

MAC-ENC-PRO-061

SURFACE WATER MONITORING PROGRAM

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Contents

1.0	Scope	3
1.1	Responsibilities.....	3
1.2	Review and modification	3
1.3	Context	3
2.0	Detailed Procedure	4
2.1	Surface Water Hydrology.....	4
2.2	Surface Water Quality.....	7
3.0	References	14
3.1	External Documents	14
3.2	Internal Documents.....	14
Appendix 1: Surface Water Reference Data		15
Appendix 2: Correspondence Records.....		17

Tables

Table 1: Surface Water Flow Monitoring Locations.....	5
Table 2: Riparian and In-Stream Vegetation and Channel Stability Monitoring Locations	6
Table 3: Surface Water Quality Monitoring Locations	9
Table 4: Surface Water Quality Impact Assessment Criteria Trigger Values	12
Table A1.1: Summary Details of Hunter River Gauging Stations	15
Table A1.2: Summary Details of Bowfield Gauging Station.....	15
Table A1.3: Summary of Statistics of Local Creek Reference (Baseline) Water Quality Data	16

Figures

Figure 1: Surface Water Monitoring Locations	13
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1.0 Scope

This monitoring program describes the environmental monitoring activities undertaken by Hunter Valley Energy Coal (HVEC) Pty Ltd in relation to surface water resources in the Mt Arthur Coal Mine area.

Surface water monitoring is undertaken for the purpose of quantifying changes to the surface water system as a result of operations, assessing the performance of the control measures used to limit these impacts, and to meet relevant legal and other requirements.

This monitoring program addresses a number of distinct elements of surface water monitoring. For each element, the program sets out background information, the purpose of the monitoring and the deliverables which are produced as a result of the monitoring. The program also includes a detailed description of the monitoring methods. Reference (baseline) data relevant to the program are provided in Appendix 1.

1.1 Responsibilities

The NSW Energy Coal Asset President is responsible for ensuring that all legal and other requirements described in this monitoring program are met.

HVEC employs environmental specialists and sufficient other staff with experience and qualifications acceptable to establish, maintain and fulfil the requirements of this monitoring program.

1.2 Review and modification

This monitoring program is reviewed annually as a minimum. Any required amendments identified during the review will be updated in a revision of the program and submitted to Department of Planning and Environment for approval.

1.3 Context

This monitoring program meets the requirement for a Surface Water Monitoring Program under Schedule 3 Conditions 29 and 32 of the Mt Arthur Coal Modification Project Approval (PA 09_0062 MOD1). Collection of meteorological information relevant to this program is described within the Air Quality Monitoring Program.

2.0 Detailed Procedure

2.1 Surface Water Hydrology

2.1.1 Background

The environmental values associated with the hydrological regime of the Mt Arthur Coal Mine area considered in the development of this monitoring program include primary industry use, industrial use, recreation and aesthetics, and aquatic ecosystems.

Local hydrology comprises a number of ephemeral drainage lines and creeks flowing north and south-west towards the Hunter River. Quarry Creek, Fairford Creek, Whites Creek, and Ramrod Creek flow northwards into the Hunter River. The Whites Creek Diversion directs runoff from undisturbed and mine rehabilitated areas around the eastern and northern sides of the mine and discharges to a small tributary downstream of Denman Road and then to the Hunter River. Southwards flowing drainage lines report to Saddlers Creek which flows generally to the southwest and joins the Hunter River downstream of Denman.

A comprehensive description of the local and regional surface water resources is provided in Section 4.5 and Appendix C of the Modification Project Environmental Assessment.

2.1.2 Purpose

Provide information that can be used to manage hydrological impacts of mining on the local and regional surface water systems to ensure no significant variation from modelled predictions detailed in the Environmental Assessment.

2.1.3 Deliverables

- Records of surface water flows to assess impacts on the local and regional surface water hydrology.
- Records of riparian and in-stream vegetation and channel stability to assess potential impacts on stream health.
- Continuous surface water monitoring instrumentation at licensed discharge point SW28 to be operational 100 per cent of the time during a discharge event.
- Calibration and maintenance of sampling equipment and records maintained.

2.1.4 Method

Surface water flow monitoring locations are shown in Figure 1. Monitoring of surface water flows is undertaken at the approximate locations and in accordance with the schedule in Table 1.

Table 1: Surface Water Flow Monitoring Locations and Schedule

Site No.	Location	Coordinates (GDA94 Zone 56)	Frequency	Parameters	Purpose
SW28 ^	Hunter River Salinity Trading Scheme (HRSTS) monitoring point (also Point 6 in EPL 11457)	E. 298190 N. 6424890	Continuous when discharging Prior to discharge	Flow rate Calibration and maintenance checks	Water volume monitoring for discharges under the HRSTS.
SWGS1 *	Saddlers Creek Gauging Station	E. 297400 N. 6413014	Continuous Every six months	Flow rate ** Calibration and maintenance checks	Internal use only and not reported.

^ Hydrostatic level probe installed in hydraulically controlled structure (v-notch weir arrangement)

* Gas purge pressure measurement (level sensor) device installed in natural stream channel

** To measure flow, a stage-discharge relationship (stream rating curve) has been developed by consultants to convert water depth measurements to stream flow rates (in accordance with AS3778.2.3-2001 Measurement of water flow in open channels – Pat 2.3: General - Determination of the stage-discharge relationship).

The rating curve for the stream cross-section at SWGS1 will be reviewed every five years to ensure accurate relationship between stage and discharge is maintained. Riparian and in-stream vegetation monitoring locations are shown in Figure 1. Monitoring of riparian and in-stream vegetation is undertaken at the approximate locations and in accordance with the schedule in Table 2.

Monitoring of riparian vegetation is undertaken annually by taking four photographs at each surface water monitoring site; looking upstream, looking downstream, looking at the left bank¹ and looking at the right bank². These photographs are documented with the location, direction and date. A rapid assessment of riparian condition will be undertaken annually, incorporating a riparian zone transect monitored for general vegetation condition and habitat quality and 20m x 20m survey plot monitored for species composition and community structure (dominance, age etc). Methodology for the vegetation community assessment is described in the Rehabilitation and Ecological Monitoring procedure.

¹ Left bank refers to the bank to the left when looking in a downstream direction.

² Right bank refers to the bank to the right when looking in a downstream direction.

Table 2: Riparian and In-Stream Vegetation Monitoring Locations and Schedule

Site No.	Location	Coordinates (GDA94 Zone 56)	Frequency	Parameters
SW03	Saddlers Creek	E. 298165 N. 6413452	Annual	Photographs to monitor vegetation. Vegetation condition and habitat quality along riparian zone transect. Species composition and community structure in 20 x 20m survey plot.
SW04	Quarry Creek	E. 294263 N. 6419453		
SW12	Ramrod Creek	E. 302205 N. 6421715		
SW15	White's Creek Diversion	E. 298854 N. 6424848		

Channel stability monitoring is undertaken through an annual rapid assessment along Mt Arthur Coal owned reaches of Saddlers Creek, Quarry Creek, Ramrod Creek and White's Creek Diversion. This includes a desktop review of aerial photography and previous monitoring results to identify potential areas of stream erosion and deposition and an observational survey of these areas that includes photographic logging and documenting dimensions of significant erosional and depositional features for assessing quantitative changes over time. A GPS coordinate is noted for each photograph in addition to a photograph direction (compass bearing) to enable repeat monitoring. Methodology for the annual rapid assessment is described in the Rehabilitation and Ecological Monitoring procedure.

Impact Assessment Criteria

Surface water flow rate impact assessment criteria has been established as:

- a) Maximum of 450 megalitres per day of water released from discharge point SW28 during an authorised discharge under the HRSTS.

Riparian and in-stream vegetation impact assessment criteria has been established as:

- b) Significant degradation in species composition, community structure, vegetation condition or habitat quality recorded between consecutive monitoring periods.
- c) Significant change in erosional and/or depositional features recorded between consecutive monitoring periods.

No impact assessment criteria have been set for in-stream ecology as this has been assessed as limited due to the modified habitat prior to mining.

Where riparian and in-stream vegetation monitoring results trigger impact assessment criteria, a response protocol will be followed as outlined in the Surface and Groundwater Response Plan. The impacts of the operation on water users will be monitored, assessed and responded to in accordance with the Landholder Consultation and Investigation Process presented in Appendix 1 of the Surface and Groundwater Response Plan.

2.2 Surface Water Quality

2.2.1 Background

The environmental values associated with the hydrological regime of the Mt Arthur Coal Mine area considered in the development of this monitoring program include primary industry use, industrial use, recreation and aesthetics, and aquatic ecosystems.

Electrical conductivity of the Hunter River has been highly variable due to varying flow and ranges from 93 to 1,011 microSiemens per centimetre ($\mu\text{S}/\text{cm}$) at the Muswellbrook Bridge gauging station, and from 119 to 1,178 $\mu\text{S}/\text{cm}$ at the Denman gauging station. The median conductivity at the upstream and downstream sites is 447 and 512 $\mu\text{S}/\text{cm}$, respectively.

The Hunter River Salinity Trading Scheme (HRSTS) regulates salinity discharged to the Hunter River. The amount of saline water that may be discharged from a given discharge licence holder is determined by reference to the salinity of the discharge waters, the river flow, the number of credits held and any overriding limit that may be applied as a condition of the licence. If required, controlled releases of excess water from the Mt Arthur Coal Mine to the Hunter River are undertaken in accordance with the HRSTS.

The median pH in local creeks has a tendency to trend towards slightly alkaline levels. The median electrical conductivity is elevated relative to ANZECC Guidelines for Fresh and Marine Water Quality and is variable at most sites. Reference data for various water quality parameters including turbidity, total dissolved solids (TDS), filtered iron, nitrate and sulphate is provided in Appendix 1.

A comprehensive description of the local and regional surface water resources is provided in Section 4.5 and Appendix C of the Modification Project Environmental Assessment.

2.2.2 Purpose

Provide information that can be used to manage surface water quality impacts of mining on the local and regional surface water systems to ensure no significant variation from modelled predictions detailed in the Environmental Assessment.

2.2.3 Deliverables

- Records of surface water quality to assess performance against impact assessment criteria (trigger values) shown in Table 3 and impacts on the local and regional surface water quality.

- Continuous surface water monitoring instrumentation at licensed discharge point SW28 to be operational 100 per cent of the time during a discharge event.
- Calibration of sampling equipment and records maintained.

2.2.4 Method

Surface water quality monitoring locations are shown in Figure 1. Monitoring of surface water quality is undertaken at the approximate locations and in accordance with the schedule in Table 3.

Surface water quality monitoring and sample collection, storage and transportation will be undertaken in accordance with the procedures outlined in the relevant sections of the Australian Standard for Water Quality Sampling AS/NZS 5667.1:1998. Laboratory analysis will be undertaken by a laboratory which has relevant accreditation by the National Association of Testing Authorities (NATA), Australia.

Table 3: Surface Water Quality Monitoring Locations and Schedule

Site No.	Location	Coordinates (GDA94 Zone 56)	Frequency	Parameters	Purpose
Operational / internal water management system					
SW07	Main Dam	E. 301800 N. 6420460	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease, alkalinity, hardness, biochemical oxygen demand, total phosphorus, e-coli, pseudomonas aeruginosa, and water level survey.	Internal use only and not reported.
			Continuous	Water level via telemetry.	
SW16	Environmental Dam	E. 298752 N. 6424784	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease alkalinity, hardness, biochemical oxygen demand, total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc, and water level survey.	Internal use only and not reported. Grab samples acquired and reported when discharging under HRSTS.
			Continuous	Water level via telemetry.	
SW17	CHPP Sediment Dam	E. 300246 N. 6421359	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease, alkalinity, hardness, biochemical oxygen demand, total phosphorus, e-coli, pseudomonas aeruginosa, water level survey.	Internal use only and not reported.
			Continuous	Water level via telemetry.	
SW23	Export Coal Loader Sediment Dam	E. 302503 N. 6420431	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
SW24	McDonalds Fill Point Dam	E. 297115 N. 6415954	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
SW28	Hunter River Salinity Trading Scheme HRSTS) monitoring point (Also Point 6 in EPL 11457)	E. 298190 N. 6424890	Continuous when discharging	EC, pH and TSS.	Water quality monitoring for discharges under the HRSTS.
			Daily during discharge	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease alkalinity, hardness, biochemical oxygen demand, total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW30	McDonalds Void	E. 295132 N. 6416691	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW31	Belmont Void	E. 295541 N. 6,417946	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	

MAC-ENC-PRO-061 SURFACE WATER MONITORING PROGRAM

Page 10 of 19

Site No.	Location	Coordinates (GDA94 Zone 56)	Frequency	Parameters	Purpose
SW32	Drayton Void	E. 301437 N. 6416324	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW33	White's Creek Wetland	E. 300649 N. 6421695	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
SW37	Industrial Area Sediment Dam 3	E. 301227 N. 6419283	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease, and water level survey.	Internal use only and not reported.
SW38	VD1 Rehabilitation Sediment Dam	E. 298837 N. 6423515	Monthly or following rainfall >25mm. *	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
Receiving environment water management system					
SW02	Saddlers Creek	E. 300861 N. 6415905	Monthly or following rainfall >25mm. *	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Monitor impacts of operation on Saddlers Creek.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW03	Saddlers Creek	E. 298165 N. 6413452	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Water quality downstream of Mt Arthur Coal activities.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW04	Quarry Creek	E. 294263 N. 6419453	Monthly or following rainfall >25mm. *	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Water quality downstream of Mt Arthur Coal activities.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW09	Ramrod Creek	E. 302555 N. 6420563	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Internal use only and not reported.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW12	Ramrod Creek	E. 302205 N. 6421715	Monthly or following rainfall >25mm. *	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Water quality downstream of Mt Arthur Coal activities.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	
SW15	White's Creek Diversion	E. 298854 N. 6424848	Monthly or following rainfall >25mm. *	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Water quality downstream of Mt Arthur Coal activities.
			Annually	Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	

Site No.	Location	Coordinates (GDA94 Zone 56)	Frequency	Parameters	Purpose
SW34	Hunter River Upstream (Keys Bridge)	E. 297206 N. 6425319	Monthly or following rainfall >25mm. * Annually	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease. Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	Water quality upstream of Mt Arthur Coal activities. Internal use only and not reported.
SW35	Hunter River Downstream	E. 290518 N. 6422571	Monthly or following rainfall >25mm. * Annually	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease. Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	Water quality downstream of Mt Arthur Coal activities. Internal use only and not reported.
SW36	White's Creek Dam upstream of diversion	E. 300830 N. 6419309	Monthly	Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease.	Water quality upstream of diversion.
SWGS1	Saddlers Creek Gauging Station	E. 297400 N. 6413014	Continuous	Water temperature, pH, EC and turbidity, and water level via telemetry.	Water quality downstream of Mt Arthur Coal activities. Internal use only and not reported.

* grab samples collected when safe to do so and access permits, generally during daylight hours. Rainfall event sampling to be conducted when 25mm rain received within 24 hours, midnight to midnight, with a new rainfall event considered to have commenced if there has not been a rainfall event in the previous 48 hours.

Notes:

- All metals and metalloids will be measured as total (unfiltered) and dissolved (filtered).

Impact Assessment Criteria

Surface water quality impact assessment criteria for externally reportable monitoring locations downstream of the mining operation have been established as:

- recorded pH value is outside the range of 6.5 – 9.0 for three consecutive readings.
- Stage 1 electrical conductivity (EC) and Total Suspended Solids (TSS): measured values that have a 95 per cent probability of being different from those already measured (95 per cent confidence level).
- Stage 2 EC and TSS: measured values that have a 99 per cent probability of being different from those already measured (99 per cent confidence level).

Surface water quality impact assessment criteria trigger values as derived from reference data (including recent monitoring data to December 2013) are presented in Table 4. A summary of reference data is provided in Appendix 1.

Table 4: Surface Water Quality Impact Assessment Criteria Trigger Values

	pH Trigger		EC 1 st Stage Trigger (μ S/cm)	EC 2 nd Stage Trigger (μ S/cm)	TSS 1 st Stage Trigger (mg/L)	TSS 2 nd Stage Trigger (mg/L)
	Lower	High				
SW2	6.5	9.0	12,365	13,900	219	277
SW3			10,133	11,402	37	46
SW4			13,959	15,509	82	104
SW12			6,659	7,153	555	708
SW15			7,128	8,262	103	130
SW28 ^			Determined by the number of HRSTS credits held		120	

^ Absolute limits based on EPL 11457 Condition L2 for pH and TSS.

Where monitored surface water quality readings exceed impact assessment criteria, a response protocol will be followed as outlined in the Surface and Groundwater Response Plan (the response protocol for pH will be according to the process equivalent for a stage 2 surface water quality trigger).

2.3 Reporting

A detailed review of monitoring results will be undertaken annually and the results, together with a discussion of the findings, will be presented in the Annual Environmental Management Report as outlined in the Environmental Management Strategy.



Figure 1: Surface Water Monitoring Locations

3.0 References

3.1 External Documents

Data from NOW Pinneena v9.2, NSW Surface Water Data Archive.

Resource Strategies (2013), Mt Arthur Coal Open Cut Modification – Environmental Assessment. Prepared for Hunter Valley Energy Coal Pty Ltd.

Gilbert and Associates Pty Ltd (2013), “Mt Arthur Coal – Appendix C Surface Water Assessment”. Report prepared for Resource Strategies April 2013.

Standards Australia (1998), “Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples”, Australian/New Zealand Standard AS/NZS 5667.1:1998, Sydney.

3.2 Internal Documents

MAC-ENC-MTP-034 Site Water Management Plan

MAC-ENC-PRO-057 Air Quality Monitoring Program

MAC-ENC-PRO-060 Erosion and Sediment Control Plan

MAC-ENC-PRO-061 Surface Water Monitoring Program

MAC-ENC-PRO-063 Surface Water and Groundwater Response Plan

MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring

Appendix 1: Surface Water Reference Data

Hydrology

The closest gauging stations on the Hunter River are located upstream at Muswellbrook Bridge (GS210002) and downstream at Denman (GS210055). GS210002 has a catchment area of 4,220 km² while GS210055 has a catchment area of 4,530 km². Table A1.1 provides summary details of the two stations.

Table A1.1: Summary Details of Hunter River Gauging Stations

Gauging Station	Catchment Area (km ²)	Full Record Length	Period of Reliable Data (complete years)	Mean Daily Flow (ML/day)*
GS210002 Hunter River at Muswellbrook Bridge	4,220	1913 - 2009	1913 - 1922 1924 - 1927 1961 - 2009	845
GS210055 Hunter River Downstream at Denman	4,530	1959 - 2009	1959 - 1982 1993 - 1996 1998 - 2009	747

Source: NSW Office of Water (NOW), Pinneena v9.2 Database (2009)

* In those years with complete data

The only local watercourse for which reference streamflow data is available is on Saddlers Creek at Bowfield (GS210043) which was operated between 1956 and 1981. Summary station details are provided in Table A1.2.

Table A1.2: Summary Details of Bowfield Gauging Station

Station Number	210043
Period of Record	25/01/1956 to 31/10/1981
Catchment Area	78 km ²
Average Recorded Flow	1,187 ML/year
Average Rainfall for Recorded Flow Period	618 mm/year
Days with Missing Data	15%
Zero Flow Days	35%
Estimated Baseflow Index*	10%

* Volume of baseflow as a proportion of total flow – derived from daily streamflow hydrograph analysis.

Surface Water Quality

Surface water quality monitoring has been undertaken across the previously known Mt Arthur North Coal Mine since 1995, generally on a monthly basis and following rainfall events, where possible. Table A1.3 presents a summary of baseline surface water quality results as presented in further detail in Appendix C of the Environmental Assessment, including minimum, maximum, mean and median values for pH, EC, turbidity, TSS, total dissolved solids (TDS), filtered iron, nitrate and sulphate.

Table A1.3: Summary of Statistics of Local Creek Reference (Baseline) Water Quality Data

	Site:	SW1	SW2	SW3	SW4	SW12	SW13	SW15	SW18
		Saddlers Upstream	Saddlers Upstream	Saddlers Downstream	Quarry Creek	Ramrod Creek	Fairford Creek	White's Creek Diversion	White's Creek Upstream
Parameter	Dates Sampled	07/01/1995 - 23/01/2012	02/06/1995 - 23/01/2012	02/06/1995 - 23/01/2012	02/06/1995 - 23/01/2012	06/07/1999 - 23/01/2012	02/04/2001 - 23/01/2012	18/09/2002 - 23/01/2012	08/11/2004 - 23/01/2012
pH	min	6.4	6.9	6.6	6.9	7.0	6.1	7.2	6.9
	max	8.4	8.6	8.7	9.1	9.6	9.0	9.7	9.3
	median	7.2	7.7	8.0	8.3	7.9	7.4	8.3	8.4
	mean	7.3	7.7	8.0	8.3	7.8	7.4	8.4	8.3
EC (µS/cm)	min	1,000	1,360	760	490	980	120	232	1,090
	max	17,000	16,300	11,000	17,000	7,000	1,150	8,790	5,180
	median	8,500	8,010	6,220	9,010	5,130	325	3,260	3,180
	mean	8,244	7,501	6,007	9,122	5,107	418	3,215	3,091
Turbidity (NTU)	min	1.0	0.1	0.2	0.1	0.6	6.2	0.7	0.9
	max	228	765	56	36	61	587	1110	73
	median	7.4	3.9	2.0	2.2	2.4	28	5.0	3.5
	mean	19	23	4.7	4.7	5.8	102	32	5.8
TSS (mg/L)	min	0.0	0.0	0.0	0.0	0.0	0.0	0	2
	max	363	828	120	240	2,030	3,300	380	450
	median	11	10	4	6	10	167	14	7
	mean	30	31.3	8	15.4	77.8	453.7	22	18
TDS (mg/L)	min	1,310	850	550	310	610	150	305	700
	max	14,000	15,600	6,920	11,000	4,900	700	6,000	3,830
	median	6,840	6,400	3,900	5,500	3,605	280	2,350	2,120
	mean	6,434	5,876	3,751	5,573	3,579	288	2,222	2,138
Filtered Iron (mg/L)	min	0.01	0.01	0.00	0.01	0.00	0.15	0.01	0.001
	max	5.86	0.50	0.50	0.58	0.37	11.0	1.70	0.11
	median	0.04	0.05	0.05	0.05	0.05	1.73	0.05	0.05
	mean	0.15	0.10	0.05	0.05	0.05	2.42	0.07	0.04
Nitrate (mg/L)	min	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	max	5.3	5.3	3.1	5.3	3.1	20.0	7.0	1.1
	median	0.2	0.4	0.2	0.4	0.1	1.1	0.1	0.2
	mean	0.5	0.6	0.5	0.8	0.3	2.7	0.4	0.2
Sulphate (mg/L)	min	220	44	0.4	14	240	1	25	270
	max	4,280	6,100	3,420	2,350	4,400	250	2,190	1,610
	median	2,700	2,440	380	250	1,220	10	799	910
	mean	2,567	2,419	426	333	1,331	20	753	890

Appendix 2: Correspondence Records

EPA Consultation

From: Gale, Michael (NSWEC)
Sent: Friday, 23 January 2015 3:47 PM
To: hunter.region@epa.nsw.gov.au
Cc: kurt.sorensen@epa.nsw.gov.au; Withell, Sarah (NSWEC)
Subject: Groundwater and Surface Water Plans | Mt Arthur Coal
Attachments: 150123 Groundwater Monitoring Program Draft.docx; Groundwater Monitoring Program current.pdf; 150123 Surface Water Monitoring Program Draft.docx; Surface Water Monitoring Program current.pdf; 150123 Surface and Ground Water Response Plan Draft.docx; Surface and Groundwater Response Plan current.pdf; Additional Information.docx

Dear Kurt,

In accordance with the requirements of Schedule 3 Condition 29 of the Mt Arthur Coal Modification Project Approval (PA 09_0062 MOD1), I would like to invite comment and input from the EPA on the following draft programs/plans:

- **Groundwater Monitoring Program** – revised to incorporate holistic groundwater network review and two-stage trigger procedure.
- **Surface Water Monitoring Program** – revised to incorporate two-stage trigger procedure.
- **Surface and Groundwater Response Plan** – revised to incorporate groundwater and surface water exceedance protocol and alluvial cut-off wall management measures according to Schedule 3 Condition 28 of the Modification Project Approval (PA 09_0062 MOD1).

The attached document 'Additional Information.doc' provides an overview of the proposed two-stage trigger procedure as it relates to surface water for your background to the revisions. This methodology has also been incorporated into the newly revised groundwater monitoring program. I have also attached the previously approved document versions for your reference.

Regards,

Mike.



bhpbilliton
resourcing the future
Michael Gale
Superintendent Environment Analysis & Improvement
Mt Arthur Coal

NOW Consultation and Endorsement



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Michael.Gale@bhpbilliton.com

ATTN: Mr Michael Gale

Contact Alison Collaros
Phone (02) 4904 2527
Fax (02) 4904 2501
Email Alison.collaros@dpi.nsw.gov.au

Our ref ER20491
Your ref PA09_0062_MOD1

Dear Mr Gale

Mt Arthur Coal Mine – Hunter Valley Energy Coal Pty Ltd – Response to Submissions in relation to Revised Surface Water Monitoring Program (Version 4, dated 22 June 2015)

NSW Office of Water has reviewed the revised Surface Water Management Plan (Version 4) supplied by BHP Billiton Mt Arthur Coal in response to the recommendations issued by NSW Office of Water in the letter dated 24 February 2015. It is considered that the proponent has provided a satisfactory response to the issues raised in relation to monitoring of riparian vegetation.

If you require further information regarding Office of Water's comments, please contact Alison Collaros, Senior Water Regulation Officer on Alison.collaros@dpi.nsw.gov.au or (02) 4904 2527.

Yours sincerely



Mitchell Isaacs
Manager, Strategic Stakeholder Liaison
16 July 2015

Approval from DP&E



Contact: Scott Brooks
Phone: 6575 3401
Fax: 6575 3415
Email: scott.brooks@planning.nsw.gov.au
Our ref: 09-0062

Michael Gale
Superintendent Environment Analysis & Improvement
Mt Arthur Coal
PMB 8
MUSWELLBROOK NSW 2333

Dear Mike,

Mt Arthur Coal Surface Water Monitoring Program.

Thank you for providing Version 4 of the Mt Arthur Coal Surface Water Monitoring Program on the 17th July for review. This is required by Condition 32 Schedule 3 of Approval 09-0062.

I can advise that the Department has reviewed this program and that the Secretary has approved the program

This program is a requirement of the Mt Arthur consent and replaces Version 2. Version 4 of this program comes into force on the 20th July 2015 and remains in force until replaced by any future updated approved Program.

Could you please place this program on your website and forward a finalised copy of the above plan (preferably in PDF format with a copy of this approval letter appended) for the Department's records by the end of July 2015.

If you require further information or clarification in this matter please contact Scott Brooks on 6575 3401 or by email to scott.brooks@planning.nsw.gov.au.

Yours sincerely



Scott Brooks
Investigations (lead) Compliance
Singleton
As the Secretary's Nominee.

17-7-2015