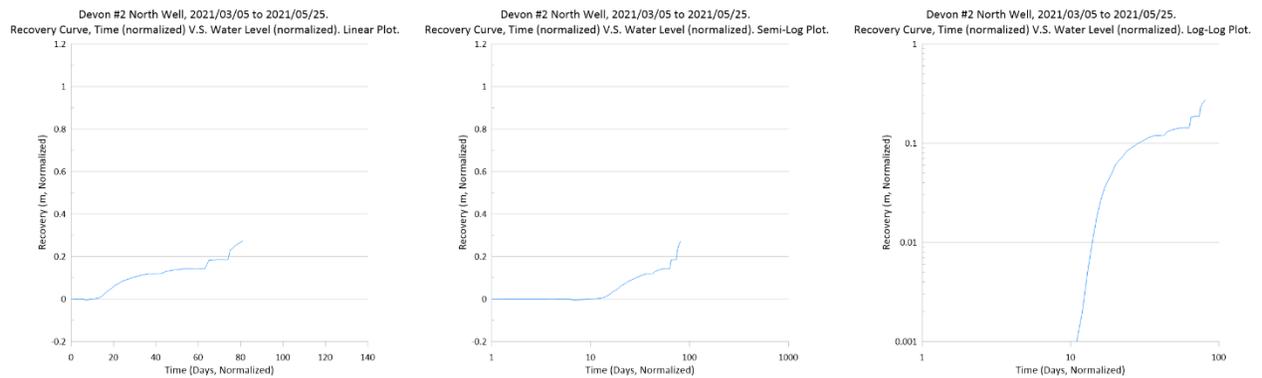


Figure 754: Recovery curve plots for Devon #2 North_0159 well, 2021/03/05 to 2021/05/25. Surficial aquifer.

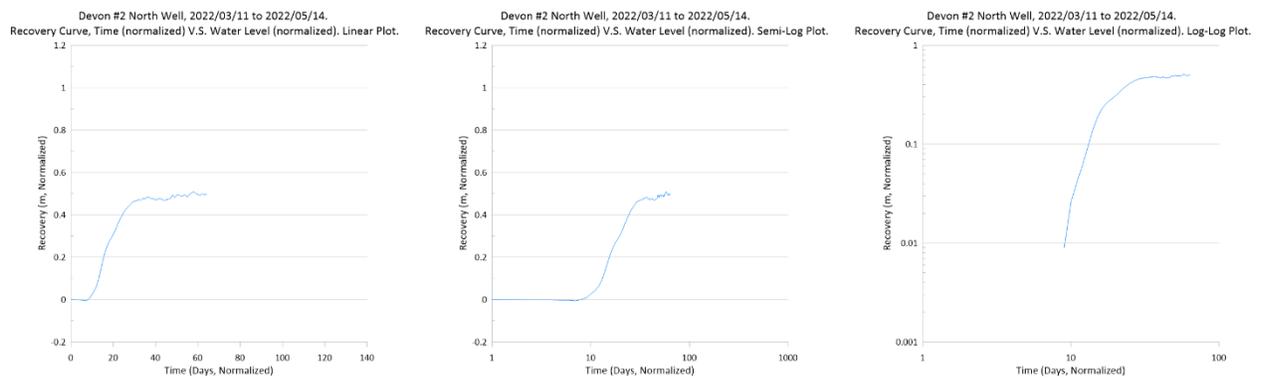


Figure 755: Recovery curve plots for Devon #2 North_0159 well, 2022/03/11 to 2022/05/14. Surficial aquifer.

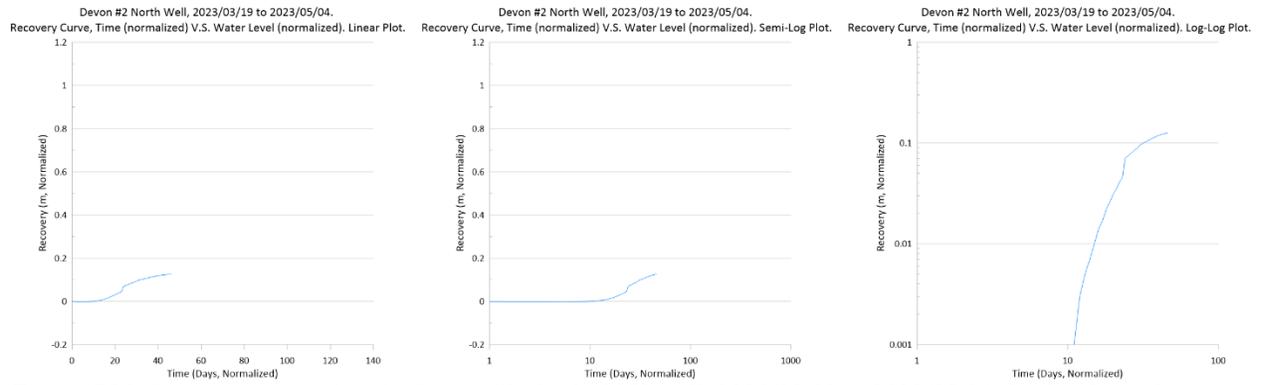


Figure 756: Recovery curve plots for Devon #2 North_0159 well, 2023/03/19 to 2023/05/04. Surficial aquifer.

Appendix I18: GOWN Monitoring Well Recovery Curve Plots for Carmangay West_3010 Well

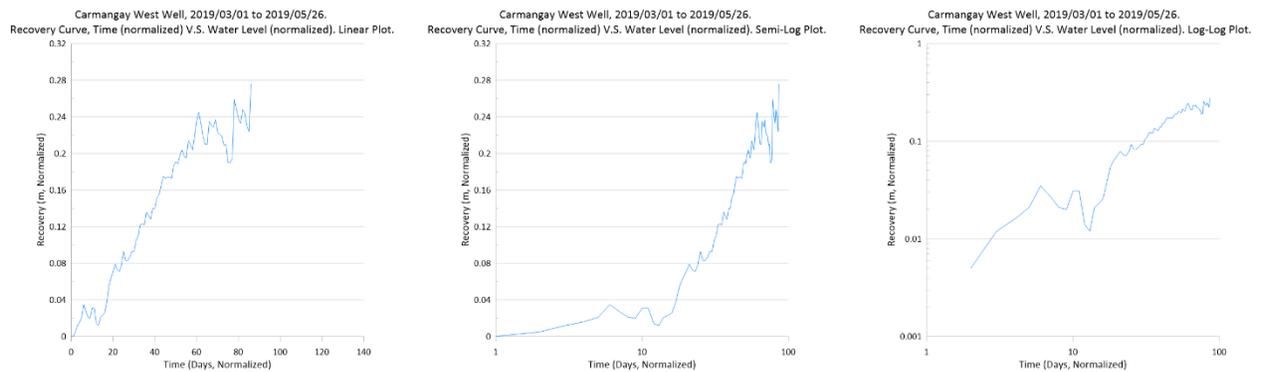


Figure 757: Recovery curve plots for Carmangay West_3010 well, 2019/03/01 to 2019/05/26. Surficial aquifer.

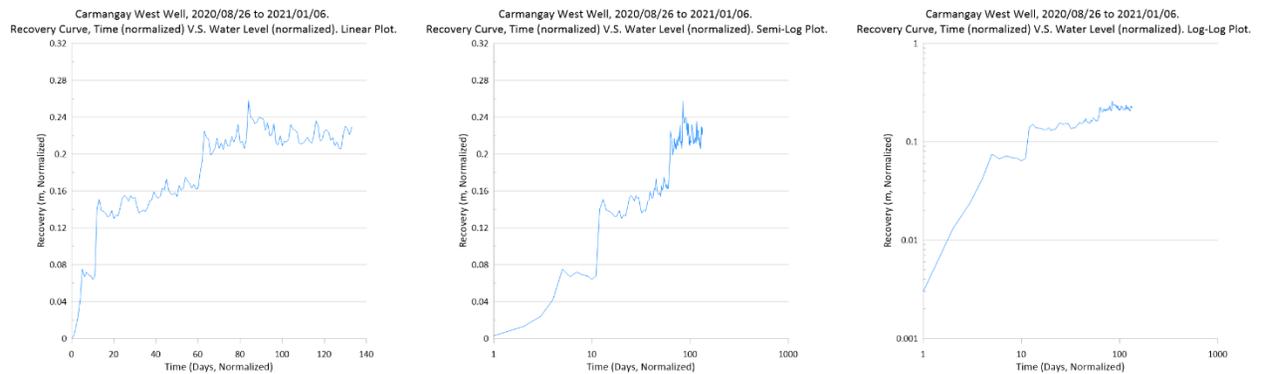


Figure 758: Recovery curve plots for Carmangay West_3010 well, 2020/08/26 to 2021/01/06. Surficial aquifer.

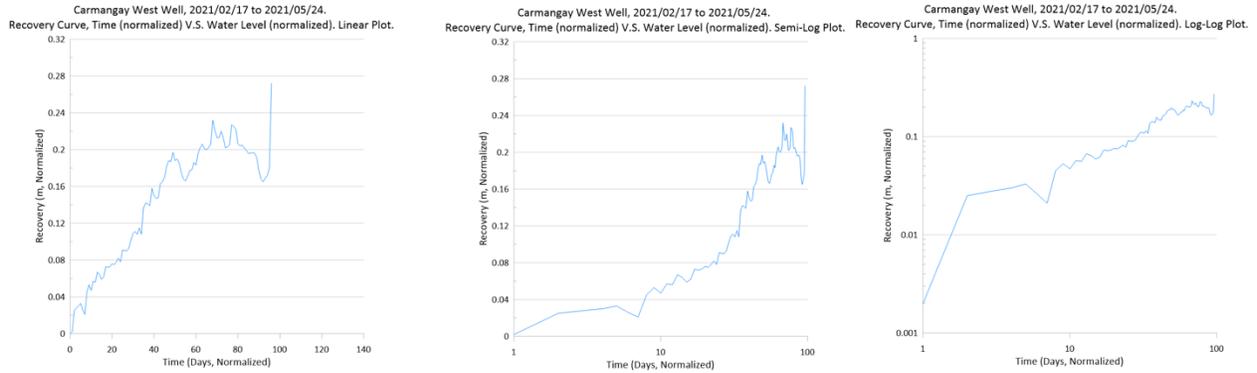


Figure 759: Recovery curve plots for Carmangay West_3010 well, 2021/02/17 to 2021/05/24. Surficial aquifer.

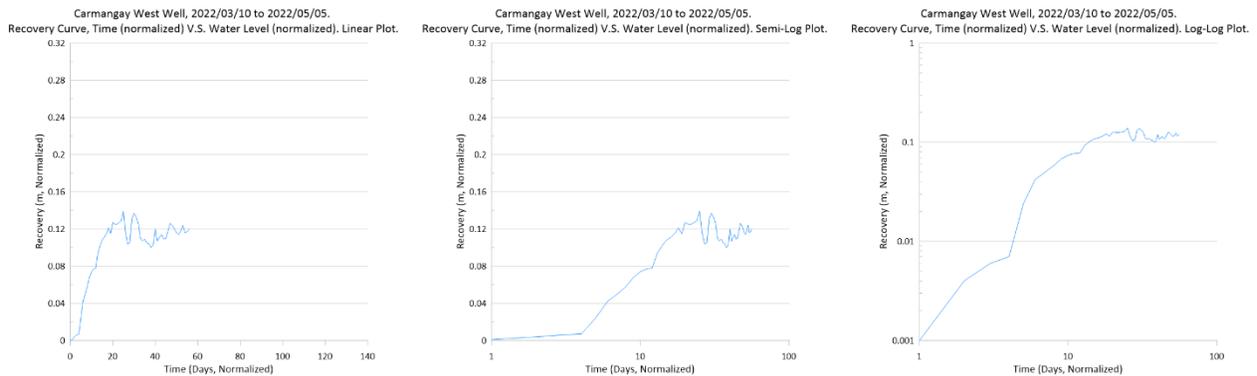


Figure 760: Recovery curve plots for Carmangay West_3010 well, 2022/03/10 to 2022/05/05. Surficial aquifer.

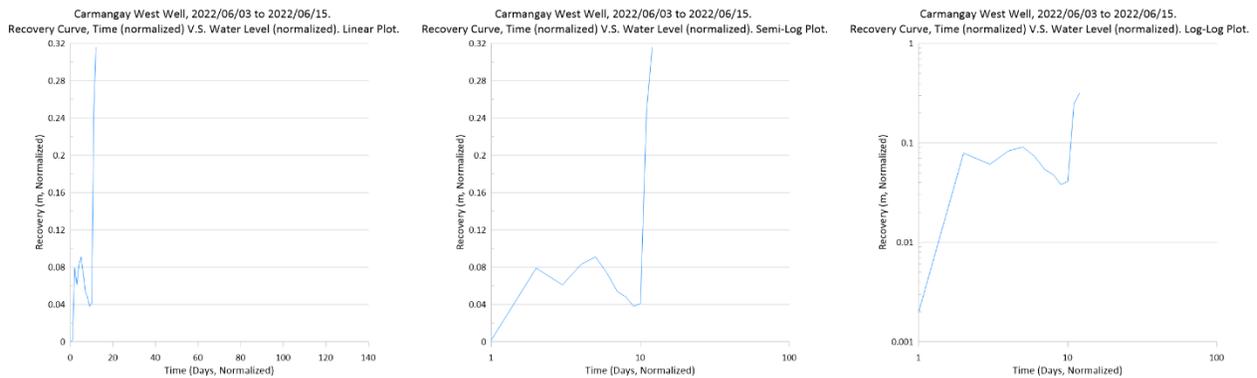


Figure 761: Recovery curve plots for Carmangay West_3010 well, 2022/06/03 to 2022/06/15. Surficial aquifer.

Appendix I19: GOWN Monitoring Well Recovery Curve Plots for Cypress Hills 2293E_0107 Well

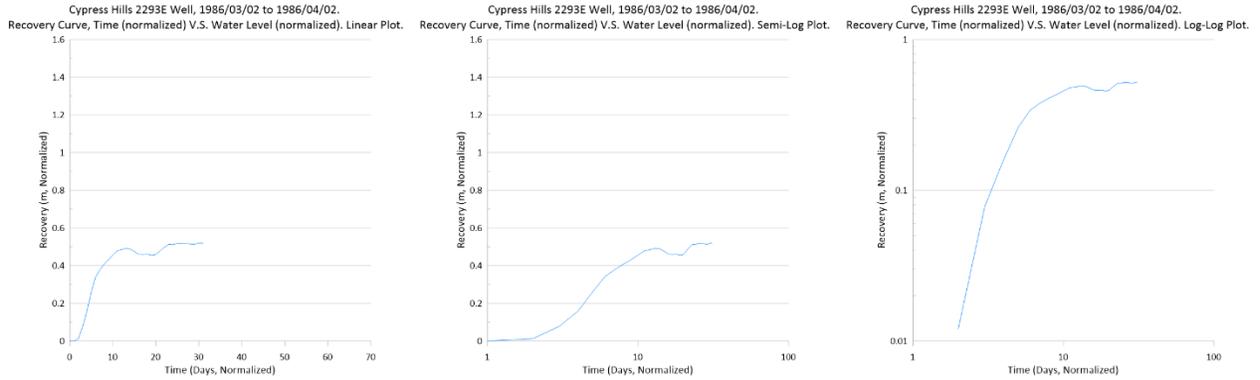


Figure 762: Recovery curve plots for Cypress Hills 2293E_0107 well, 1986/03/02 to 1986/04/02. Surficial aquifer.

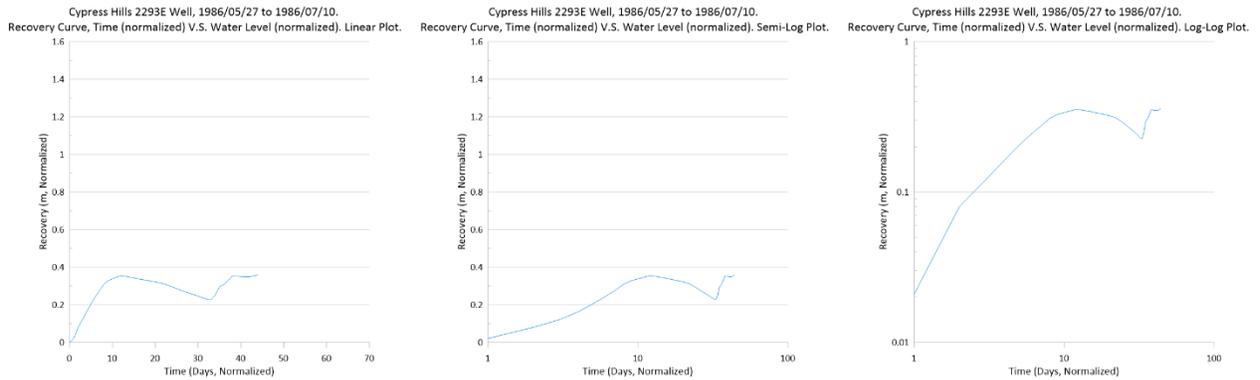


Figure 763: Recovery curve plots for Cypress Hills 2293E_0107 well, 1986/05/27 to 1986/07/10. Surficial aquifer.

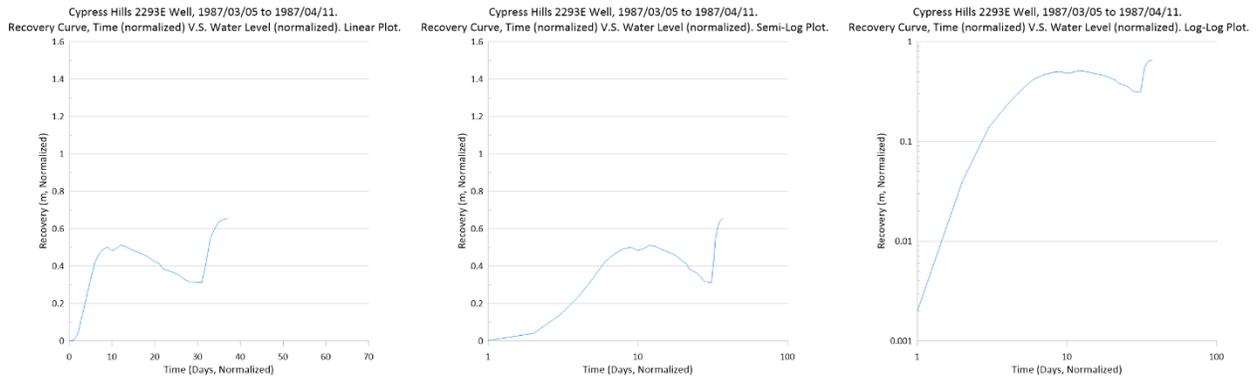


Figure 764: Recovery curve plots for Cypress Hills 2293E_0107 well, 1987/03/05 to 1987/04/11. Surficial aquifer.

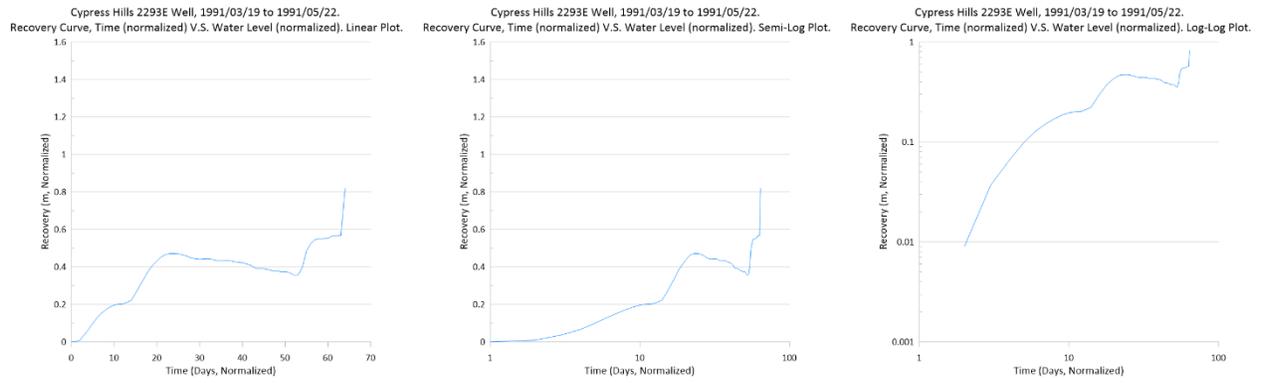


Figure 765: Recovery curve plots for Cypress Hills 2293E_0107 well, 1991/03/19 to 1991/05/22. Surficial aquifer.

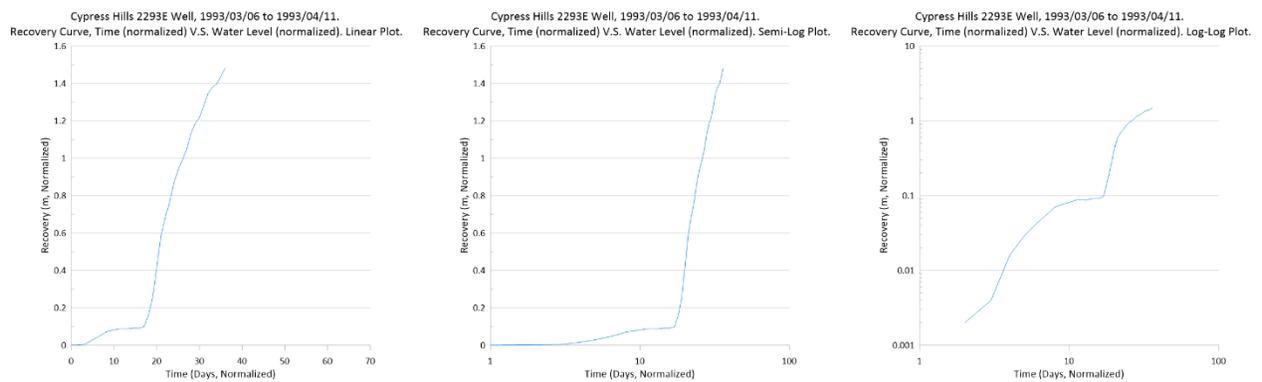


Figure 766: Recovery curve plots for Cypress Hills 2293E_0107 well, 1993/03/06 to 1993/04/11. Surficial aquifer.

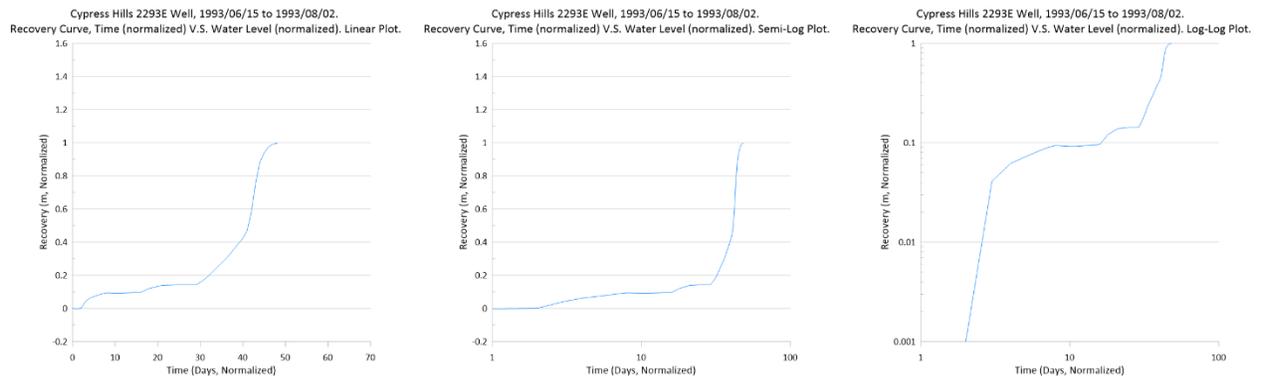


Figure 767: Recovery curve plots for Cypress Hills 2293E_0107 well, 1993/06/15 to 1993/08/02. Surficial aquifer.

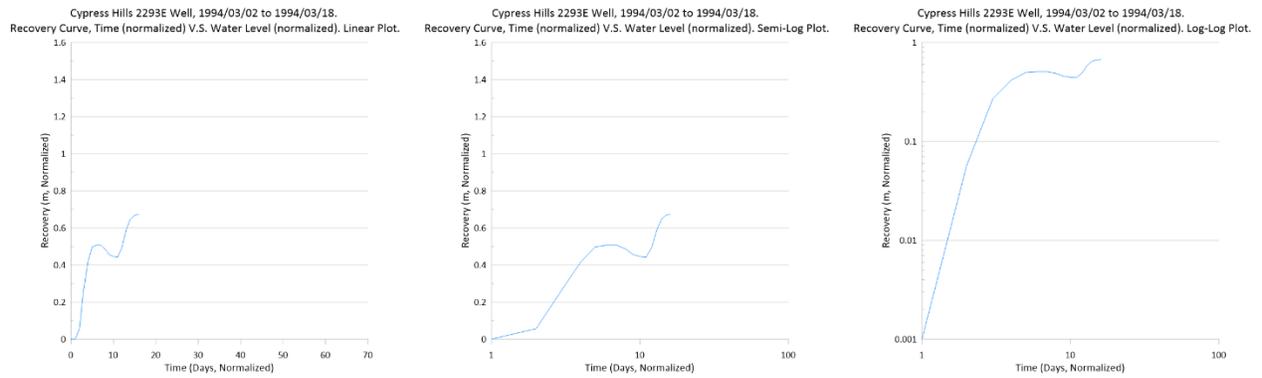


Figure 768: Recovery curve plots for Cypress Hills 2293E_0107 well, 1994/03/02 to 1994/03/18. Surficial aquifer.

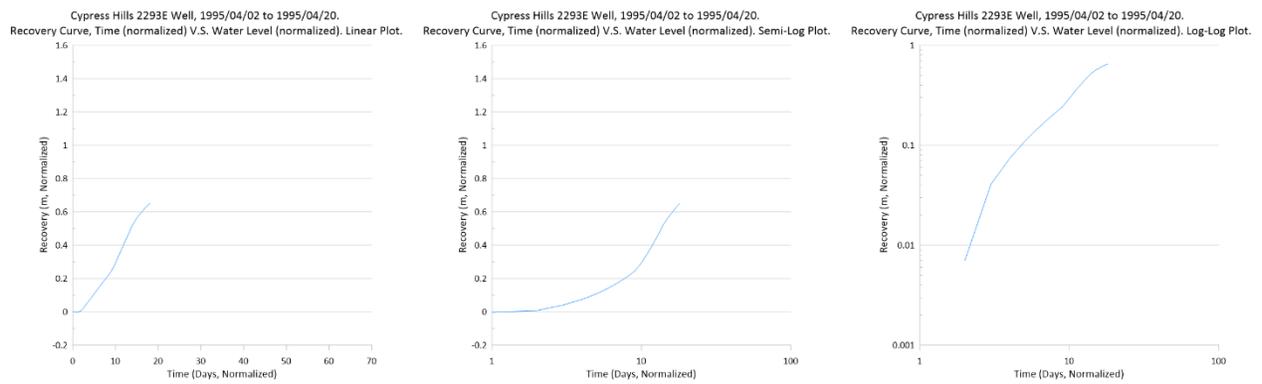


Figure 769: Recovery curve plots for Cypress Hills 2293E_0107 well, 1995/04/02 to 1995/04/20. Surficial aquifer.

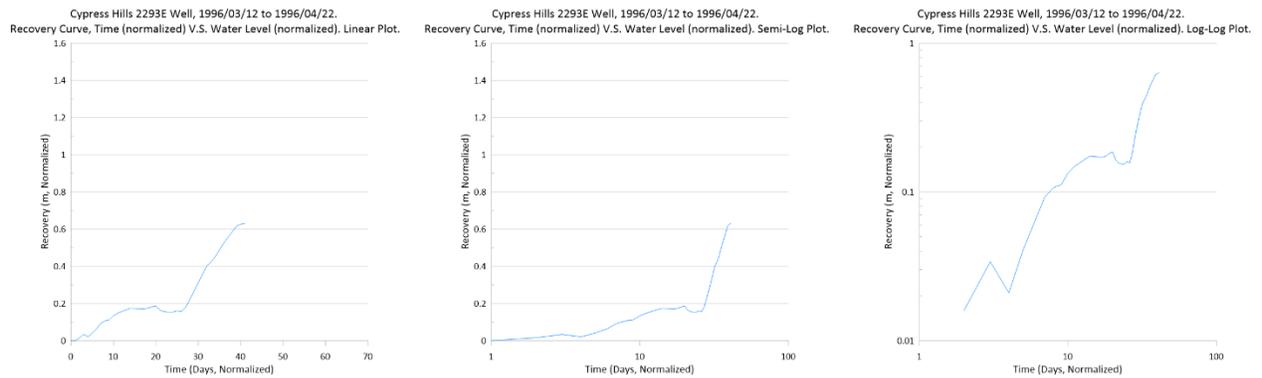


Figure 770: Recovery curve plots for Cypress Hills 2293E_0107 well, 1996/03/12 to 1996/04/22. Surficial aquifer.

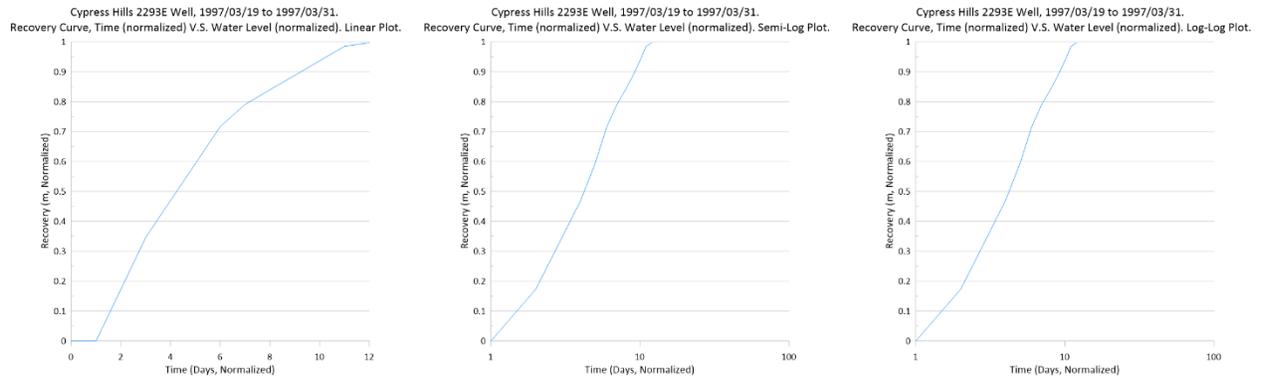


Figure 771: Recovery curve plots for Cypress Hills 2293E_0107 well, 1997/03/19 to 1997/03/31. Surficial aquifer.

Appendix J: GOWN Monitoring Well Recovery Curve Plots for Miscellaneous Alberta Aquifers Wells

Appendix J1: GOWN Monitoring Well Recovery Curve Plots for Dewberry 2410E_0237 Well

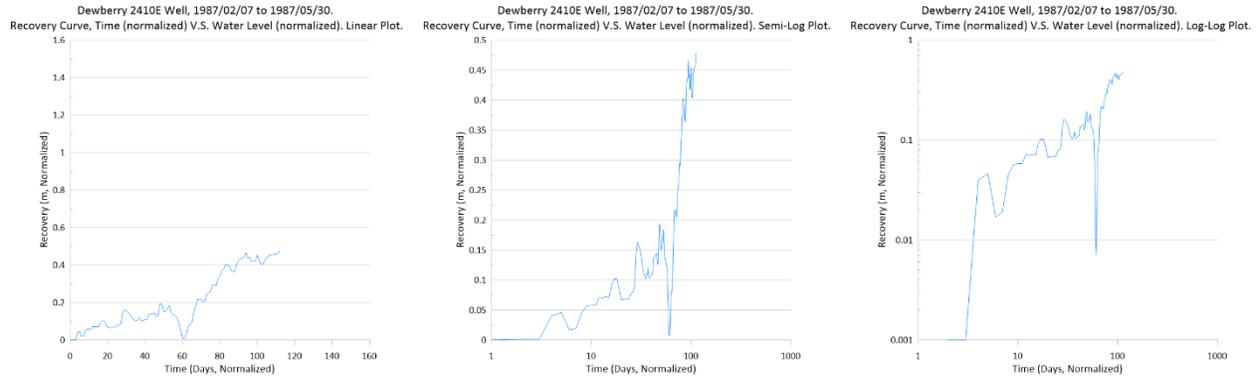


Figure 772: Recovery curve plots for Dewberry 2410E_0237 well, 1987/02/07 to 1987/05/30. Surficial aquifer.

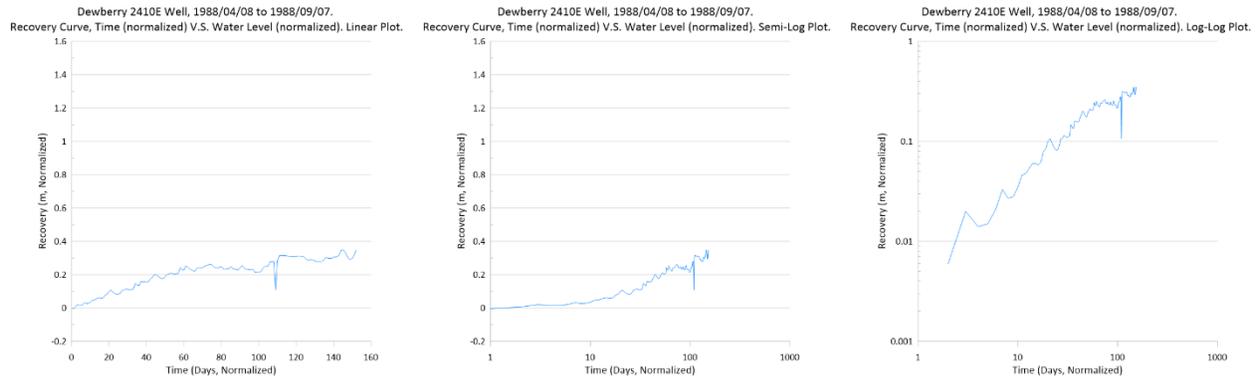


Figure 773: Recovery curve plots for Dewberry 2410E_0237 well, 1988/04/08 to 1988/09/07. Surficial aquifer.

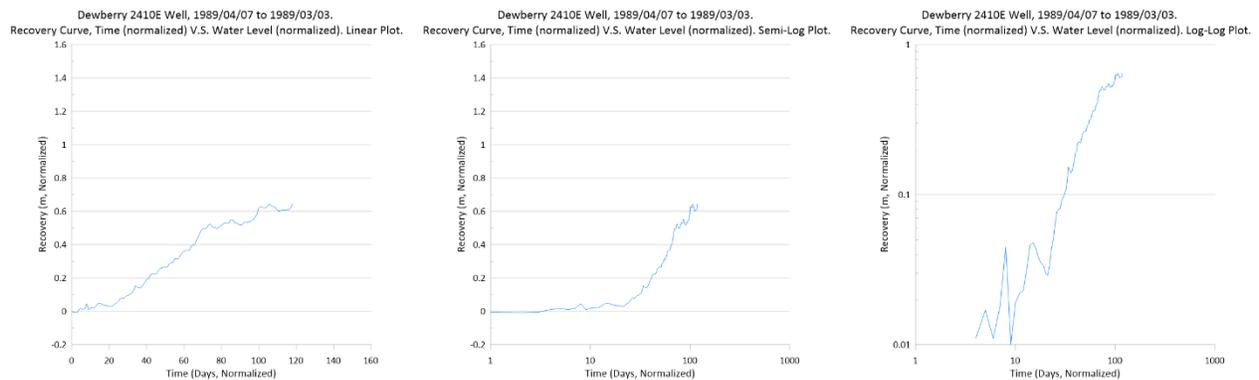


Figure 774: Recovery curve plots for Dewberry 2410E_0237 well, 1989/04/07 to 1989/03/03. Surficial aquifer.

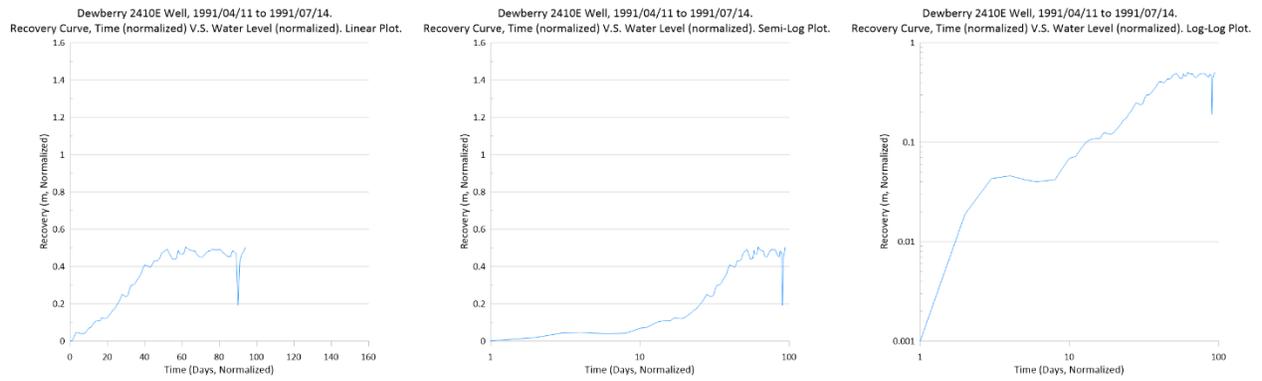


Figure 775: Recovery curve plots for Dewberry 2410E_0237 well, 1991/04/11 to 1991/07/14. Surficial aquifer.

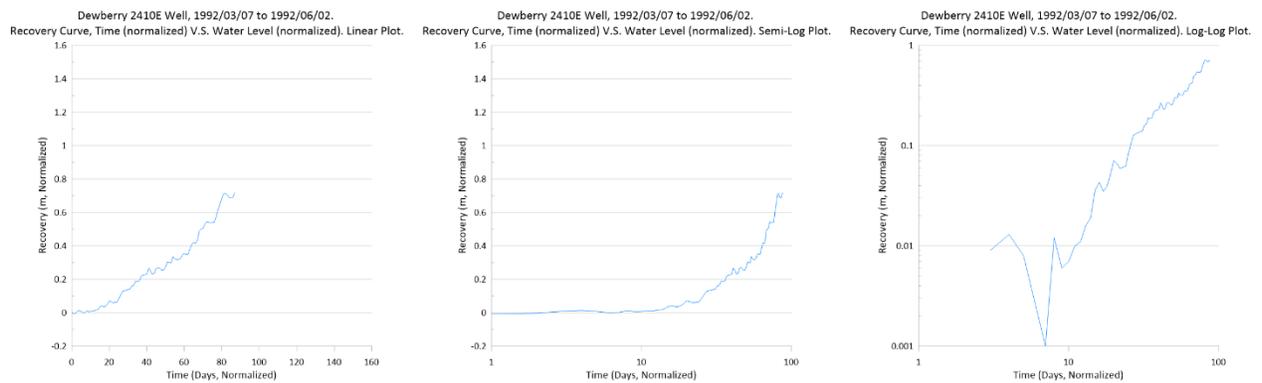


Figure 776: Recovery curve plots for Dewberry 2410E_0237 well, 1992/03/07 to 1992/06/02. Surficial aquifer.

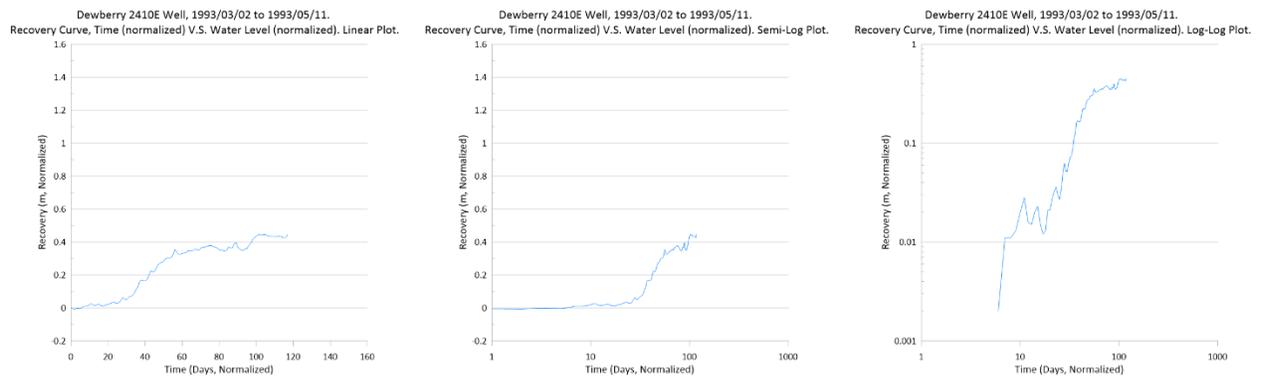


Figure 777: Recovery curve plots for Dewberry 2410E_0237 well, 1993/03/02 to 1993/05/11. Surficial aquifer.

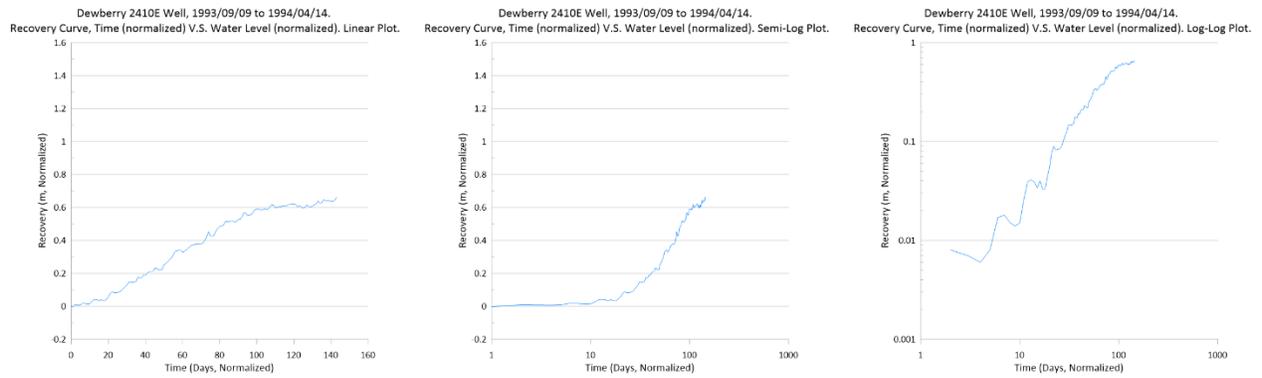


Figure 778: Recovery curve plots for Dewberry 2410E_0237 well, 1993/09/09 to 1994/04/14. Surficial aquifer.

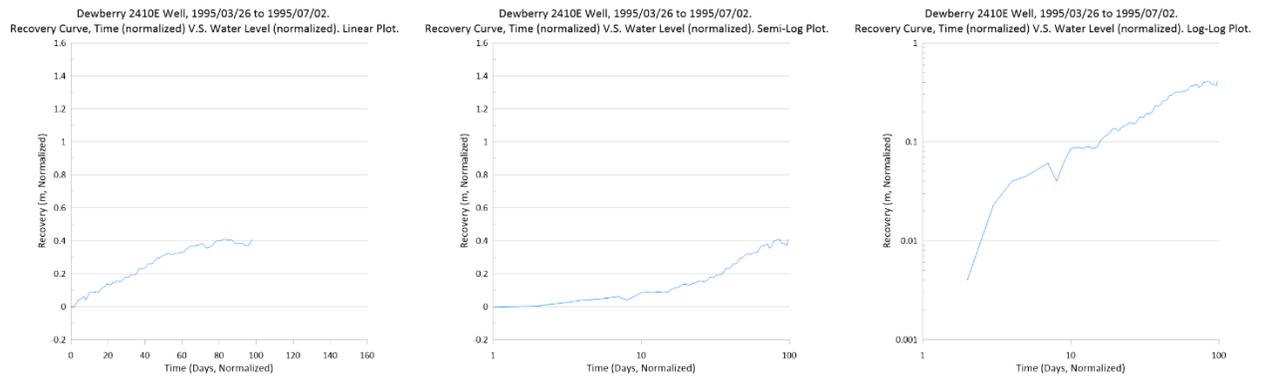


Figure 779: Recovery curve plots for Dewberry 2410E_0237 well, 1995/03/26 to 1995/07/02. Surficial aquifer.

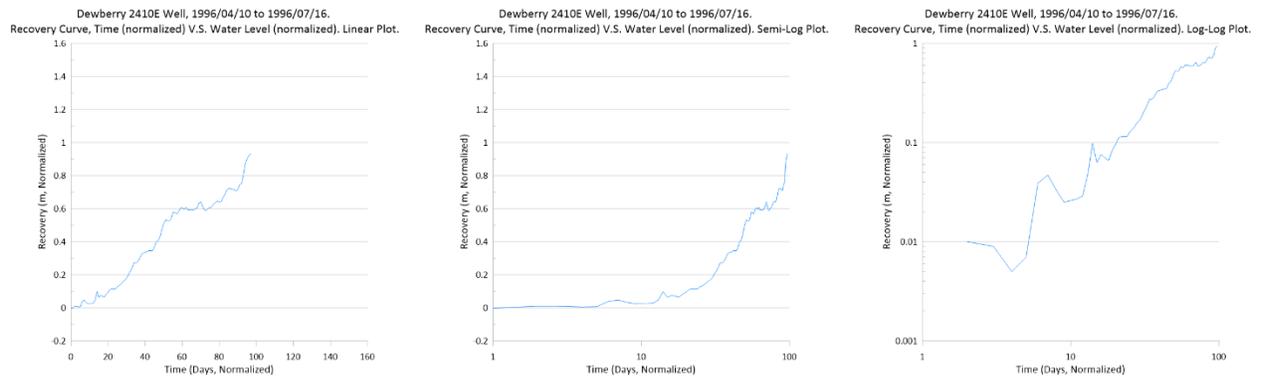


Figure 780: Recovery curve plots for Dewberry 2410E_0237 well, 1996/04/10 to 1996/07/16. Surficial aquifer.

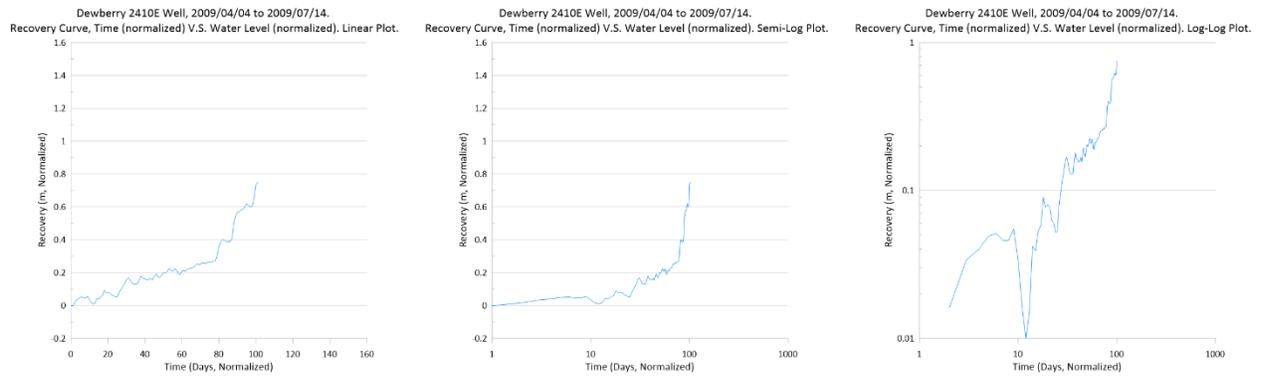


Figure 781: Recovery curve plots for Dewberry 2410E_0237 well, 2009/04/04 to 2009/07/14. Surficial aquifer.

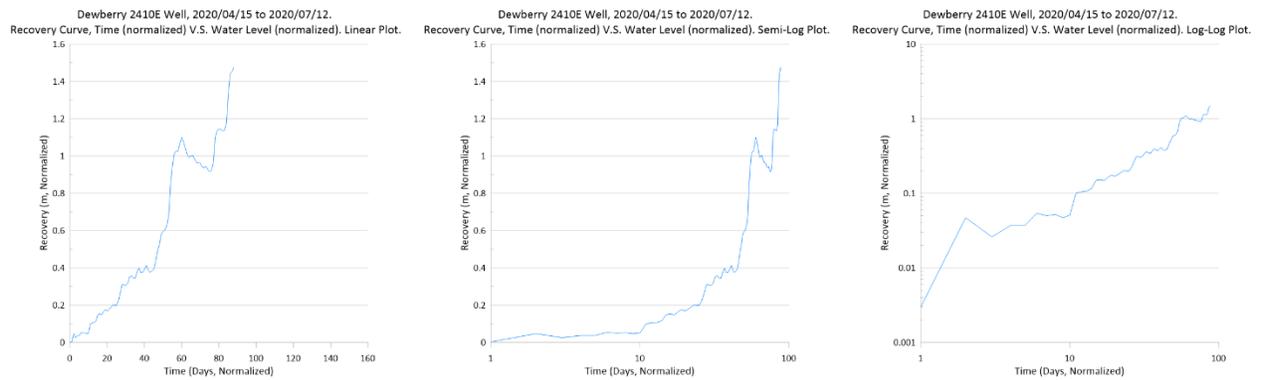


Figure 782: Recovery curve plots for Dewberry 2410E_0237 well, 2020/04/15 to 2020/07/12. Surficial aquifer.

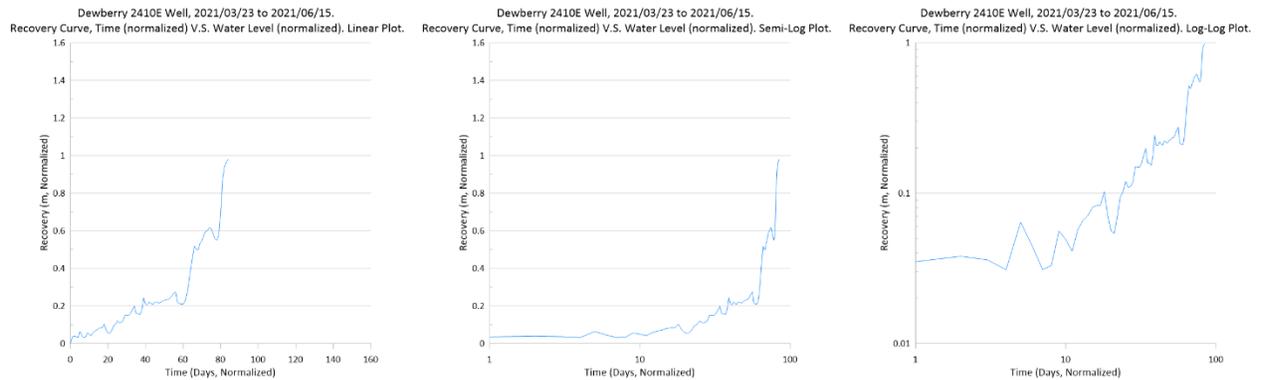


Figure 783: Recovery curve plots for Dewberry 2410E_0237 well, 2021/03/23 to 2021/06/15. Surficial aquifer.

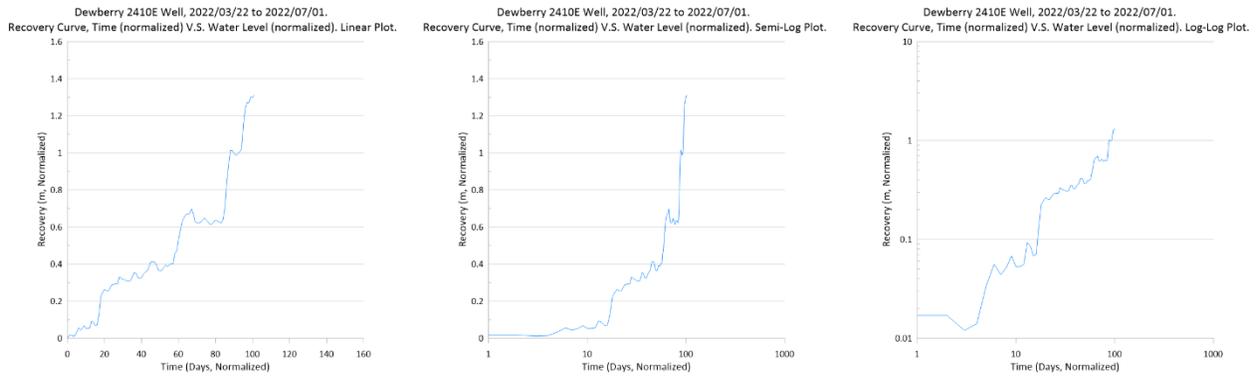


Figure 784: Recovery curve plots for Dewberry 2410E_0237 well, 2022/03/22 to 2022/07/01. Surficial aquifer.

Appendix J2: GOWN Monitoring Well Recovery Curve Plots for Ross Creek 2286E_0114 Well

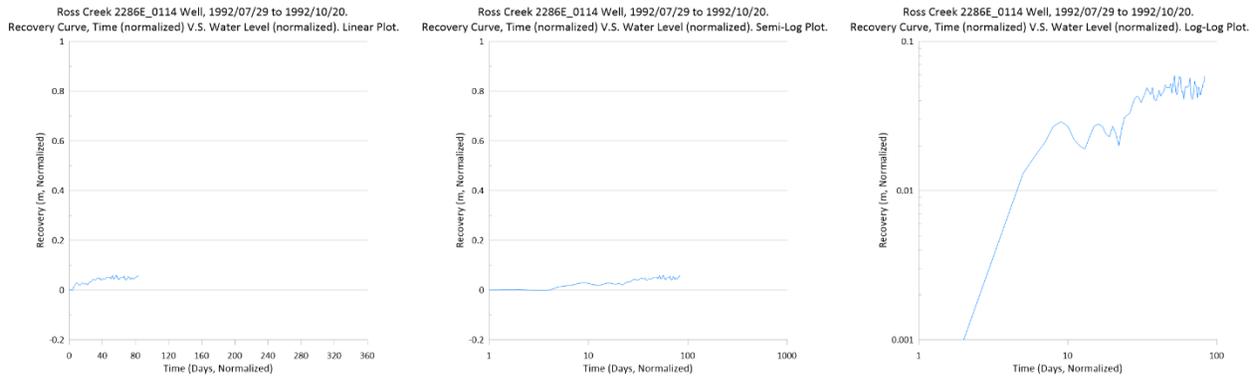


Figure 785: Recovery curve plots for Ross Creek 2286E_0114 well, 1992/07/29 to 1992/10/20. Surficial aquifer.

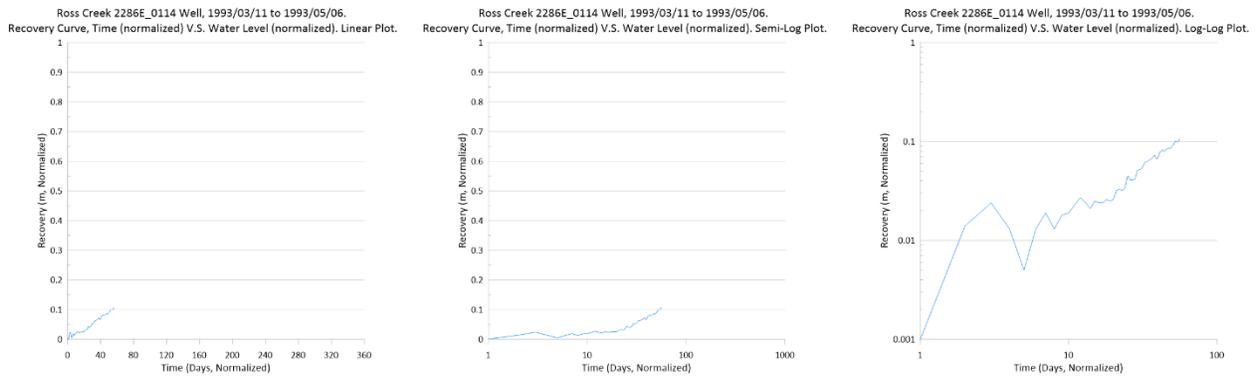


Figure 786: Recovery curve plots for Ross Creek 2286E_0114 well, 1993/03/11 to 1993/05/06. Surficial aquifer.

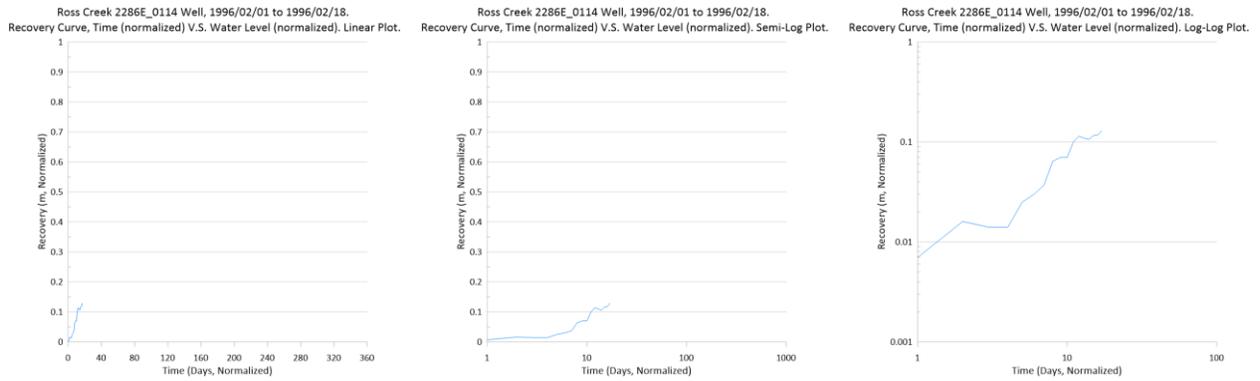


Figure 787: Recovery curve plots for Ross Creek 2286E_0114 well, 1996/02/01 to 1996/02/18. Surficial aquifer.

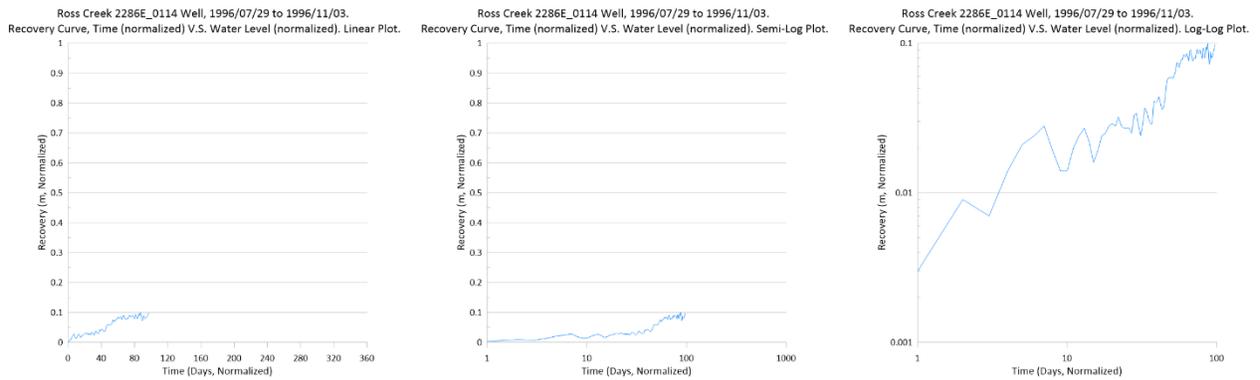


Figure 788: Recovery curve plots for Ross Creek 2286E_0114 well, 1996/07/29 to 1996/11/03. Surficial aquifer.

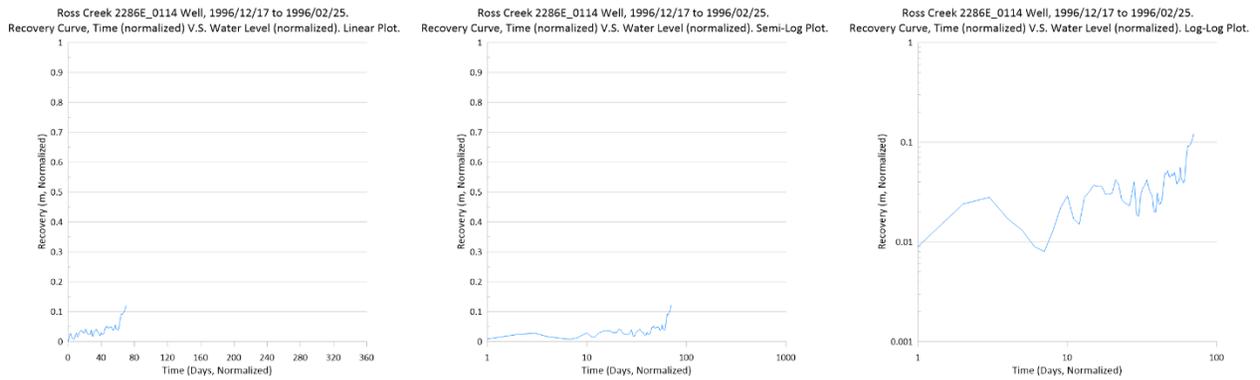


Figure 789: Recovery curve plots for Ross Creek 2286E_0114 well, 1996/12/17 to 1997/02/25. Surficial aquifer.

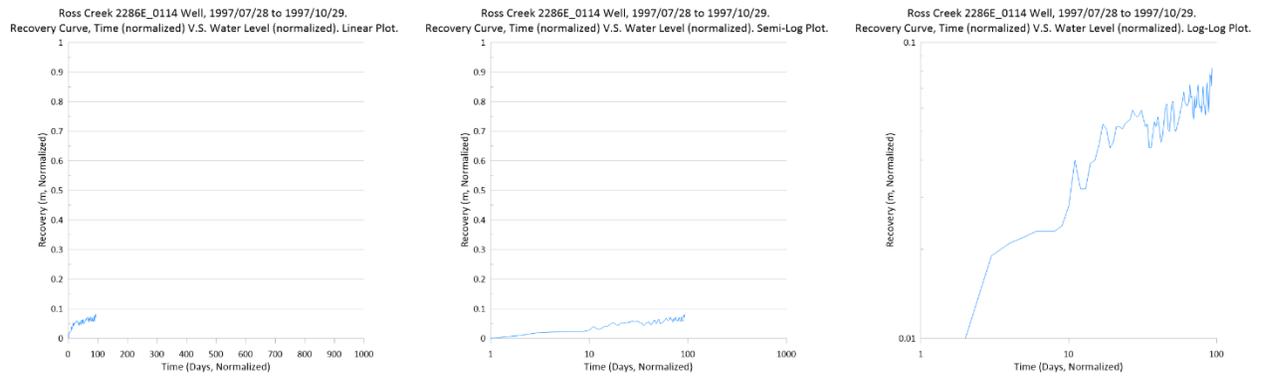


Figure 790: Recovery curve plots for Ross Creek 2286E_0114 well, 1997/07/28 to 1997/10/29. Surficial aquifer.

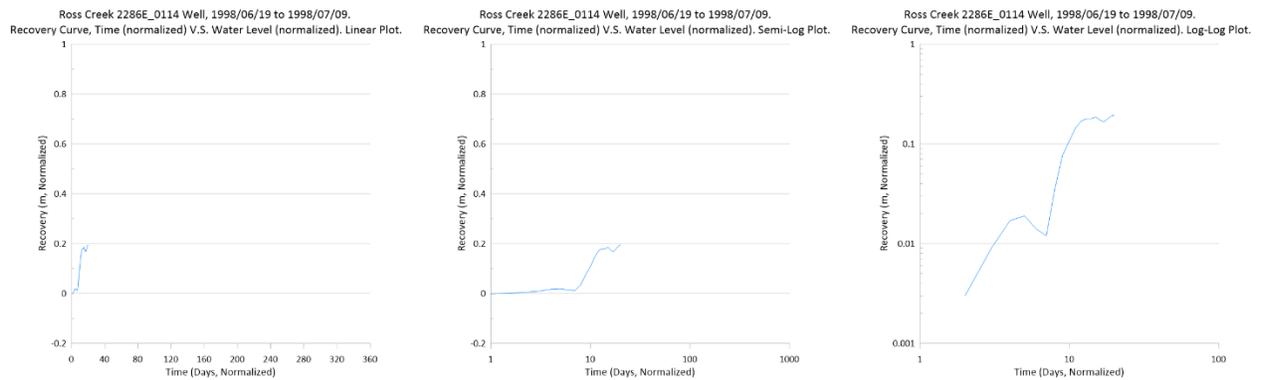


Figure 791: Recovery curve plots for Ross Creek 2286E_0114 well, 1998/06/19 to 1998/07/09. Surficial aquifer.

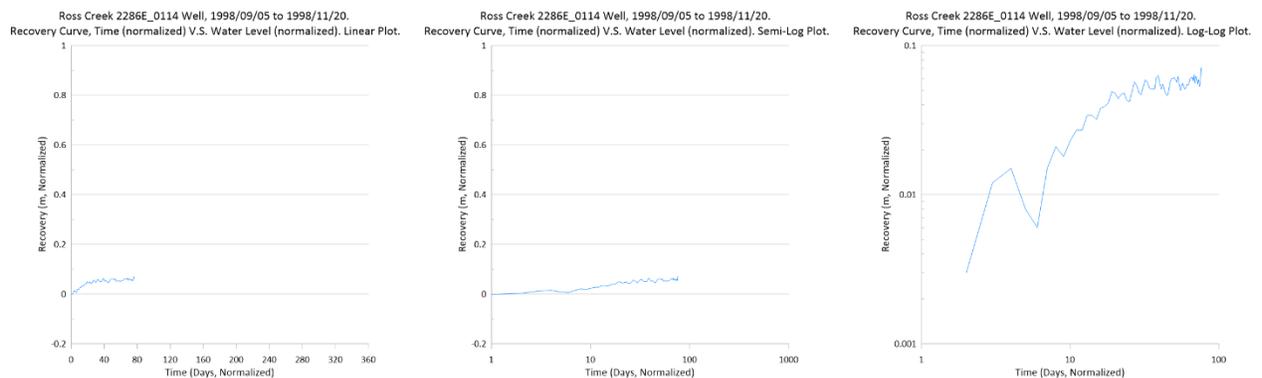


Figure 792: Recovery curve plots for Ross Creek 2286E_0114 well, 1998/09/05 to 1998/11/20. Surficial aquifer.

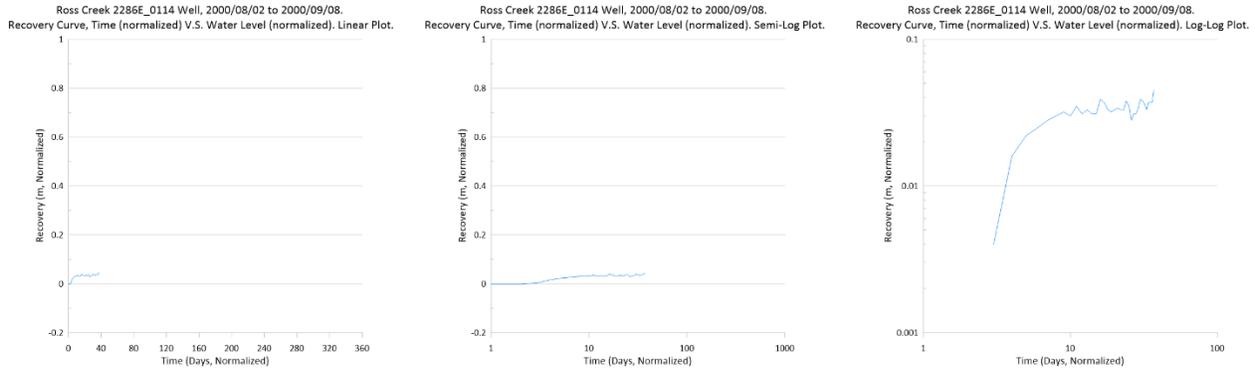


Figure 793: Recovery curve plots for Ross Creek 2286E_0114 well, 2000/08/02 to 2000/09/08. Surficial aquifer.

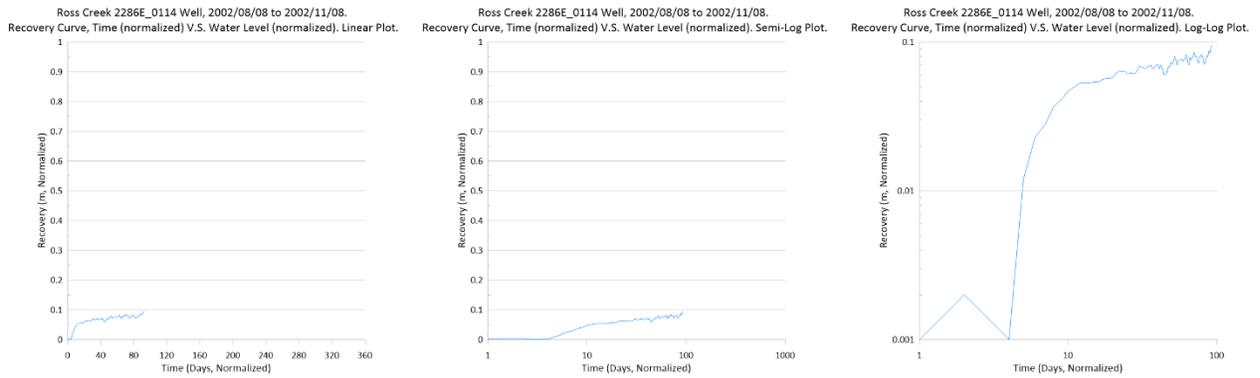


Figure 794: Recovery curve plots for Ross Creek 2286E_0114 well, 2002/08/08 to 2002/11/08. Surficial aquifer.

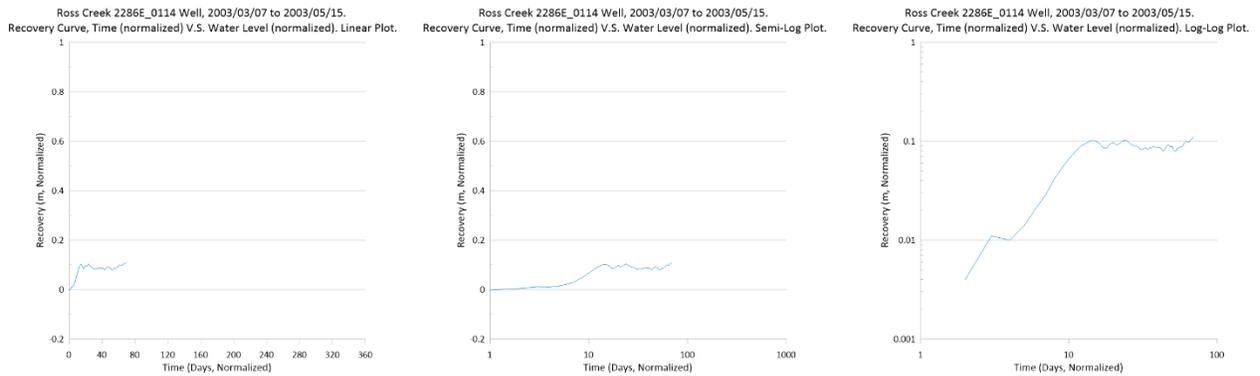


Figure 795: Recovery curve plots for Ross Creek 2286E_0114 well, 2003/03/07 to 2003/05/15. Surficial aquifer.

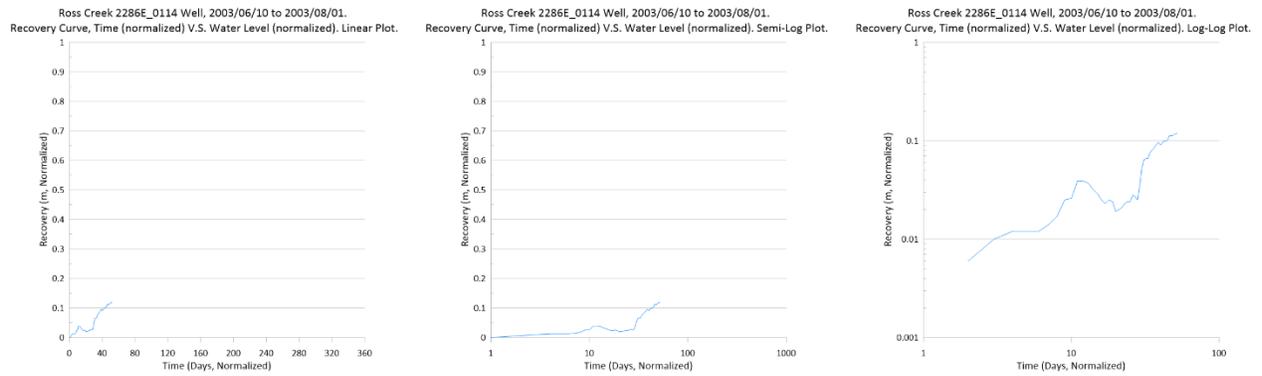


Figure 796: Recovery curve plots for Ross Creek 2286E_0114 well, 2003/06/10 to 2003/08/01. Surficial aquifer.

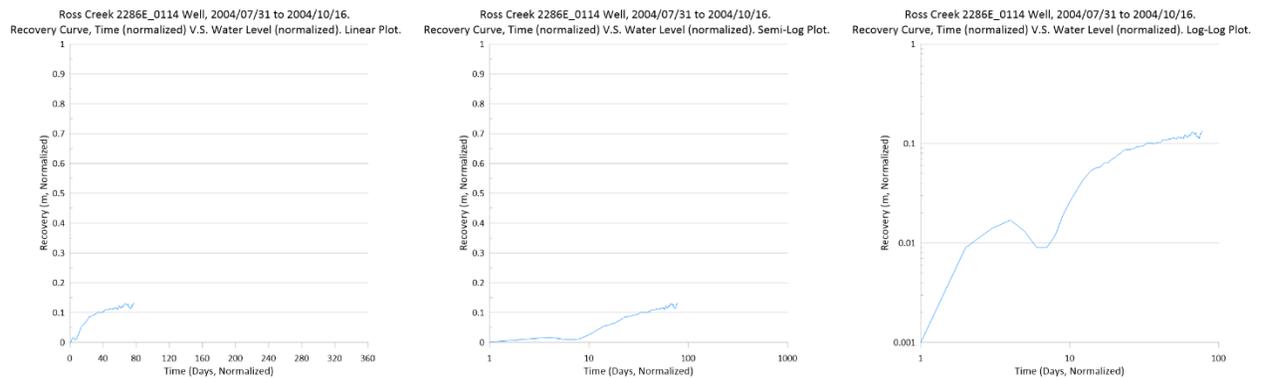


Figure 797: Recovery curve plots for Ross Creek 2286E_0114 well, 2004/07/31 to 2004/10/16. Surficial aquifer.

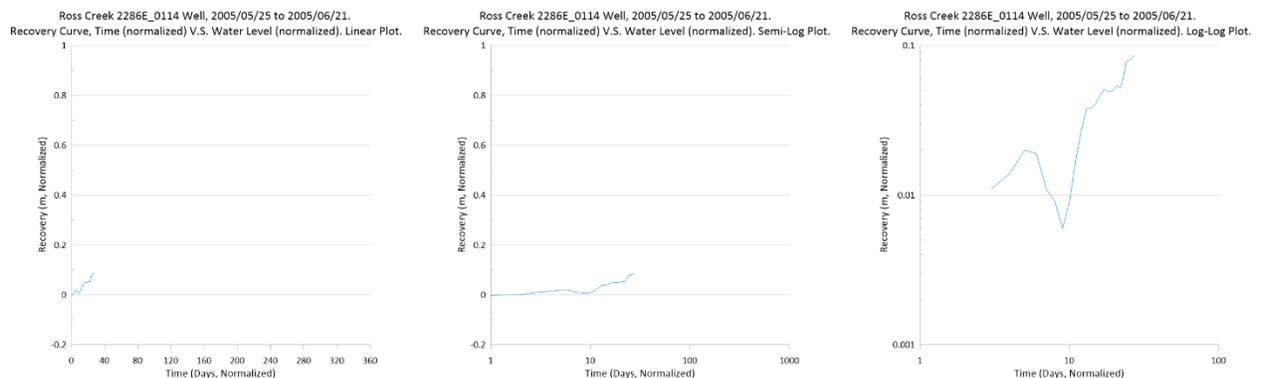


Figure 798: Recovery curve plots for Ross Creek 2286E_0114 well, 2005/05/25 to 2005/06/21. Surficial aquifer.

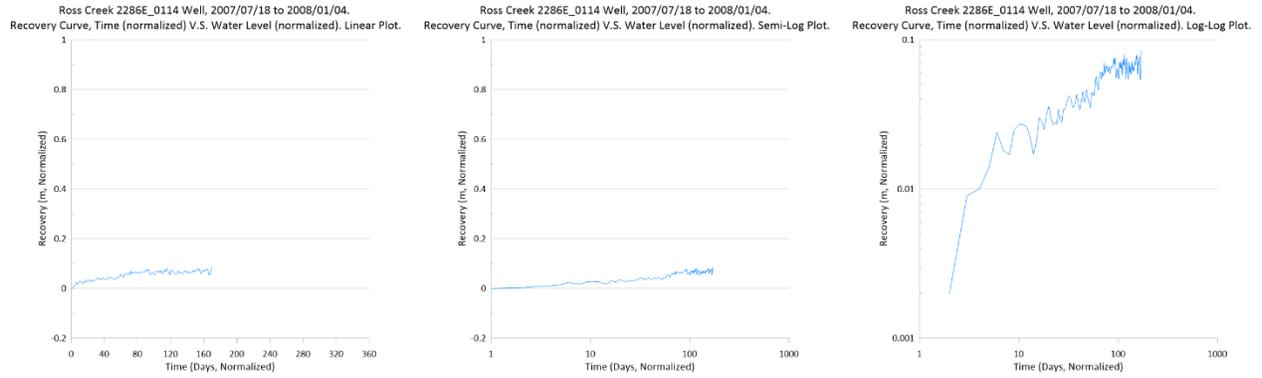


Figure 799: Recovery curve plots for Ross Creek 2286E_0114 well, 2007/07/18 to 2008/01/04. Surficial aquifer.

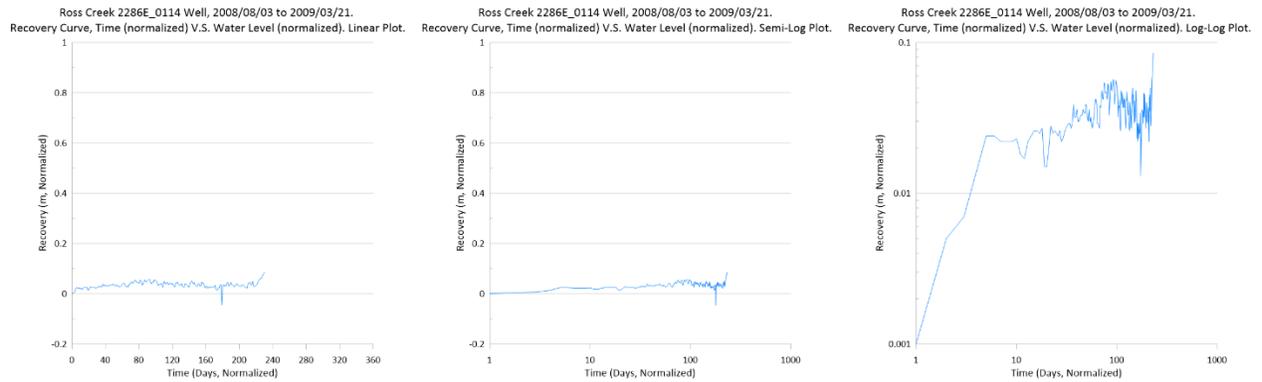


Figure 800: Recovery curve plots for Ross Creek 2286E_0114 well, 2008/08/03 to 2009/03/21. Surficial aquifer.

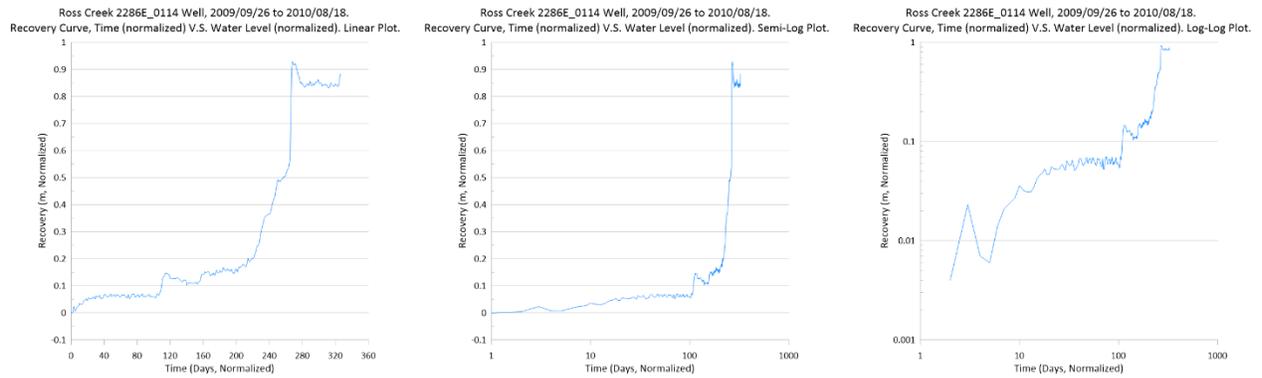


Figure 801: Recovery curve plots for Ross Creek 2286E_0114 well, 2009/09/26 to 2010/08/18. Surficial aquifer.

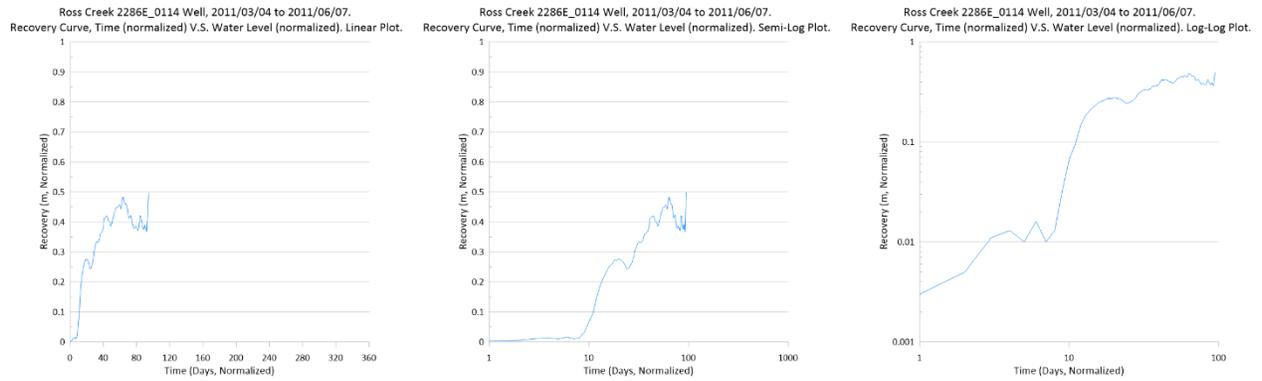


Figure 802: Recovery curve plots for Ross Creek 2286E_0114 well, 2011/03/04 to 2011/06/07. Surficial aquifer.

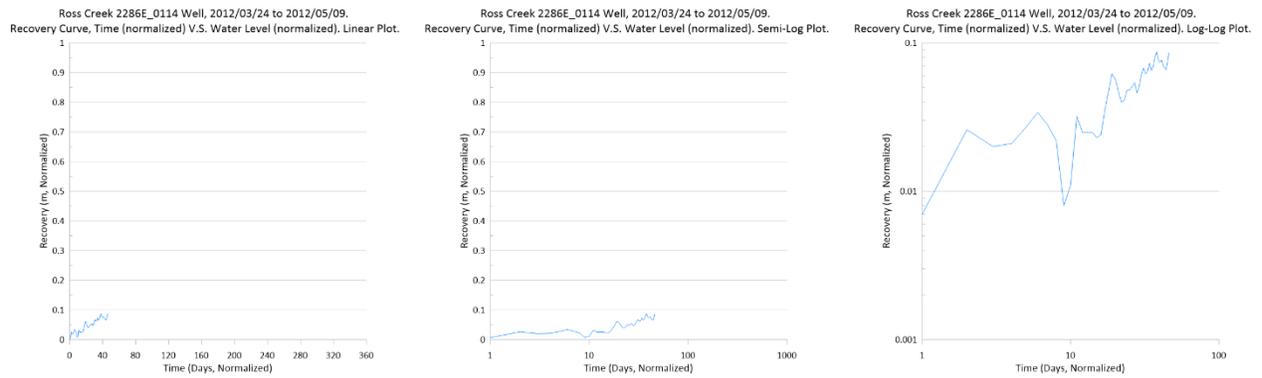


Figure 803: Recovery curve plots for Ross Creek 2286E_0114 well, 2012/03/24 to 2012/05/09. Surficial aquifer.

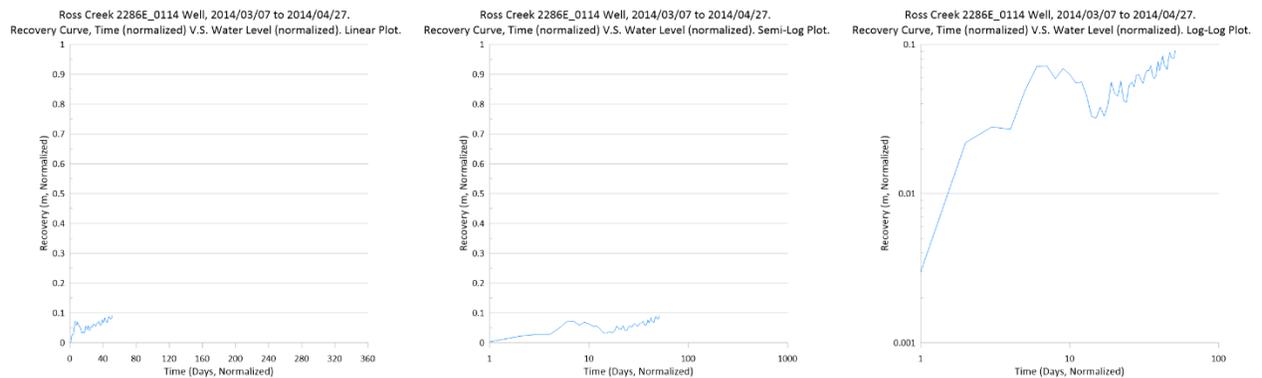


Figure 804: Recovery curve plots for Ross Creek 2286E_0114 well, 2014/03/07 to 2014/04/27. Surficial aquifer.

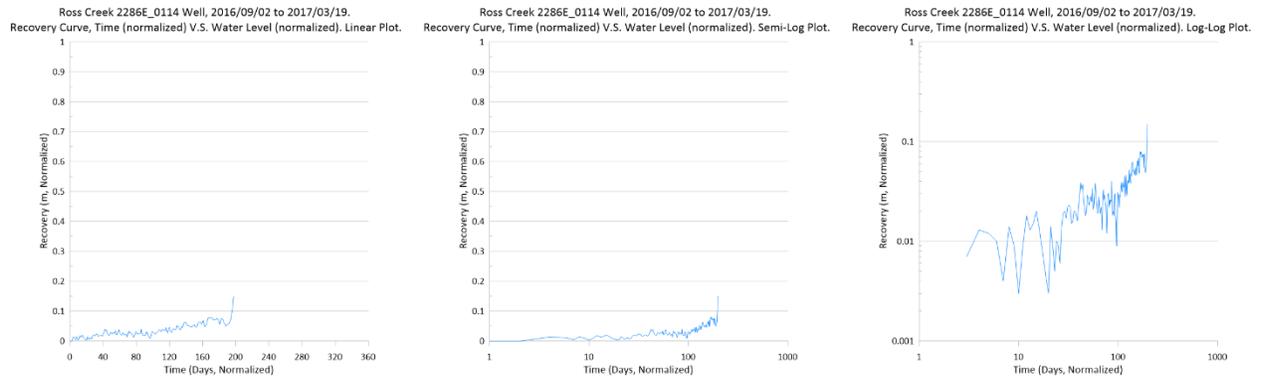


Figure 805: Recovery curve plots for Ross Creek 2286E_0114 well, 2016/09/02 to 2017/03/19. Surficial aquifer.

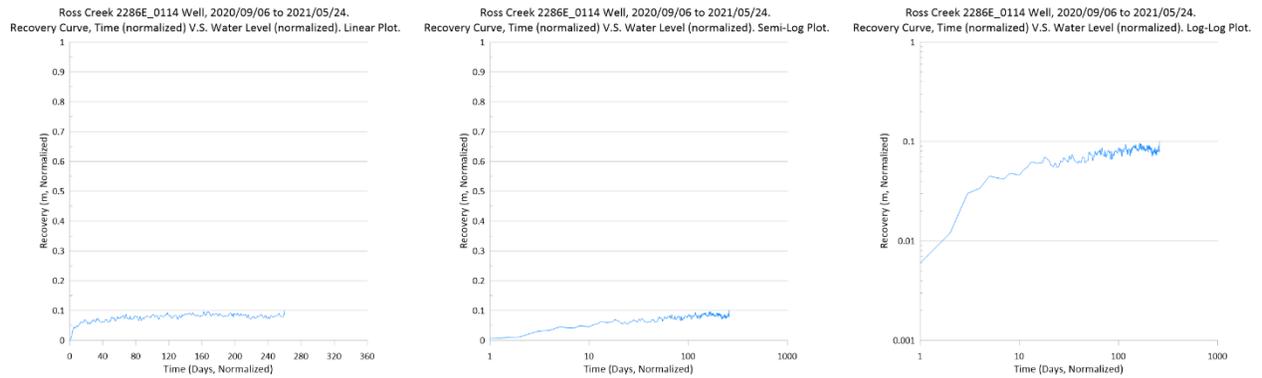


Figure 806: Recovery curve plots for Ross Creek 2286E_0114 well, 2020/09/06 to 2021/05/24. Surficial aquifer.