MOROBE MINING
HIDDEN VALLEY JV

ANNUAL ENVIRONMENT REPORT 2012

REPORT DISTRIBUTION LIST

Name	Title	Copies
Mr. Gunther Joku	DEC Secretary	1
Mr. Michael Wau	Executive Director, Environment Protection Wing, DEC	2
Mr. Philip Samar	Acting Managing Director, MRA	1
Mr. James Norum	Hidden Valley Project Coordinator, MRA	1
Mr. Kepas Tomala	Morobe Provincial Administrator. MPG	1
Mr. Taikone Gwakoro	Coordinator, Division of Mining, Natural Resources & Environment, MPG	1
Mr. Kawen Waia	Chairman, Nakwui Environment Committee	1

This page is left blank

TABLE OF CONTENTS

List of Figures

List of Tables

List of Abbreviations and Accronyms

AER	Annual Environment Report
AMD	Acid Metalliferous Drainage synonymous with ARD
ARD	Acid Rock Drainage used interchangeably with AMD
ARO	Asset Retirement Obligations
BCM	Bench Cubic Meters
CO_2-e	Carbon Dioxide Equivalent
Cumecs	Cubic metre per second (flow rate measure)
DEC	PNG Department of Environment and Conservation
EIP	Environmental Improvement Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ESAP	External Stakeholder Advisory Panel
GIS	Geographical Information System
HCN	Hydrogen Cyanide also known as Free Cyanide
HVGM	Hidden Valley Gold Mine
HVJV	Hidden Valley Joint Venture
HVSL	Hidden Valley Services Limited
kL	kilo-litres (ie. 1,000 L)
LoM	Lease of Mine (ML151 & ME82)
m3	cubic metres equivalent to kL
ML	Mega Litres (ie. 1,000,000 L)
MP5	Monitor-Pro 5 (Water Quality Information Management System)
Mtpa	Million tonne per annum
MWH	Mega Watt Hours
NAF	Non-acid Forming Rock (benign rock)
NGO	Non-Government Organisation
NTU	Nephelometric Turbidity Units (water clarity measure)
PAF	Potentially Acid Forming Rock (environmentally significant)
RPA	Rehabilitation Provision Account
SMEC	Snowy Mountains Engineering Company
TSF	Tailings Storage Facility
ToR	Terms of Reference
TSS	Total Suspended Solids (mg/L)
WRIMP	Watut River Impact Monitoring Program

1.0 EXECUTIVE SUMMARY

This report summarises environmental performance at Hidden Valley Gold Mine (HVGM) during 2012. The site demonstrated a trend of improving performance from 2010 to 2011 with a reduced number of environmental incidents, the elimination of a number of long term compliance challenges and continuing improvement in the condition of the Watut River system. The reduction in volumes of suspended sediment in the river system as a result of targeted rehabilitation programmes, stabilisation works, stormwater control systems and the installation of large scale sediment traps was particularly noteworthy. Improvements in solid waste management, sewage treatment and hydrocarbon management were also significant. The site has also undertaken a number of eco-efficiency improvements including the sourcing 30% of its power requirements in 2011 as hydro power from the PNG grid.

The improvement in water quality within the mixing zone and in particular a reduction in levels of suspended sediment has resulted in signs of early ecosystem recovery in the upper Watut. Despite the continuing improvement in 2011 HVGM has identified opportunities to make further performance improvements in 2012, including:

- Removal of excess ponded water on the TSF in the first half of 2012.
- Construction of a toe for the Nosave Waste Rock Dump to enable bottom up dump construction to secure stability and control of sediment and ARD emissions.
- Environment & Environment Patrol along the river communities was a big success story with communities accepting HV's environmental monitoring program along the river and the openly admitting to the reduction in sediments in the river.

Key priorities for the coming year (2013) include:

- Ongoing site stabilisation and drainage works to reduce sediment emissions to the river system.
- Ongoing maintenance on the Watut Sediment trap
- Establishment of a robust Environmental Management System (EMS) conformant to the ISO 14001 Standard to drive continual improvement in site environmental performance.
- Certification to the International Cyanide Code.
- Implementation of a capital improvement plan for solid waste management.

2.0 PROJECT DESCRIPTION

2.1 Location and Physical Environment

The Hidden Valley Gold Mine (HVGM) is a nominal 250,000 ounce a year gold mine that commenced construction in 2007 and commercial production in 2010. It is owned by the unincorporated Hidden Valley Joint Venture (HVJV) between subsidiaries of Harmony Gold and Newcrest Mining, and operated by Hidden Valley Services Limited (HVSL). It is located in the Bulolo District of Morobe Province, 300 km north-west of Port Moresby, 90 km south-west of the Provincial capital of Lae and 15 km south west of Wau on the divide (Manki Range) of the Upper Watut and Bulolo river catchments (refer Figure 2). These two rivers converge to form the Watut River, which flows into the Markham River.

Figure 1: Mountain stream near Hidden Valley Mine

HVGM is located at elevations above 1,900 m and within steep mountainous and forested terrain that experiences about 3m of rainfall per year. Features include narrow streambeds, sharp ridges, and V shaped valleys with grades exceeding 30° (refer Figure 1). Some seismic activity has been recorded and an earthquake exceeding magnitude 7.0 on the Richter scale was recorded in November 2011.

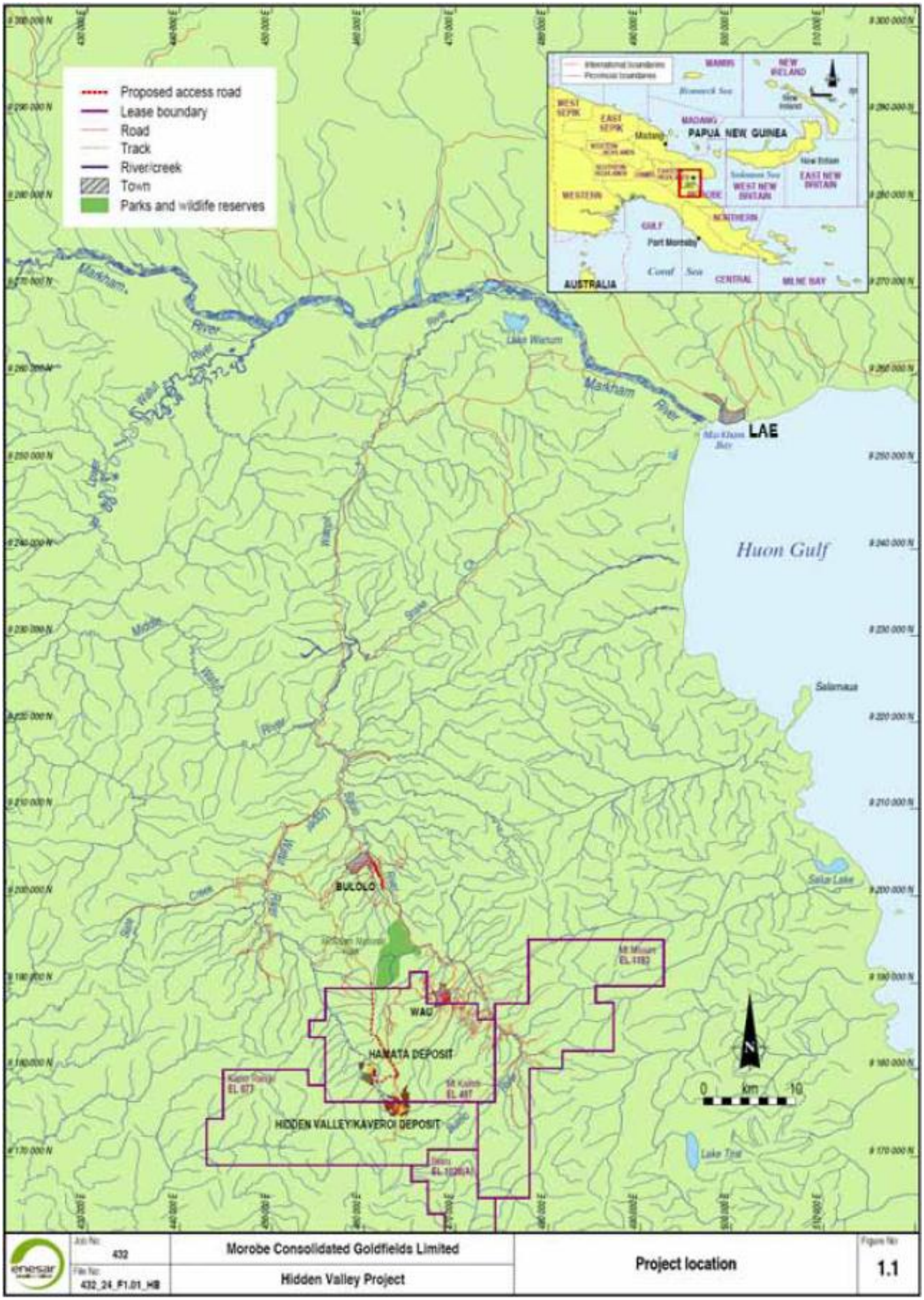

Figure 2: Location of the Hidden Valley Gold Mine

Land-use by the Watut River communities consists primarily of subsistence gardening, hunting and foraging, and small scale alluvial mining. Mining occurred in the 1930's in the Bulolo River through large dredging operations. Coffee growing was introduced into the agricultural system in the 1950's and is now well established. The area also supports commercial forestry, intensive poultry farming and gold buying.

2.2 Operations

The Hidden Valley (HV) ore body has three main lodes: Hidden Valley, Kaveroi, and Hamata. The Hidden Valley deposit was discovered in 1984 and, the Hamata and Kaveroi deposits were discovered in 1987 and 1992 respectively. The mine commenced commercial production during September 30, 2010 with a target production rate of 4.2 million tonnes per annum (Mtpa).

Open Pit Mining is undertaken at Hamata and Hidden Valley / Kaveroi (HVK). HVK is the larger of the two and is anticipated to be the primary ore source over the life of mine. Some rock waste from the Hidden Valley Pit has been classified as Potentially Acid Forming (PAF) and is placed in a number of waste rock dumps including South Dump and Nosave Dump adjacent to the pit. Waste rock from Hamata pit is Non-Acid Forming (NAF) and has been used to construct the HVGM engineered Tailings Storage Facility (TSF). Small quantities of waste rock unsuitable for the TSF are placed in the Hamata Waste Rock Dump.

The HVK pit is approximately 5km from the process plant (Refer Figure 4). Ore is transported from the pit to the plant by an overland conveyor belt (refer Figure 5) and supplemented by a fleet of trucks. Waste rock from the pit is stored in several waste rock dumps constructed in the valleys adjacent to the pit. Tailings are deposited as slurry into the TSF (refer Figure 6) adjacent to the plant and reclaimed water is either used in the process plant or released into Pihema Creek after treatment.

Ancillary infrastructure includes:

- Site offices
- Accommodation, amenities and catering/laundry facilities
- Power generator plant and substation for Ore processing plant
- Waste water facilities
- Goods storage facilities
- Fuel depot
- Explosive manufacture store
- Maintenance workshops
- Access and Service Roads

Current indications are that operations at HVGM will continue until approximately 2025, after which final closure, decommissioning, rehabilitation, and re-development activities will be undertaken. It is HVJVs' intention to implement progressive rehabilitation and to seek tenement relinquishment following closure.

During the reporting period, HVGM produced approximately 160,000 ounces of gold and 1.6 million ounces of silver in 2012 (refer Table 1).

Table 1: Hidden Valley Production data for 2012

PRODUCTION/GENERAL DATA	Number
Ore Milled	3.7 million tonnes
Gold Produced	159,784 oz
Silver Produced	1,643,192 oz
Average Number of persons living in camp	1,314 people
Diesel consumption	51, 864 kL
Total electricity consumption	96,716 MWH

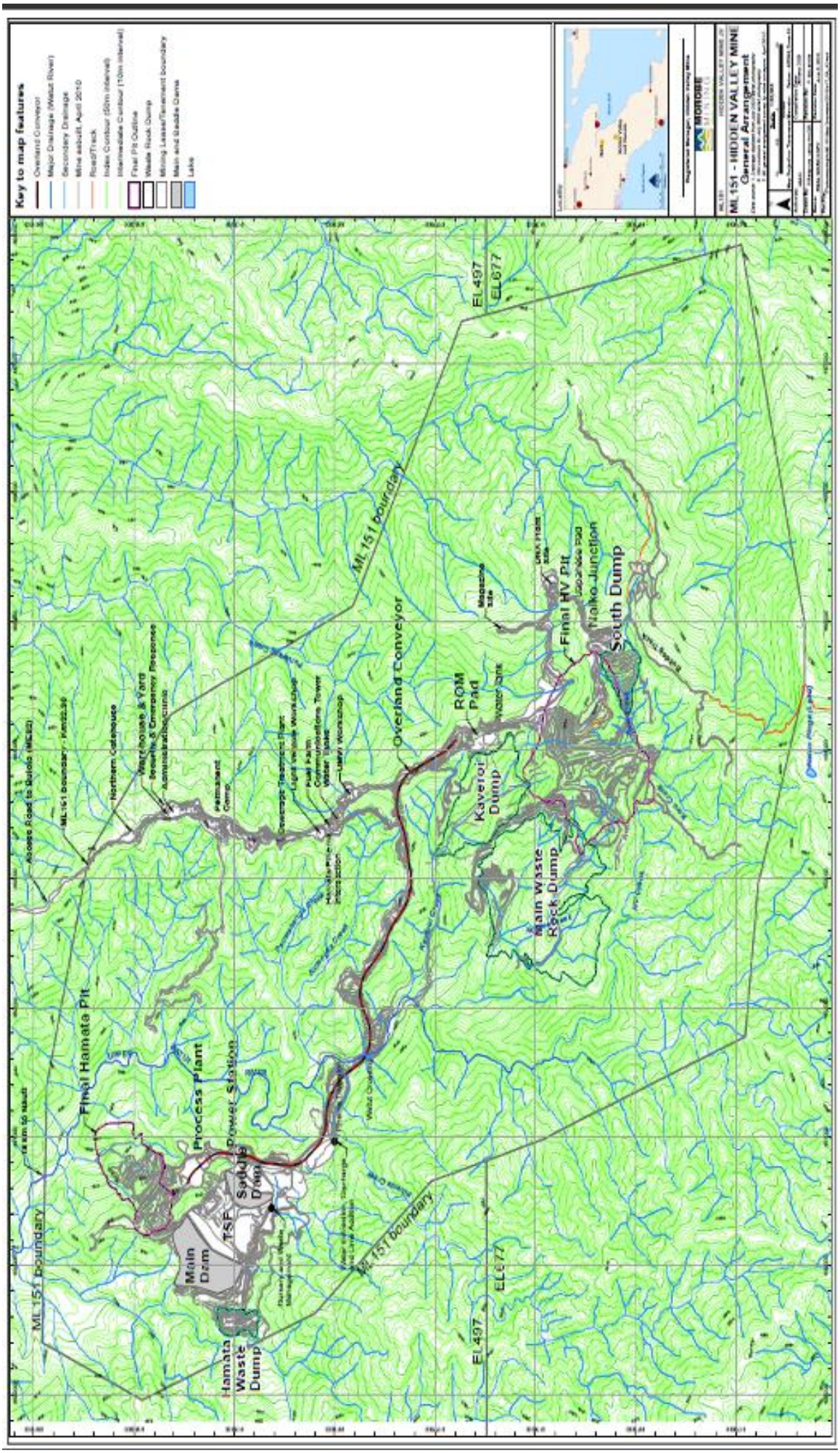

Figure 3: Layout of Hidden Valley Mine Infrastructure

Figure 4: Hidden Valley Pit and South Waste Rock Dump in the background on the right.

Figure 5: Hidden Valley Mine Overland Conveyor

Figure 6: Hidden Valley Mine Tailings Storage Facility

3.0 ENVIRONMENTAL PERMITING

3.1 Permits and Environmental Management Plan (EMP)

The HV Project Environmental Impact Statement (EIS) was accepted by the DEC in June 2004 and Environmental Permits (Waste Discharge and Water Extraction) were issued to HVSL in March 2005, and initially amended on 25 June 2009. The Permits specify environmental performance requirements for the Project. The Permits were reviewed in light of monitoring data collected over the 2010 – 2011 period resulting in requested amendments which were granted on the 7th & 23rd November 2012.

Under the HVGM environmental permits, HVGM is required to have an Environmental management Plan (EMP) in place. The EMP deals with the scope and schedules for monitoring and reporting. The HVGM EMP was approved by the DEC in April 2006. Subsequently, an amended version was submitted to the DEC in March 2011 to address changes to operational parameters and increasing scope of the monitoring programme. This expansion of the monitoring programme is reflected in the staffing levels of the Environmental Department which increased from 27 permanent staff and 30 casual employees in 2011 to 33 staff and 36 casuals respectively in 2012. The organisational structure of the Environmental Department is shown in Figure 7.

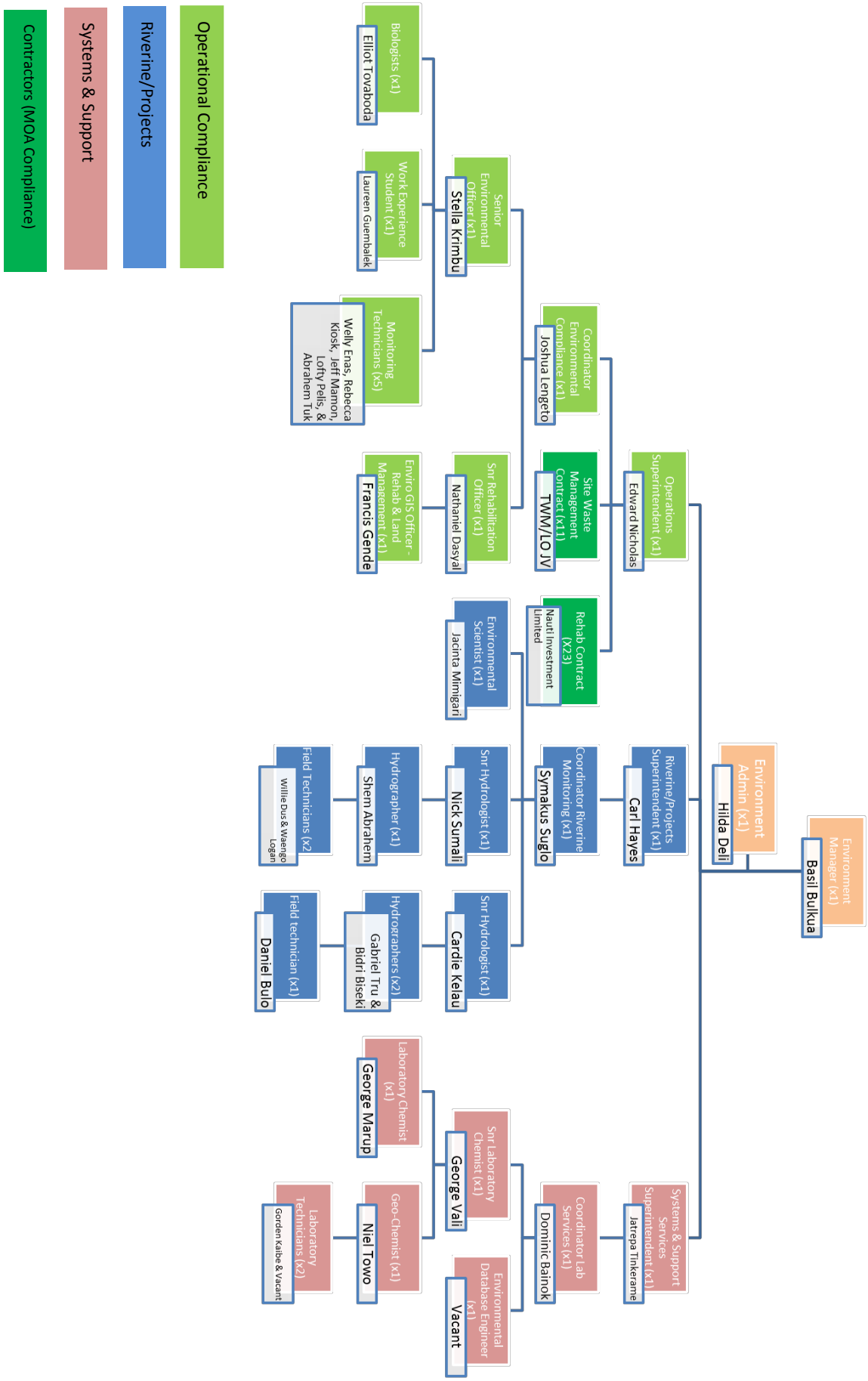

Figure 7. Organisational Chart

.

3.2 Environmental Improvement Plan (EIP)

The DEC commissioned SMEC to undertake an external audit of the environmental performance of HVGM in 2010. The audit identified a number of potential compliance issues and areas for performance improvements.

Following the audit, an Environmental Improvement Plan (EIP) was submitted setting out the proposed actions to address the audit findings. The EIP included 40 specific improvement actions, 34 of these actions were completed by the end of the reporting period. Significant progress was made on all other actions which are largely components of longer-term improvement Projects and will be implemented during 2013 as part of the ongoing EIP.

4.0 ENVIRONMENTAL INCIDENTS

HVGM places a high emphasis on the reporting and investigation of incidents so that root causes can be addressed to prevent a recurrence. At HVGM environmental incidents are classified on a scale of 1 (low) to 5 (severe). Low Level incidents (i.e. Level 1 and Level 2) are tracked for internal diligence and continual improvement purposes whilst more serious incidents (i.e. Level 4 to 5) are mandatorily reported to the DEC. Refer to the risk matrix for incident classification in Appendix 1. Systems are in place to ensure that events outside of permit conditions are identified and reported to DEC, regardless of severity.

HVGM recorded a total 66 environmental incidents in 2012 (41 Category 1, 17 Category 2 and 8 Category 3 incidents). There were no recorded Category 4 or 5 incidents. The 66 recorded incidents in 2012 (refer Figure 8) was higher than the 53 reported in 2011 but the overall pattern was similar with most relating to minor spills of hydrocarbons and process chemicals.

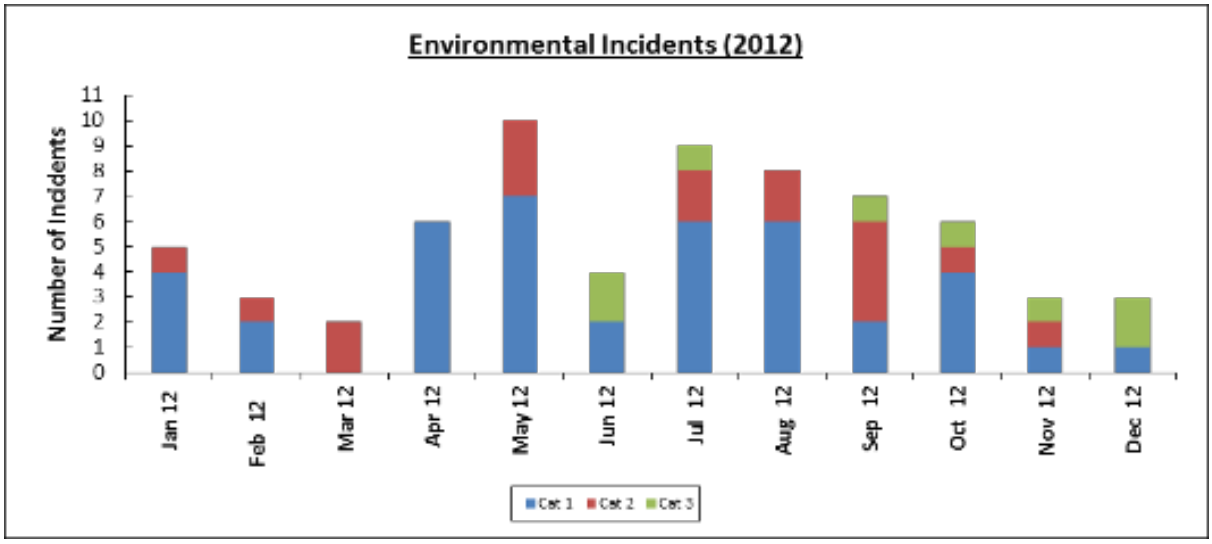

Figure 8: Environmental Incidents in 2012

5.0 ENVIRONMENT MANAGEMENT PLAN

HVGM continued to implement the comprehensive Environmental Management Plan (EMP) to monitor local creeks, operational sites and major river tributaries in the Upper Watut River catchment. The following data collection and storage processes were utilised to facilitate high quality interpretation and reporting.

5.1 Scope of monitoring

The scope of monitoring is defined in the EMP and includes a large number of on-site (refer Figures 9, 10 and 11) and off-site (refer Figures 12 and 13) sample locations on a scheduled sampling regime, including daily monitoring at some critical local sites, with weekly at the Nauti compliance point and monthly at other locations. Continuous data is collected at key locations in the Watut catchment from a network of nine automated river monitoring stations.

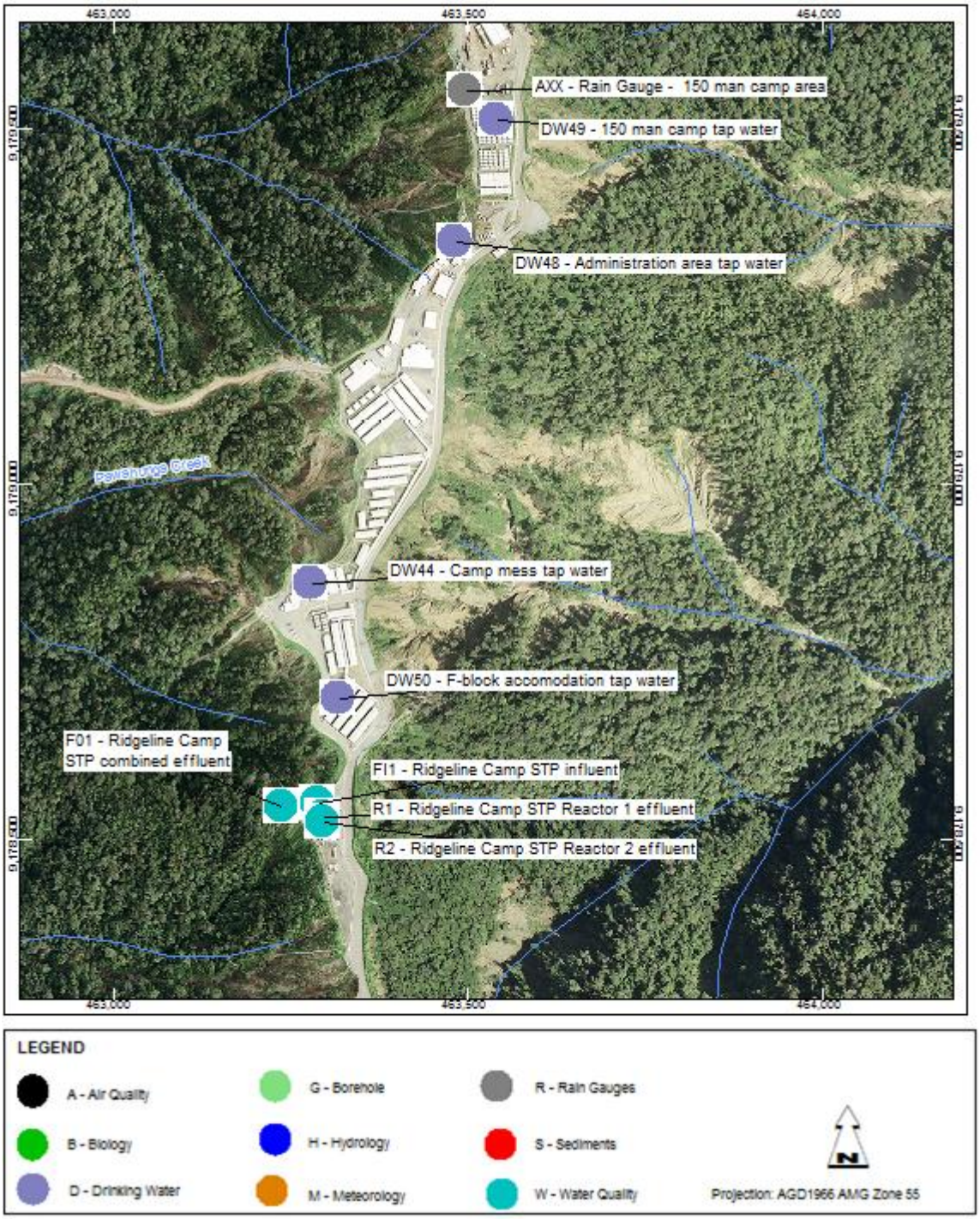

Figure 9: Ridgeline Potable and STP Effluent Monitoring

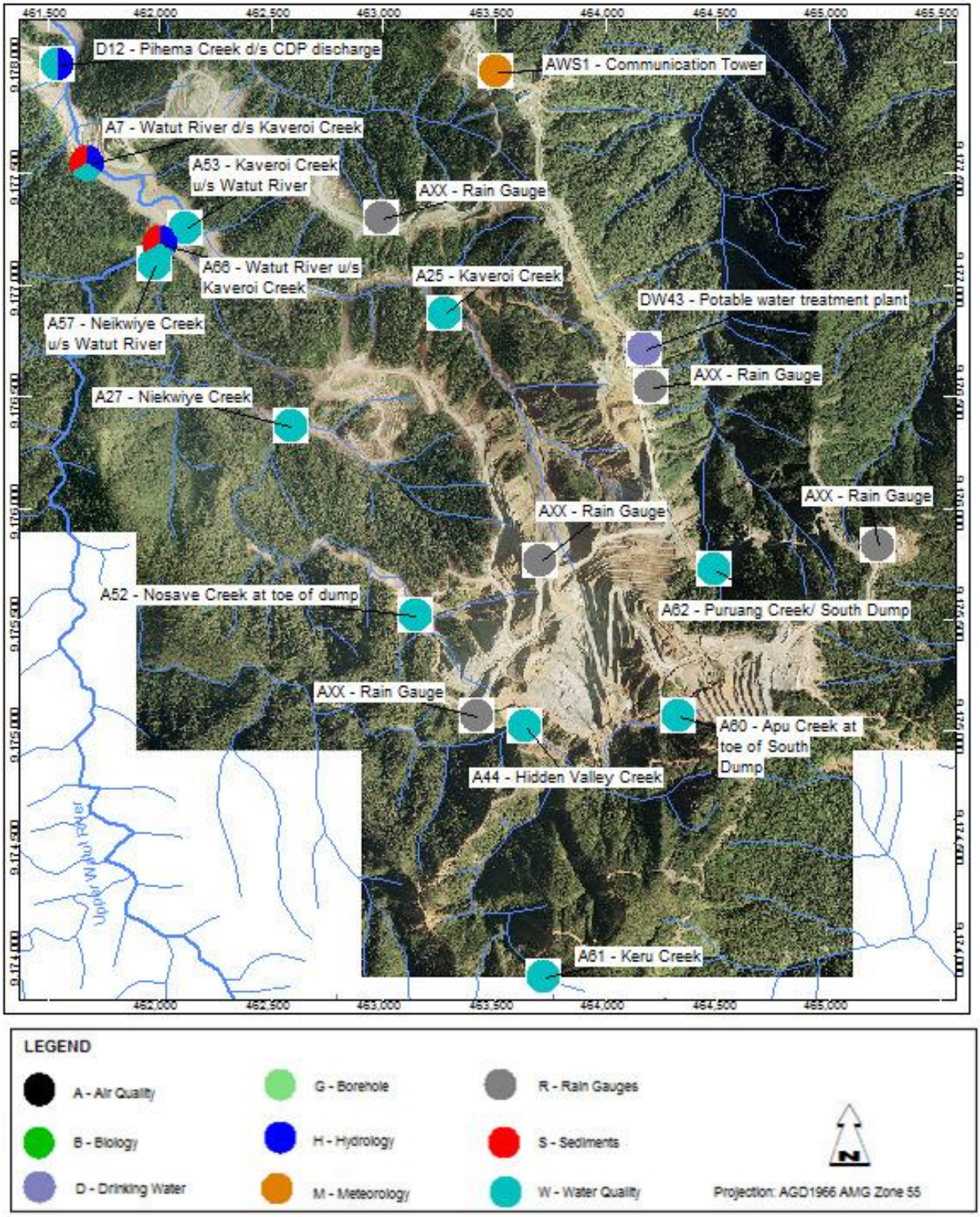

Figure 10: HVK Monitoring Program Sites

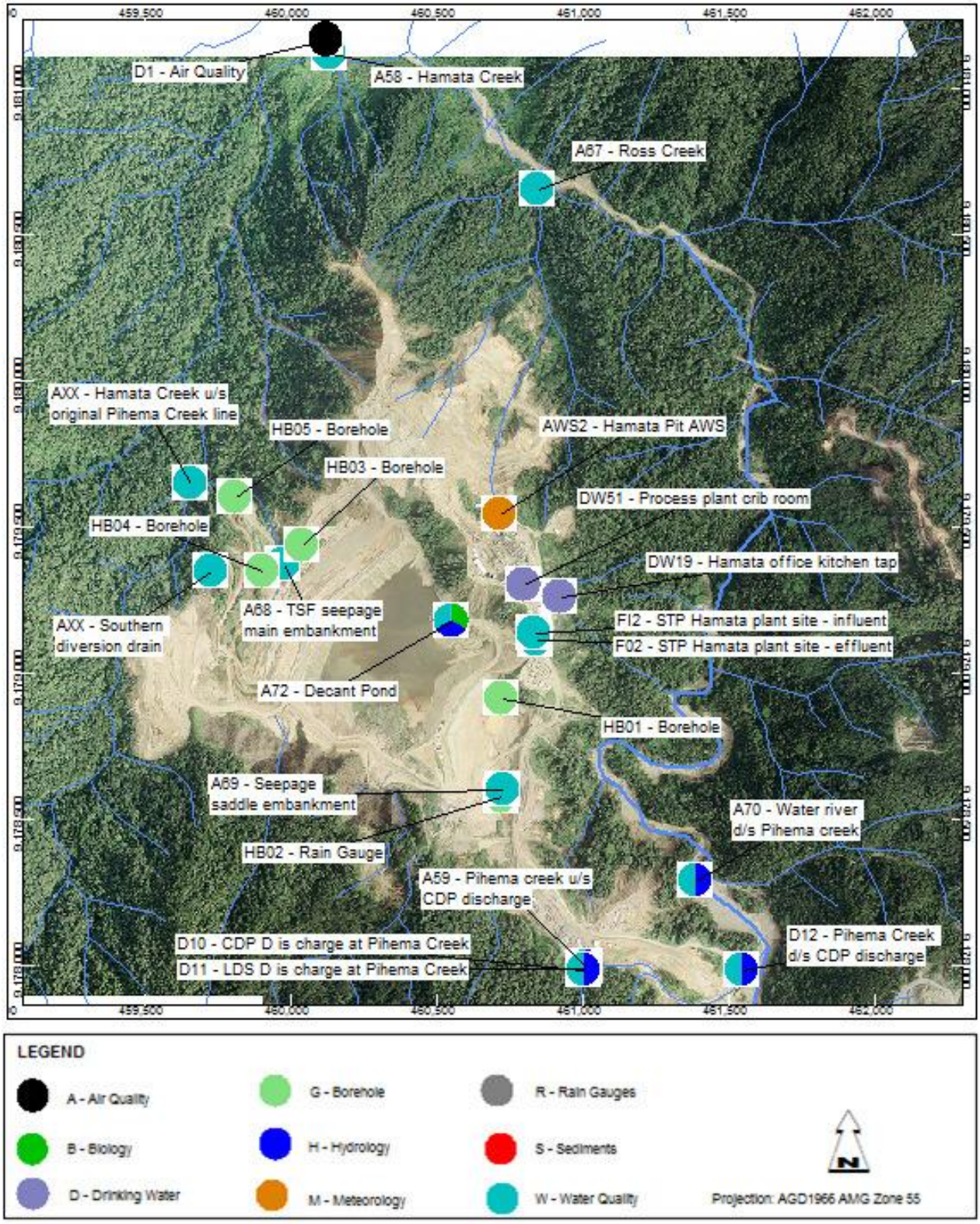

Figure 11: Monitoring Sites near Hamata and TSF

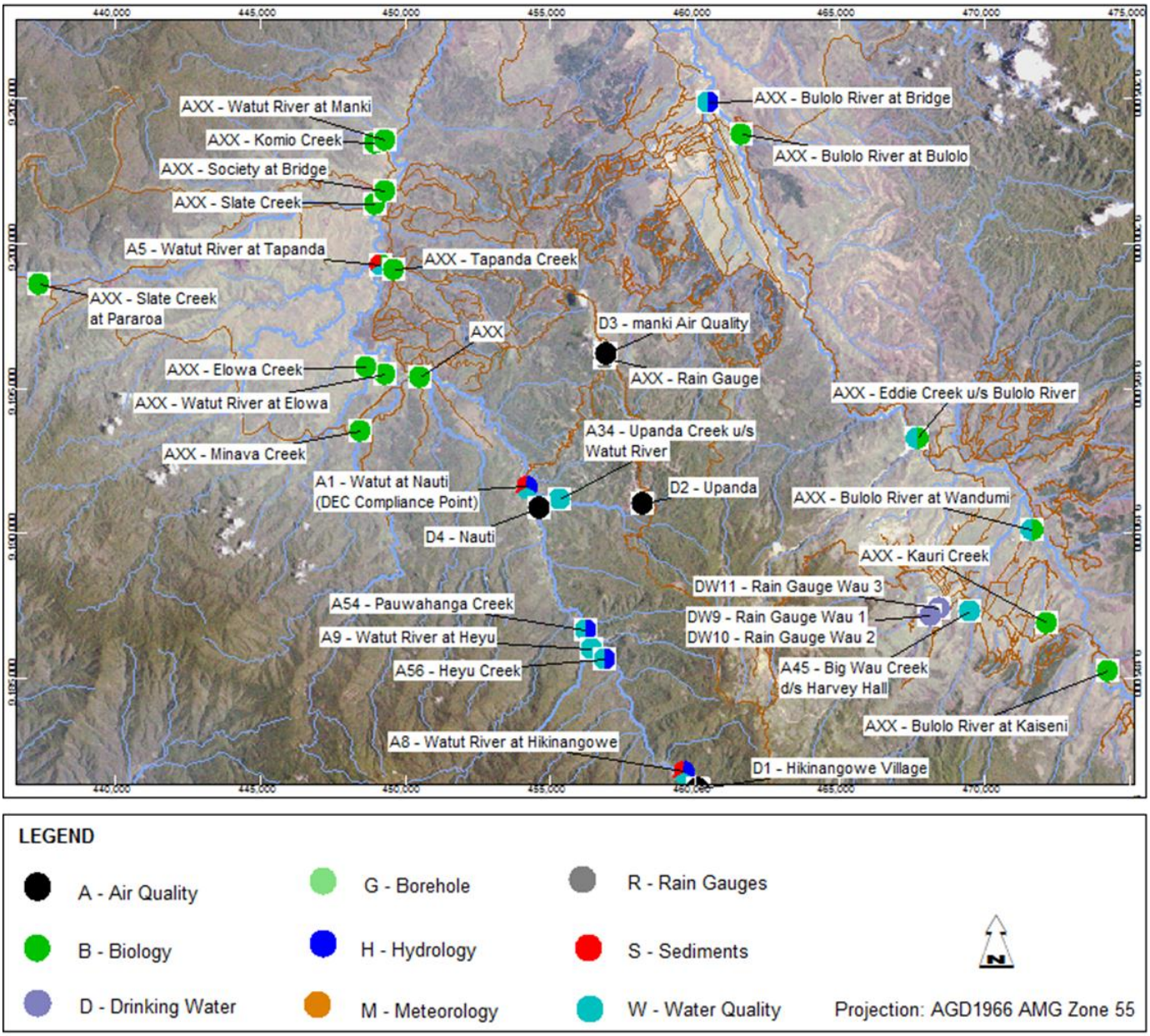

Figure 12: Upper Watut and Bulolo River Monitoring Sites

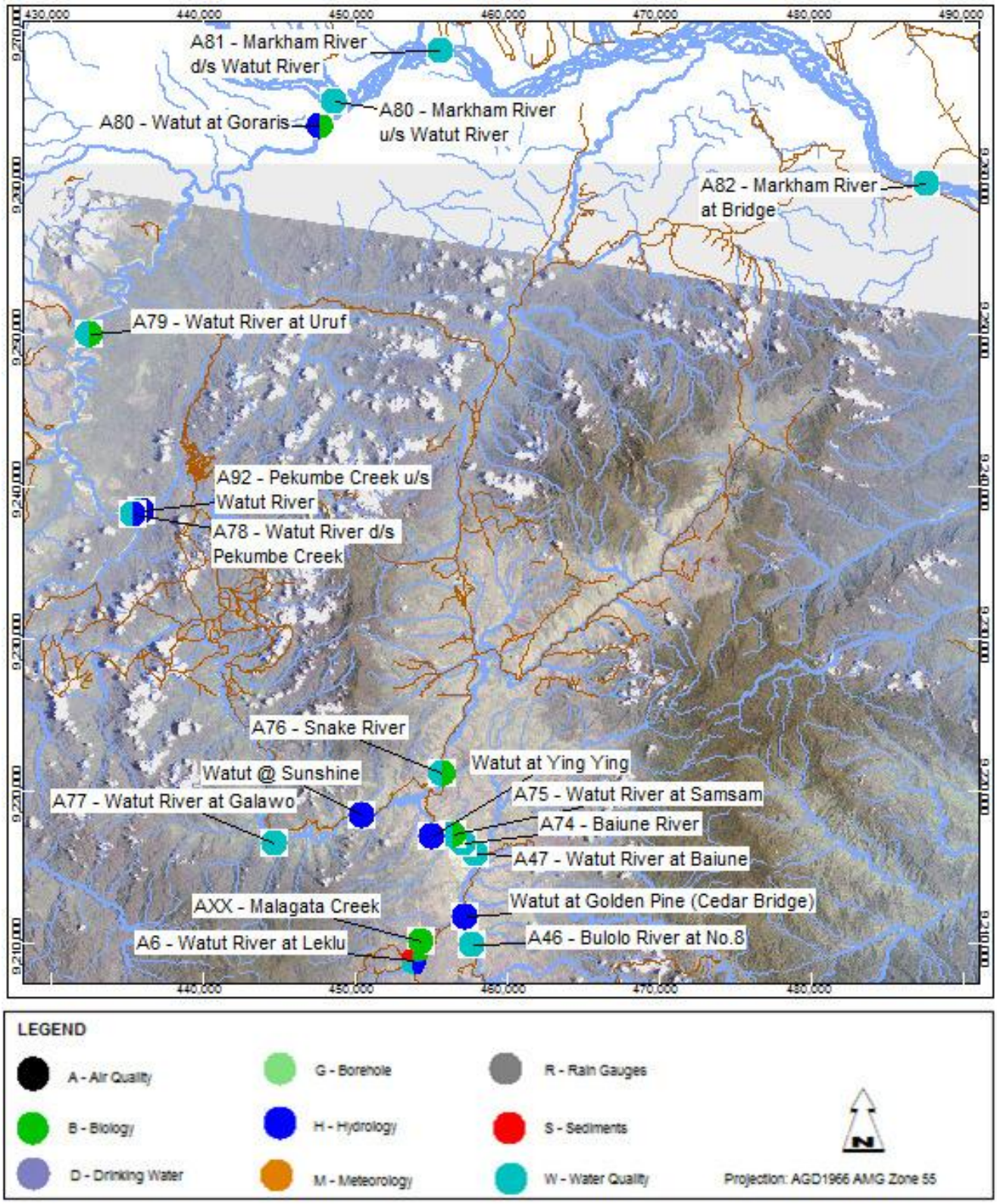

Figure 13: Middle and Lower Watut EMP Monitoring Sites

5.2 Meteorological Data

Meteorological conditions and particularly rainfall have a large impact on HVGM operations and surrounding areas. The mine has Automatic Weather Stations (AWS) at the Communications Tower on the Ridgeline near the Hidden Valley Pit and at the bottom of the valley near the Hamata Pit and TSF to track weather conditions. These are supplemented with 6 pluviographs continually collecting rainfall intensity data. The AWS and pluviographs form part of a Near Real-Time Telemetry Network with data transmitted via radio link back to the Environmental Centralised Database every hour. Daily reports are then generated for operational planning each day.

Onsite Weather Monitoring captures:

- Rainfall in the mine and operation catchment
- Wind Speed and Direction
- Relative Humidity
- Station Level pressure
- Solar Radiation

5.2.1 General Weather Conditions

General weather conditions at HVGM were similar to previous years (refer Table 2 and Table 3). The average temperature on the ridgeline in the vicinity of Hidden Valley Pit was 14.3 oC which was some two degrees cooler than the 16.6 oC mean temperature recorded at Hamata. The average daily maximum and minimum temperatures were also two degrees cooler on the Ridgeline than at Hamata at 16.1 oC and 14.4 oC respectively.

The mean humi dity on the Ridgeline was 91.2% compared to the 93.3% at Hamata. There was also slightly less wind in the valley at Hamata with an average wind speed of 0.8 m/s compared to the 1.3 m/s on the less sheltered Ridgeline.

Table 2: Meteorological Parameters at the Communications Tower AWS in 2012

Parameter		2011	2012	Long term average
Temperature	Mean	14.2	14.3	14.3
	Mean Daily Max	16.1	16.1	16.1
	Mean Daily min	11.6	12.3	12.0
Relative Humidity (%)	Mean	92.3	91.2	91.8
	Mean Daily Max	100	100	100
	Mean Daily min	66.3	47.4	56.9
Barometric Pressure (hpa)	Mean	769.5	769.3	769.4
	Mean Daily Max	771.8	772.1	772.0
	Mean Daily min	765.3	764.7	765.0
Solar radiation (w/m2)	Mean	140.2	145.1	142.7
	Mean Daily Max	280.7	305.2	293.0
	Mean Daily min	27.1	29.7	28.4
Wind Speed (m/second)	Mean	1.3	1.3	1.3
	Mean Daily Max	2.2	3.0	2.6
	Mean Daily min	0.7	0.6	0.7
Calculated Evaporation (mm)	Mean	1.842	1.938	1.890
	Mean Daily Max	3.952	4.517	4.234
	Mean Daily min	0.442	0.402	0.416

Table 3: Meteorological Parameters at the Hamata AWS in 2012

Parameters		2011	2012	Long Term Average
Temperature	Mean	**16.3**	16.6	16.5
	Mean Daily Max	18.0	18.3	18.2
	Mean Daily min	13.6	14.4	14.0
Relative Humidity (%)	Mean	82.3	80.4	81.4
	Mean Daily Max	93.2	93.3	93.3
	Mean Daily min	60.7	55.2	58.0
Barometric Pressure (hpa)	Mean	796.4	804.9	800.7
	Mean Daily Max	801.4	808.5	805.0
	Mean Daily min	794.0	784.4	789.2
Solar radiation (w/m2)	Mean	175.0	151.7	163.4
	Mean Daily Max	303.6	324.4	314.0
	Mean Daily min	27.0	32.4	29.7
Wind Speed (m/second)	Mean	1.0	0.8	0.9
	Mean Daily Max	2.8	3.1	3.0
	Mean Daily min	0.2	0.3	0.3
Calculated Evaporation (mm)	Mean	2.576	2.355	2.465
	Mean Daily Max	4.414	5.175	4.794
	Mean Daily min	0.318	0.419	0.369

5.2.2 Rainfall

A total 3,007 mm of rain was recorded at the Ridgeline AWS (Communication tower) in 2012 and included an exceptionally wet January which experienced 428 mm of rainfall which was 200 mm above average (refer Figure 14). May, August,September and October also received above average rainfall. Rainfall was recorded on a total of 283 days and only 82 days recorded no rain at the ridgeline.

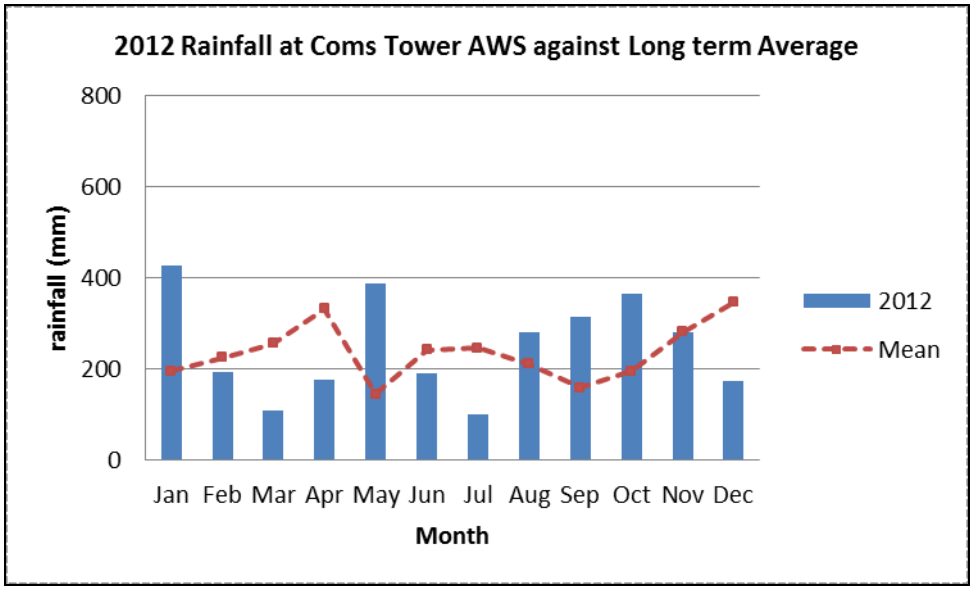

Figure 14: Ridgeline AWS Rainfall and Long Term Mean

Data collected at Hamata recorded a total of 1,848 mm in 2012 compared to the long term mean of 2,335 mm (refer Figure 15). However, this station was vandalised and lost two months of data. A true reflection of actual rainfall maybe taken from the nearest neighbouring station at TSF recorded 2457mm of rainfall with a total wet days of 271.

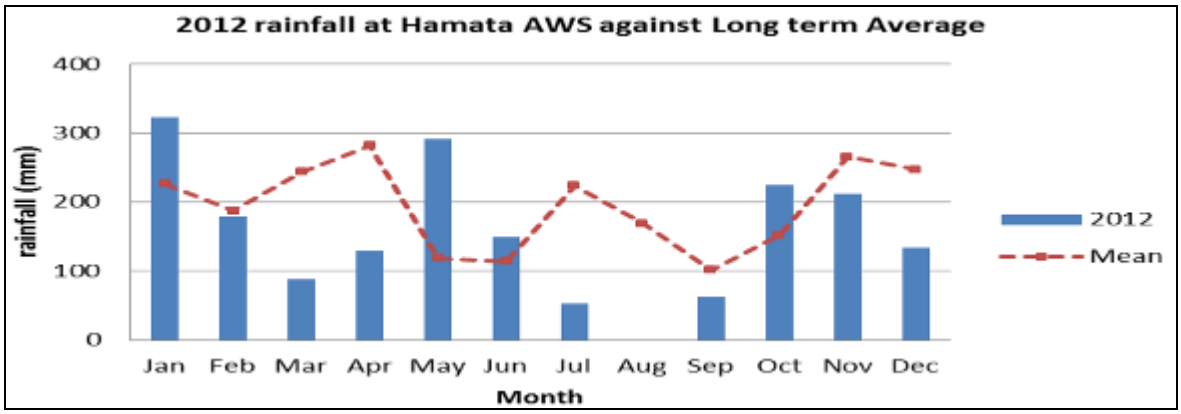

Figure 15: Rainfall at Hamata AWS 2012 and Long Term Mean

5.3 Hydrology and Water Quality

HVSL continued to collect extensive hydro-meteorological, sediment transport and physico-chemical data during 2012 with a specific focus on the Watut River system and its tributaries and the upper catchments of the Bulolo River.

5.3.1 Hidden Valley Drainage

Most mine-derived emissions including sediment, dissolved metals and treated water from the surface of TSF enter the Watut River via surface water runoff, Pihema Creek and other upstream

tributaries. The average Upper Watut River flow downstream of Pihema Creek is 1.8 cumecs. This flow increases significantly by the time it reaches Nauti compliance point where the average flow rate is 5.2 cumecs (refer Table 4). This increase obviously has a significant dilution factor on the dissolved metal levels by the time they reach Nauti which is about 18-20Km river distance downstream of HVGM.

Table 4: Summary of Annual Average Flow Data in Local Creeks in 2012

Site Name	Max. Flow (cumecs)	Min. Flow (cumecs)	Mean Flow (cumecs)	Long Tern Mean (cumecs)
Apu Creek	0.027	0.005	0.012	0.011
Keru Creek	0.008	0.001	0.005	0.008
Nosave Creek	0.052	0.012	0.014	0.026
Kaveroi Creek	0.892	0.055	0.154	0.118
Pihema Creek	0.609	0.223	0.310	0.403
Watut River u/s Kaveroi	1.581	0.018	0.946	0.961
Watut River d/s Kaveroi	2.506	0.724	1.322	1.151
Watut River d/s Pihema	2.647	1.313	1.831	1.444
Watut River at Hikinangowe	3.856	2.431	3.10	2.820
Watut RiveratNauti	6.131	3.360	5.245	6.310

*Key: u/s = upstream, d/s = downstream,

5.3.2 Water Quality

Water quality monitoring is concentrated on local streams and the main stem of the Upper Watut River between the mine site and the confluence with the Bulolo River. Refer to Table 4 above for the names of the local creeks.

5.3.3 Local Mine Area Creeks

Local mine area creeks were monitored to assess the quality of water potentially impacted by mining activities for Apu Creek at the toe of South Dump, Kaveroi Creek and the Watut River upstream of Kaveroi Creek. This monitoring enables assessment of the health of the Upper Watut River system. Monitoring is undertaken consistent with the HVGM Water Quality Monitoring Schedule. Key parameters include metals (dissolved and total), sulphate, alkalinity and Total Suspended Solids (TSS) along with pH, conductivity, turbidity, and dissolved oxygen (DO).

5.3.4 General Parameters and Turbidity

Table 5 presents the physical parameters measured in routine sampling in 2011 and 2012 of the local mine area tributaries of the Upper Watut River. Apu Creek, which drains the South Dump had lower concentrations of suspended sediment in 2012 (120 mg/L) than in 2011 (4764 mg/L) and indicated levels similar to 2010 (233 mg/L). Monitoring results also indicated increased levels of sulphate and dissolved metals (specifically Al, Co, Fe, Mn, and Zn; refer to Table 5), as well as lower pH. A continued reducing trend in sediment loading was observed from Kaveroi Creek in 2012 (5775 mg/L) compared to 2010 (26,923 mg/L)) and 2011 (9,248 mg/L), refer (Table 5). The water quality in Nosave Creek, did not exhibit any significant change except that sediment loading increased in 2012 (3,315 mg/L) from 2011 (708 mg/L) and 2010 (213 mg/L) due to the earth works associated with the construction of the Nauti push down ramp and waste dump. The overall situation, therefore, is one of decreasing sediment load in combination with relativelystable levels of ARD in the mine area creeks. This is consistent with the water quality outcomes at Nauti (refer Table 9) which also show decreased sediment loading from 2010 to 2012 and little obvious changes in metal concentrations. The large standard deviation values indicate highly variable levels in all parameters measured.

Table 5: Physical Parameters Local Creeks in 2011 and 2012

Parameter		Apu Creek		Kaveroi Creek		Nosave Creek		Ross Creek	
		2011	2012	2011	2012	2011	2012	2011	2012
pH-field (pH Units)	Mean	4.8	4.7	6.1	7.2	3.9	4.4	7.5	7.6
	StdDev	0.55	0.64	0.88	0.49	0.72	0.46	0.6	0.43
	Count	200	236	333	335	4	34	21	31
Sulfate as SO4	Mean	1612	2046	387	265	1279	1486	66	123
	StdDev	518	290	98	119	313	494	21	24
	Count	62	18	10	23	9	19	10	18
Acidity (mg/L CaCO3)	Mean	175	399	24	8	547	378	17	10
	StdDev	87	175	35	3.54	301	196	17	4.2
	Count	190	115	301	302	3	14	3	17
Alkalinity (mg/L CaCO3)	Mean	<1	<1	13.9	<1	<1	<1	143	123
	StdDev	0		16.6	0	0	0	171	19.9
	Count		19	221	29		23	14	34
Total Suspended Solids (mg/L)	Mean	4764	120	26923	5775	708	3315	12609	6599
	StdDev	1282	63	96498	6626	1079	11808	19181	9761
	Count	32	19	113	27	3	23	7	24

Parameter		Apu Creek		Kaveroi Creek		Nosave Creek		Ross Creek	
		2011	2012	2011	2012	2011	2012	2011	2012
Dissolved Oxygen (mg/L)	Mean	7.08	7.1	8.5	8.61	7.2	8.41	5.91	7.45
	StdDev	2.44	1.49	2.1	1.53	3.09	1.86	1.19	1.68
	Count	186	235	267	331	4	33	6	31

5.3.5 Dissolved Metals

The concentration of dissolved metals in local creeks recorded in 2012 was largely unchanged from 2011 (refer to Table 6) for Nosave and Kaveroi Creeks, whereas in Apu Creek increased levels were noted for Al, Co, Fe, Mn, and Zn. All dissolved metals were within Permit limits at the Nauti compliance point, other than cobalt and manganese.

Table 6: Comparison of Dissolved metals (mg/L) 2011 and 2012

Parameter		Apu Creek		Kaveroi Creek		Nosave Creek		Ross Creek	
		2011*	2012	2011*	2012	2011*	2012	2011*	2012
Aluminium	Mean	7.46	22.44	1.52	0.3456	73.89	53.56	0.05	0.0223
	StdDev	6.26	12.26	2.69	1.5751	26.8	28.64	0.0293	0.016
	Count	60	18	8	30	9	22	11	25
Arsenic	Mean	0.002	0.0019	0.009	0.0066	0.009	0.0029	0.002	0.005
	StdDev	0.001	0.0011	0.007	0.0136	0.013	0.0018	0.0006	0.0037
	Count	38	18	8	30	8	22	10	25
Cadmium	Mean	0.059	0.0668	0.018	0.008	0.066	0.0718	0.0113	0.0125
	StdDev	0.0228	0.0149	0.005	0.0054	0.02	0.0228	0.0125	0.0228
	Count	61	19	9	30	9	23	11	26
Chromium	Mean	<0.001	0.0015	<0.001	0.004	<0.001	0.0042	<0.001	<0.001
	StdDev		0.0007		0		0.0033	0	0
	Count		18		30		22	10	25
Cobalt	Mean	0.72	1.2139	0.14	0.0382	0.5	0.4697	0.003	0.0013
	StdDev	0.31	0.3011	0.07	0.0465	0.18	0.1878	0.0014	0.0007
	Count	62	18	9	30	9	22	11	25
Copper	Mean	0.17	0.1514	0.05	0.0162	0.77	0.6032	0.0077	0.0038
	StdDev	0.1	0.1403	0.07	0.0362	0.37	0.333	0.0117	0.0035

Parameter		Apu Creek		Kaveroi Creek		Nosave Creek		Ross Creek	
		2011*	2012	2011*	2012	2011*	2012	2011*	2012
	Count	60	18	8	30	9	22	11	25
Iron	Mean	26.36	85.7	0.12	1.208	15	1.455	0.09	0.24
	StdDev	17.87	36.92	0.1	2.395	14.72	2.2053	0.0141	0.2404
	Count	58	18	6	30	9	22	10	25
Lead	Mean	0.012	0.0172	0.006	0.0217	0.014	0.0336	0.001	0.0015
	StdDev	0.007	0.0056	0.008	0.0349	0.006	0.0163	0	0.0007
	Count	57	18	5	30	9	22	10	25
Manganese	Mean	54.29	77.52	16.02	7.668	43.53	56.65	1.1478	0.795
	StdDev	19.41	11.46	3.98	4.416	14.83	17.03	0.4554	0.3442
	Count	62	18	9	30	9	22	11	25
Mercury	Mean	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	StdDev		0		0		0	0	0
	Count		18		30		22	10	25
Nickel	Mean	0.549	0.8785	0.132	0.034	0.621	0.6771	0.0115	0.0023
	StdDev	0.22	0.2023	0.066	0.042	0.211	0.2609	0.0064	0.0013
	Count	61	18	9	30	9	22	11	25
Selenium	Mean	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	StdDev		0		0		0	0	0
	Count		18		30		22	10	25
Silver	Mean	<0.001	0.001	<0.001	0.0015	<0.001	0.0023	<0.001	<0.001
	StdDev		0		0.0007		0.0006	0	0
	Count		18		30		22	11	25
Zinc	Mean	9.75	16.14	1.55	0.1814	11.96	12.46	0.0088	0.0194
	StdDev	4.29	4.22	1.38	0.3818	4.17	5.3843	0.0058	0.0247
	Count	61	18	9	30	9	22	10	25

*Data for 2011 presented in this table has been updated against data reported in the 2011 AER. This has come about due to the unavailability of laboratory data at time of issue of the 2011 AER.

5.3.6 Watut River Sites

Watut River water quality monitoring was completed for metals, oil and grease and general water quality parameters including TSS, sulphate and total alkalinity. In addition to these, the Nauti compliance point was sampled for dissolved metals and general water quality including pH, conductivity, turbidity, dissolved oxygen (DO) and temperature.

Most mine derived emissions enter the river system from Apu Creek, Nosave Creek and Kaveroi Creek. Accordingly, water quality outcomes at Nauti are a more reliable reflection of water quality in these local creeks as well as the overall input from surface water runoff in the catchment area between the mine and Nauti. The greatest change at Nauti from 2010 through 2012 is the reduction in suspended sediment.

This is also consistent with the general reduction trend in volumes of sediment observed at Nauti (refer to Figure 16 & 17) as obtained by Hydstra continuously recorded turbidity data.

5.3.7 Physicochemical Parameters and Sediment Load

The physicochemical quality of the river system during 2012 was similar to 2011. The 2011 AER noted that suspended sediment concentration levels had halved at both Hikinangowe and Nauti from 2010, data collected during 2012 was similar to 2011 data (refer Table 7). As noted, these results are based on spot samples which may miss the high sediment peaks associated with storm pulses. Continuous turbidity readings from the river monitoring station at Nauti provide a more accurate picture of sediment loadings throughout the year (refer to Figure 16).

The Environmental Permit level for dissolved cobalt is stated as “below limit of detection” which is equivalent to 1ppb, this is much lower than the current 90 ppb ANZECC trigger level for dissolved cobalt for the protection of Freshwater Aquatic Ecosystems. During 2012, HVSL requested the DEC to amend permit conditions for Co. The only other dissolved metal that was occasionally detected at levels above compliance at the Nauti compliance point during 2012 was manganese having a compliance limit of 500 ppb.

Manganese is released from carbonates in the waste rock dumps when it is dissolved by ARD conditions and remains an element of concern despite the slight decrease from an average 440 ppb in 2011 to 330 ppb in 2012. Long term control of dissolved manganese will be achieved by effective mitigation of ARD in engineered waste rock dumps and managing seepage runoff from exposed pit walls.

Table 7: Physicochemical Parameters in the Upper Watut in 2011 and 2012

Parameter		Watut at Hikinangowe		Watut at Nauti	
		2011	2012	2011	2012
Dissolved Oxygen (mg/L)	Mean	7.08	8.1	8.2	8.8
	StdDev	2.22	1.3	2.6	1.97
	Count	22	34	249	330
pH-field (pH Units)	Mean	7.4	7.5	7.4	7.7
	StdDev	0.49	0.31	0.4	0.31
	Count	26	34	31	334
Sulphate as SO4 (mg/L)	Mean	72.4	84	34.8	40.8
	StdDev	27.7	37	20.4	23.63
	Count	17	10	89	55
Total alkalinity as CaCO3 (mg/L CaCO3)	Mean	25.5	36.8	31.4	35.8
	StdDev	8.8	7.7	16.2	9.07
	Count	7	27	284	342
Total Suspended Solids (mg/L)	Mean	1259	1208	1333	1086
	StdDev	424	707	576	825
	Count	3	24	37	249

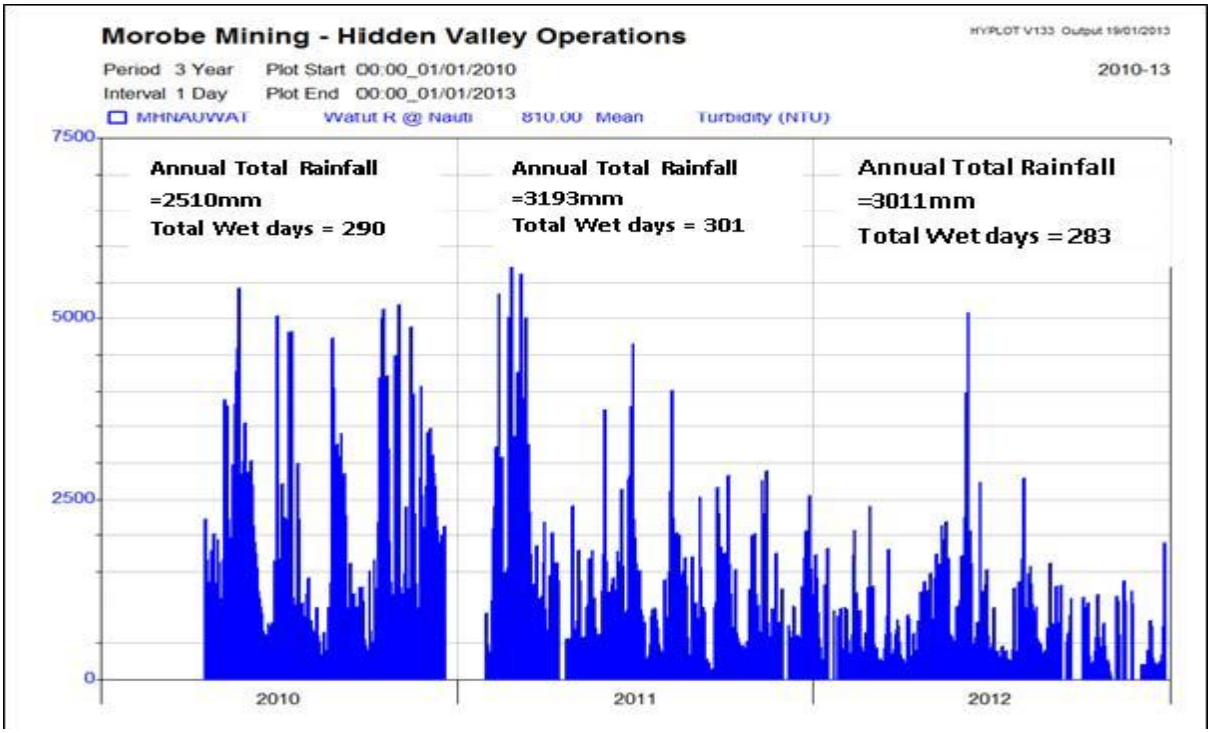

Figure 16: Mean Total Suspended load at Nauti (mg/L) from Turbidity data for 2010 - 2012 (Continuous Data)

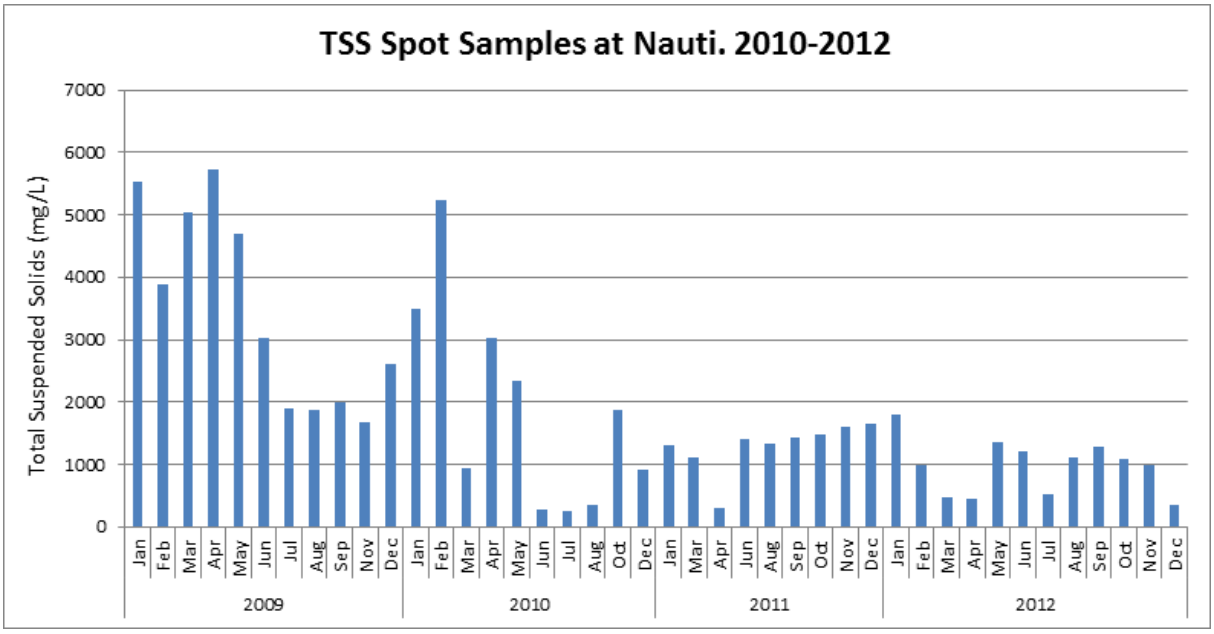

Figure 17: TSS concentrations at Nauti in 2012 (Spot Samples)

Table 8: Dissolved Metals (mg/L) in Upper Watut River

Metals (mg/L)		Hikinangowe		Nauti		Permit Level
		2011	2012	2011	2012	
Aluminium	Mean	0.16	0.0499	0.11	0.0619	NA
	StdDev	0.23	0.028	0.23	0.041	
	Count	9	10	149	130	
Arsenic	Mean	0.005	0.0031	0.006	0.0043	0.05
	StdDev	0.003	0.0012	0.001	0.0009	
	Count	6	10	80	250	
Cadmium	Mean	0.003	0.0009	0.0007	0.0004	0.01
	StdDev	0.003	0.0009	0.0008	0.0004	
	Count	13	15	121	261	
Chromium	Mean	<0.001	0.0002	<0.001	0.0006	0.05
	StdDev		0		0.0003	
	Count		10		249	
Cobalt	Mean	0.005	0.0027	0.001	0.0018	LOD (0.001)
	StdDev	0.005	0.0024	0.001	0.0018	
	Count	9	10	146	282	
Copper	Mean	0.024	0.0127	0.006	0.0142	1
	StdDev	0.049	0.0107	0.014	0.0173	
	Count	8	10	149	282	
Iron	Mean	0.19	0.0351	0.093	0.0531	1
	StdDev	0.35	0.0235	0.17	0.0353	
	Count	5	10	78	250	
Lead	Mean	0.006	0.0003	0.001	0.0011	0.005
	StdDev	0.008	0.0002	0.001	0.0032	
	Count	2	10	47	249	
Manganese	Mean	1.38	0.8699	0.44	0.3378	0.5
	StdDev	0.77	0.1498	0.15	0.0978	

	Count	9	10	149	282	
Mercury	Mean	<0.0001	<0.0001	<0.0001	0.0005	0.002
	StdDev		0		0.0004	
	Count		14		246	
Nickel	Mean	0.003	0.001	0.0008	0.0012	1
	StdDev	0.003	0.0005	0.0004	0.0026	
	Count	7	10	86	282	
Selenium	Mean	<0.01	<0.0002	<0.01	0.0002	0.01
	StdDev		0		0.0001	
	Count		10		248	
Silver	Mean	0.001	0.0006	0.0005	0.0002	0.05
	StdDev	0.001	0.0005	0.001	0.0001	
	Count	3	10	64	282	
Zinc	Mean	0.0745	0.0104	0.0096	0.0181	5
	StdDev	0.103	0.0104	0.011	0.028	
	Count	4	10	79	249	

5.4 Water Extraction and Discharge

The high rate of potable water consumption reflects an increase in the HVGM workforce from the time the initial Permit was granted.

The total of 66,606 m^3 extracted from Keru Creek in 2012 is below the amended permit limit of 109,500m^3. The extracted volume is equivalent to 0.0021 cumecs which is 50% of the average annual flow of 0.004 cumecs. Due to an average daily water usage of 0.0045 cumecs at Hidden Valley Ridgeline camp, supply from Keru Creek alone with a flow of 0.004 cumecs is not able to meet demand. With the DEC approval for water to be extracted from Bulldog Creek, the shortfall in water supply to the camp was overcome. (Bulldog Creek was a late inclusion in the amended Water Extraction Permit (WE-L3 (38) granted in November 2012). Data collected from Bulldog Creek for 2012 shows that 75,556m^3 (equivalent 0.0024 cumecs) was extracted.

1.2 million cubic metres of water was extracted from Pihema Creek during 2012 for the mill processing plant, this value is within the Permit limit of 1.8 million cubic metres per year (refer Table 9). A total of 1.7 million cubic metres (refer Table 10) of treated effluent was discharged back

to Pihema Creek, the extra 508,000m^3 of water discharged to Pihema Creek comes from 1847.5mm of rainfall falling in the TSF catchment in 2012 which had to be removed.

Table 9: 2012 Water Extraction Volumes (m3) and Permitted volumes

Month	Process Water (m^3)	Potable Water* (m^3)		
	Pihema Creek	Keru Creek	Bulldog Creek	Total
January	62,264	11,380	6,017	79,661
February	66,477	5,114	5,670	77,261
March	81,044	7,220	4,772	93,036
April	89,656	4,962	3,290	97,908
May	117,548	0	8,996	126,544
June	136,439	0	8,909	145,348
July	112,132	3,339	3,504	118,975
August	104,938	9,259	8,326	122,523
September	111,958	7,224	6,971	126,153
October	109,566	8,850	8,496	126,912
November	102,449	4,573	6,858	113,880
December	94,582	4,685	3,747	103,014
2012 Total	**1,189,050**	**66,606**	**75,556**	**1,331,212**
Permitted level (Annual)	1,800,000	109,500	109,500	2,019,000

* missing data for Keru in the month of May and June was due to failure in the Flow meter installed at the site causing back flow

Figure 18: Pihema Creek looking downstream from water extraction point

Table 10: Water Discharge Volumes (m3) and Permitted Levels

Month	TSF Discharge	Ridgeline STP	Hamata STP
January	144,629	10,680	Unmetered
February	308,335	6,629	Unmetered
March	358,849	6,433	Unmetered
April	137,087	6,750	Unmetered
May	155,853	7,684	Unmetered
June	77,670	6,846	2,516
July	96,859	6,982	3,139
August	130,472	8,318	2,786
September	18,166	7,630	2,968
October	86,453	6,653	2,508
November	90,731	6,638	1,846
December	91,924	6,306	2,157
2012 Total	**1,697,028**	**87,549**	**18,800**
Permitted level	2,803,200	102,200	47,450

5.5 Sewage Treatment

The Hidden Valley Ridgeline Sewage Treatment Plant (STP) originally constructed at HVGM was found to be undersized for the larger than anticipated work-force and was replaced by a new larger-capacity STP commissioned in Quarter 1, 2012. The new plant is still experiencing teething issues and has not performed to expectations due in part to the high elevation (2000m asl) and ambient temperature on site affecting the microbial processes needed to digest waste. This has resulted in elevated values of parameters (refer Table 11) against their respective permit criteria, except for pH which has remained mostly in compliance. Efforts are continuing to remedy this situation with the ordering of 4 new air blowers to help raise the levels of dissolved oxygen to improve microbial performance to better break down organic matter.

Table 11 below shows that the mean values of the reported parameters in 2012 are higher than that of 2011 which is indicative of the low performance of the current Ridgeline STP. The high biological oxygen demand (BOD) in Ridgeline indicates the low levels of dissolved oxygen in the plant for microbial activity. However the mean BOD for Hamata is in compliance, as Hamata caters for less people and hence less organic matter to break down. With the exception of the pH, all the mean values of the other parameters have more than doubled from 2011. Note the high variability of the parameters with very high standard deviations.

Table 11: Sewage Effluent Parameters 2010 and 2011

Parameter		Ridgeline Camp		Hamata Plant Site		Permit Requirements
		2011	2012	2011	2012	
pH-field (pH Units)	Mean	6.9	7.1	6.3	6.7	6.5 - 8.5
	StdDev	0.4	0.4	1	1	
	Count	35	49	35	46	
Biological Oxygen Demand (mg/L)	Mean	59	150	9	21	20
	StdDev	85	104	13	21	
	Count	16	45	16	47	
Suspended Solids (mg/L)	Mean	95	184	37	99	30
	StdDev	100	91	57	270	
	Count	12	45	12	47	
TKN as N (mg/L)	Mean	57	70	11	35	20
	StdDev	21	37	7	29	
	Count	33	69	31	67	

5.6 Potable Water Monitoring

Drinking water was free of coliform bacteria which show a significant improvement from 2011. The other parameters also met the water criteria during 2012 (refer Table 12).

Table 12: Results for drinking water quality in 2011 and 2012

Sample Point	pH-field (pH Units)	E. coli (Colonies /100mL)	Tot. Coliforms (Col/100mL)	Turbidity (NTU)	E-Cond. (uS/cm)	TSS (mg/L)	Temp (°C)
Ridgeline Potable Water Treatment Plant							
2011 Mean	7.3	0.4	1.2	22.8	92.1	0	17.8
2012 mean	7.8	0.2	0.8	1.1	114.8	7.5	16.7
Ridgeline Camp Mess Tap							
2011 Mean	7	3.4	22.8	11.8	74.9	0	19.5
2012 mean	7.6	0.2	0.5	1.9	96.1	4.6	18.2
Permit Criteria	6.5-8.5	0	<3	5 - 25	None	500 - 1500	None

5.7 Groundwater Monitoring

Groundwater quality in the vicinity of the TSF in 2012 was monitored in two out of five groundwater bores (refer Tables 13 & 14) on the main dam, three bores were buried during construction of the TSF,four were replaced in the latter part of the year. The groundwater was uniform with most dissolved metals and cyanide below detection limit for 2011 and 2012. It is apparent that some seepage of TSF liquors into the groundwater is occurring but it is also apparent that TSF contaminants including dissolved metals and cyanide are being attenuated. Note that the pH is slightly on the acidic side with the lowest points at 5.45 in 2011 and 5.99 in 2012 for Bore number 04, and similarly for Bore number 05 ranging from 5.58 and 7.1. Otherwise the conductivities for both bores are at background levels indicating no major risk to release of dissolved metals.

Table 13: Comparison of groundwater quality between 2011 and 2012 at Bore 04 (HB04) on the Main Dam

Key Parameters	2011				2012			
	n	Range	Mean	StdDev	n	Range	Mean	StdDev
pH-field (pH Units)	25	5.45 - 7.12	6.414	0.382	19	5.99 - 7.49	6.676	0.370
Temperature (°C)	9	16 - 21	18.900	1.471	19	12 - 20	17.667	1.815
EC field (uS/cm)	9	37 - 63	49.667	8.382	19	52 - 106	61.611	12.243
Free cyanide (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Weak acid dissociable cyanide (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Cyanide (Total) (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Calcium (Dissolved) (mg/L)	12	3 - 5	4.083	0.669	7	4 - 5	4.429	0.535
Chloride (mg/L)	15	1 - 2	1.200	0.414	7	1 - 9	2.143	3.024
Total alkalinity as CaCO3 (mg/L CaCO3)	13	18 - 70	30.236	12.620	13	25 - 37.	29.643	3.792
Sodium (Dissolved) (mg/L)	12	5 - 7	5.917	0.669	7	6 - 13	7.286	2.563
Magnesium (mg/L)	4	0.26 - 1	0.485	0.345	-	-	-	-
Potassium (mg/L)	4	0.46 - 1.1	0.765	0.332	-	-	-	-
Total Dissolved Solids (Field) (ppm)	6	0.03 - 0.04	0.035	0.005	20	0.034 - 171	9.039	39.221
Dissolved aluminium (mg/L)	13	0.01 - 0.04	0.014	0.009	7	0.01 - 0.01	<0.01	0
Dissolved Arsenic (mg/L)	13	0.001 - 0.003	0.001	0.001	7	<0.001 - <0.001	<0.001	0
Dissolved Cadmium (mg/L)	13	<0.0001 - <0.0001	<0.0001	0	7	<0.0001 - <0.0001	<0.0001	0
Dissolved Chromium (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Cobalt (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0

Key Parameters	2011				2012			
	n	Range	Mean	StdDev	n	Range	Mean	StdDev
Dissolved Copper (mg/L)	13	0.001 - 0.066	0.010	0.017	7	0.001 - 0.004	<0.002	0.001
Dissolved Iron (mg/L)	13	0.005 - 0.05	0.047	0.012	7	<0.05 - <0.05	<0.05	0
Dissolved Lead (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Manganese (mg/L)	13	0.002 - 0.047	0.018	0.012	7	0.017 - 0.075	0.031	0.021
Dissolved Mercury (mg/L)	13	<0.0001 - <0.0001	<0.0001	0	7	<0.0001 - <0.0001	<0.0001	0
Dissolved Nickel (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Selenium (mg/L)	13	0.003 - 0.01	0.009	0.002	7	<0.01 - <0.01	<0.01	0
Dissolved Silver (mg/L)	12	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Zinc (mg/L)	13	0.014 - 0.086	0.043	0.024	7	0.011 - 0.041	0.029	0.012

Table 14: Comparison of groundwater quality between 2011 and 2012 at Bore 05 (HB05) on the Main Dam

Key Parameters	2011				2012			
	N	Range	Mean	StdDev	n	Range	Mean	StdDev
pH-field (pH Units)	25	5.58 - 6.72	6.318	0.290	17	6.15 - 7.11	6.645	0.277
Temperature (°C)	9	11 - 22	18.378	3.194	17	12 - 23	18.647	2.597
EC field (uS/cm)	9	109 - 173	124.333	19.906	17	105 - 186	135.412	23.738
Free cyanide (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Weak acid dissociable cyanide (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Cyanide (Total) (mg/L as CN)	3	<0.004 - <0.004	<0.004	0	5	<0.004 - <0.004	<0.004	0
Calcium (Dissolved) (mg/L)	12	13 - 21	16.58	2.109	7	10 - 17	13.000	2.236
Chloride (mg/L)	15	1 - 2	1.2	0.414	7	1 - 2	1.143	0.378
Total alkalinity as CaCO3 (mg/L CaCO3)	13	57 - 78	70.86	5.381	13	58 - 74	64.415	5.008
Sodium (Dissolved) (mg/L)	12	7 - 10	9.250	0.965	7	8 - 10	9.00	0.816
Magnesium (mg/L)	4	2 - 3.2	2.550	0.500	-	-	-	-
Potassium (mg/L)	4	1 - 1.6	1.325	0.250	-	-	-	-
Total Dissolved Solids (Field) (ppm)	6	0.07 - 0.11	0.081	0.015	18	0.07 - 187	10.469	44.056
Dissolved aluminium (mg/L)	13	0.01 - 0.02	0.011	0.003	7	0.01 - 0.02	0.011	0.004
Dissolved Arsenic (mg/L)	13	0.001 - 0.003	0.001	0.001	7	0.001 - 0.001	0.001	0
Dissolved Cadmium (mg/L)	13	<0.0001 - <0.0001	<0.0001	0	7	<0.0001 - <0.0001	<0.0001	0
Dissolved Chromium (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0

Key Parameters	2011				2012			
	N	Range	Mean	StdDev	n	Range	Mean	StdDev
Dissolved Cobalt (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Copper (mg/L)	13	0.001 - 0.029	0.005	0.007	7	0.001 - 0.006	0.002	0.002
Dissolved Iron (mg/L)	13	0.005 - 0.05	0.047	0.012	7	0.05 - 0.09	0.056	0.02
Dissolved Lead (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0
Dissolved Manganese (mg/L)	13	0.003 - 0.029	0.010	0.008	7	0.002 - 0.022	0.007	0.007
Dissolved Mercury (mg/L)	13	<0.0001 - <0.0001	<0.0001	0	7	<0.0001 - <0.0001	<0.0001	0
Dissolved Nickel (mg/L)	13	<0.001 - <0.001	<0.001	0	7	<0.001 - <0.001	<0.001	0

6.0 ENVIRONMENTAL IMPROVEMENT PROGRAMME

An ongoing Environmental Improvement Programme is in place and is aimed at continuous improvement of site environmental performance in all current and proposed environmental programmes and activities, some of which are planned to continue over the long term.

6.1 Managing River Sediment Loads

HVGM implemented a sediment reduction program that to date has significantly improved sediment management on site. Initiatives that have been implemented to better manage sediment include drainage works, revegetation stabilisation programs and the establishment of engineered waste rock dumps (Figure 19).

The reduction in TSS is illustrated by Figure 20 which TSS concentrations reached maximum levels of over 5000 mg/L during construction in 2008-2009, then reducing to current value of about 1000 mg/L, the difference being quite visible (refer to Figure 21).

HVGM is also assessing the movement of the historically contributed sediment load through the river system and its impact on the Middle and Lower Watut River. This work includes assessing the contribution of sediment from other sources including the Snake River which has had a large landslip and the Bulolo River which is being heavily impacted by historical and ongoing small scale mining.

Figure 19: Construction of engineered bottom-up waste rock dump at Nosave

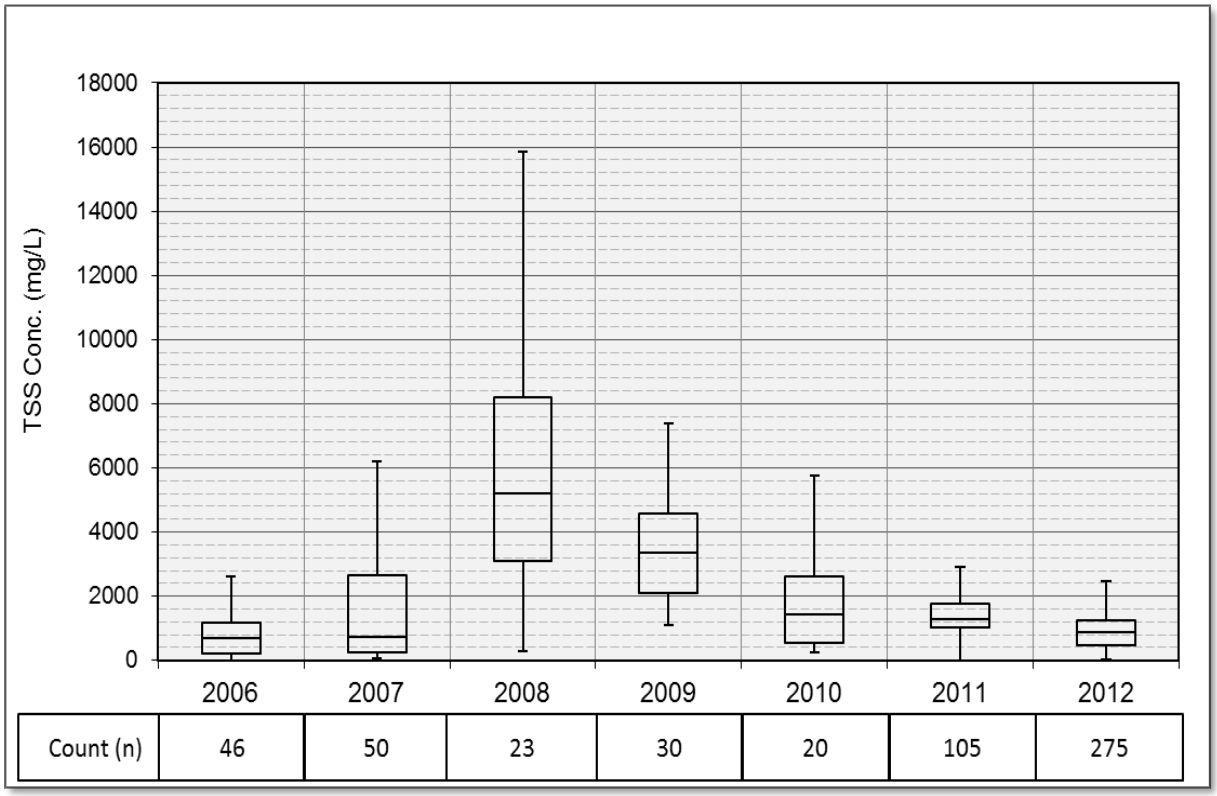

Figure 20: Box and Whisker Plots of mean annual TSS concentrations at Nauti.

January 2011

April 2012

Figure 21: Comparison of Sediment deposition at Nauti in the Watut River

There were a number of sediment management initiatives during 2012 to complement the ongoing sediment and erosion management work. This included:

- Completion of a stable toe on Nosave Waste Rock Dump.(refer Figure 19).. This initiative is also relevant to the control of ARD and will enable the creation of a bottom up constructed stable and engineered waste rock dump.
- Improvement of the HVK pit dewatering system including the installation of ground-water depressurisation pumps and clean water interception sumps that will enable clean stormwater to be discharged and contribute to a drier pit and reduced sediment run-off.
- On-going stabilisation and revegetation of open erosive areas to reduce erosion during rain events.
- On-going maintenance of the sediment traps and improved sediment excavation and disposal strategies.
- Environment team working very closely with the Mining team to manage sediment structures
- Site Wide awareness on environment issues including Sediment.
- Further review and update of the sediment management plan including catchment by catchment sediment reduction targets to enable the establishment of a realistic sediment reduction target at the Nauti compliance point. Phase one of this study commenced during the last quarter of 2012.

Figure 22: Environment Team stabilizing a steep exposed slope.

6.2 Reducing Dissolved Metals in the River System

A primary source of dissolved metals to the river system is Acid Rock Drainage (ARD) from Potentially Acid Forming (PAF) rock in the waste rock dumps. Discharge of treated water from the TSF is a smaller contributor of metal load. HVGM remains generally in compliance with Permit requirements for dissolved metals at Nauti with the exception of cobalt which has a permit level set at “limit of detection”.

The long term strategy for the management of ARD is to segregate and encapsulate the PAF material under an inert cover. This strategy does, however, require the waste rock dumps to first be stabilized through the construction of competent rock toes followed by bottom up construction. HVGM is currently constrained by a lack of physical access to some dump toes and a shortage of competent rock, but a long term waste rock management plan is being implemented. In the interim term a lime dosing system has been established in Pihema Creek to counter the acidity of ARD and help reduce the dissolved metals levels in the mixing zone of the Watut River before the compliance site at Nauti.

The introduction of the Pihema Creek lime-dosing system in 2010 continues to be effective in counteracting acidity and attenuating dissolved metals. Dissolved manganese is currently a metal of concern because it was at times elevated at Nauti during 2011 through 2012.

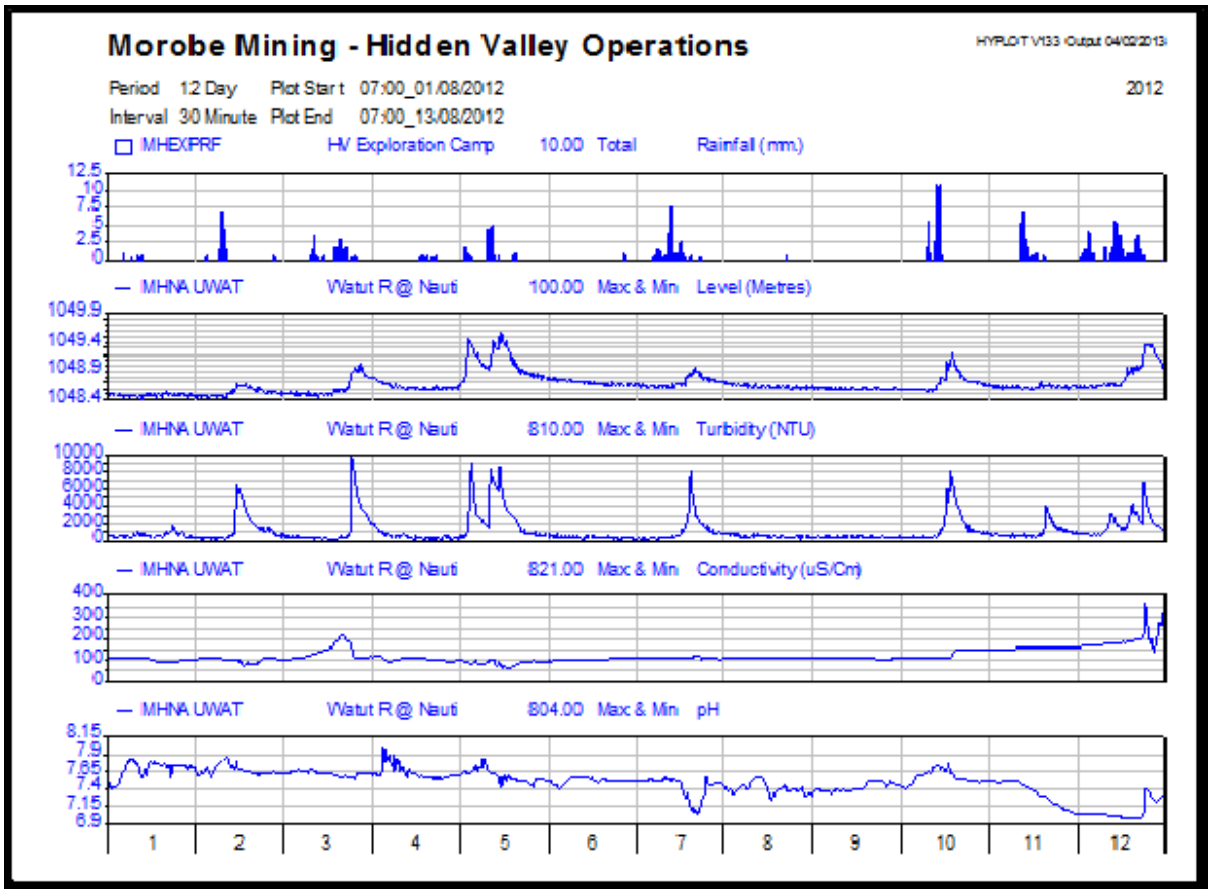

Figure 23: Nauti Monitoring Station Data (example plot 01 to 13 August 2012**)**

The relationship between pH and rainfall and/or dissolved metals inputs remains complex. This is because corresponding conductivity measurements do not consistently support dissolved metal inputs as pH drops are seen with both conductivity spikes as well as dips in conductivity (generally a relationship should be expressed where river pH levels should drop and conductivity levels should increase in response to increased dissolved metals inputs).

However it is important to keep river alkalinity at levels to support ecosystem function and the addition of lime to the river does help attenuate any ARD generated at the mine waste rock dumps.

6.3 TSF Management

The HVGM TSF is the only engineered TSF of its size in PNG. It was commissioned in 2009 and contains all of the tailings generated since mining operations commenced at HVGM. Due to high rainfall and process plant operational issues during late 2011 an abnormally large volume of ponded water accumulated on the TSF. In order to comply with the TSF Management Plan HVGM sought an authority to temporarily release the treated excess water at higher discharge rate and higher, though still safe, residual HCN levels. At the same time, initiatives were implemented to rapidly lower the WAD cyanide levels in the TSF pond to facilitate optimal performance of the Cyanide Detoxification Plant (CDP) used to treat the TSF water at HVGM before release.

A *Section 76 Emergency Authorisation* that imposed an interim HCN condition of 22 ppb at Baiune, further downstream of Nauti (consistent with the International Cyanide Code for waters outside the mixing zone) and an increase in the discharge volume to 500 m^3/hour from the TSF for a period of up to six months was granted by the DEC on 12th of January 2012. The pond volume was returned to normal operating size within the 6 month timeframe allowed under this Emergency Authorisation.

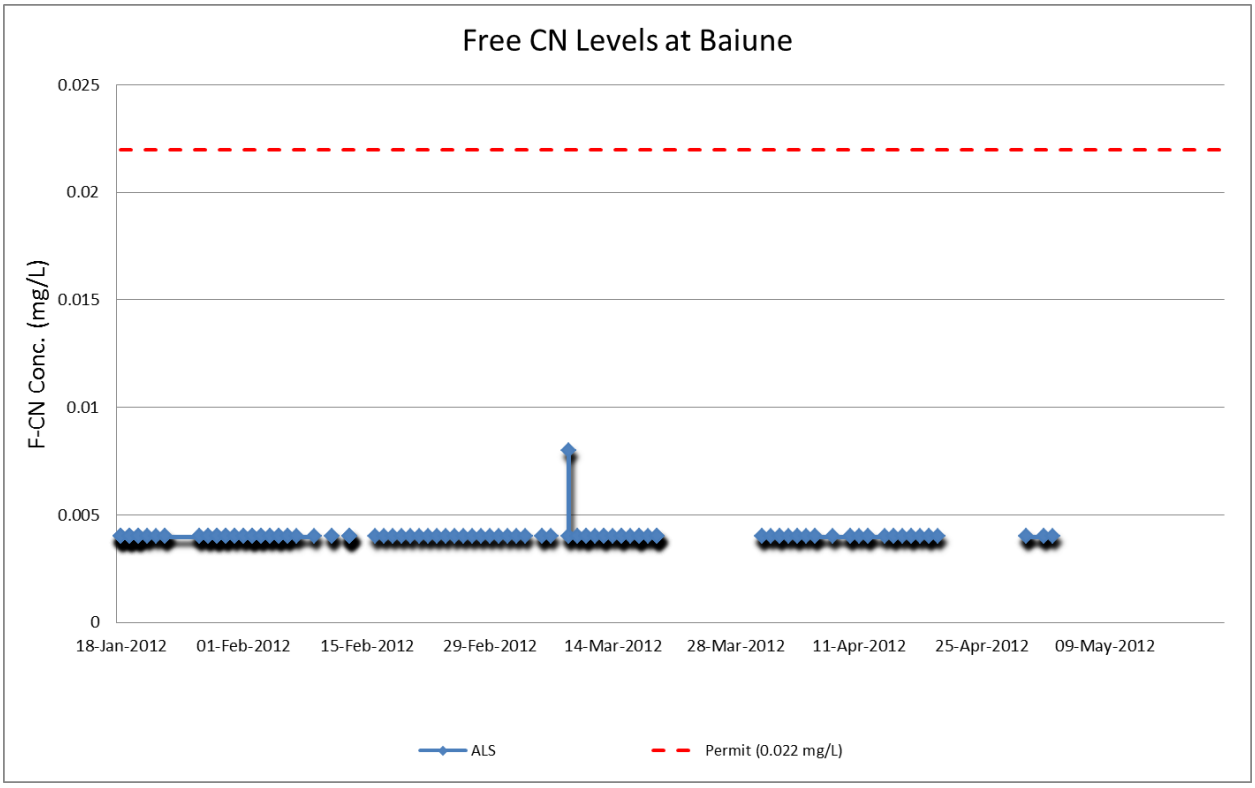

Figure 24 show free cyanide concentrations at Baiune during the emergency discharge period.

6.4 Waste Management

6.4.1 Waste Management Improvement Plan

A number of activities planned for 2012 did not go ahead as these needed to be progressed in 2013 and are listed below:

- Erection of fencing and under-cover storage areas.
- A composting unit to convert wet waste from the kitchen to compost to be used in gardens.
- Phytoremediation for oily soil.
- Turbo-burners to be placed in new waste management facility and other source to incinerate oil filters, oily rags and grease.
- Incineration area for combustible general waste.
- Waste oil incinerator incorporated into the Lime Kiln plant.

6.4.2 Landfill

HVJV generated about 1,497 tonnes of general waste in 2012 which was managed on site; in addition 1,414 tonnes of scrap metal and 395,200 litres of waste oil were recycled.

General waste comprises office waste (papers, cardboard and drinking water bottles), mess waste (waste food and paper) and packaging waste (wooden pallets). This waste was managed on site by reduction (burning) and disposal (landfill) at the Hamata Landfill, the designated landfill for HVGM.

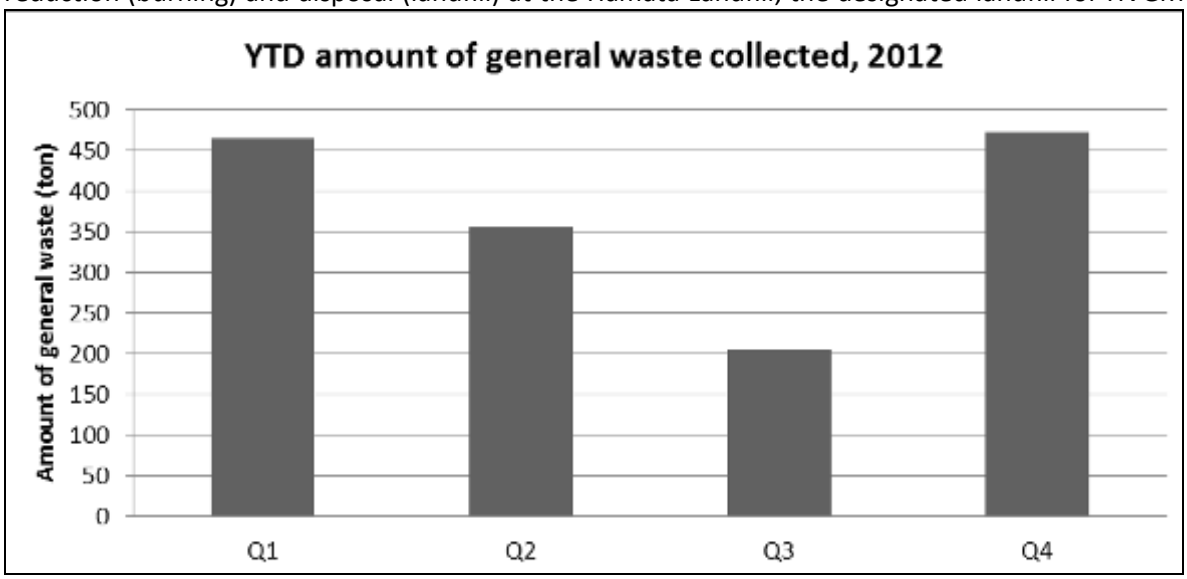

Figure 25: Solid waste generated in 2012 by quarter

6.4.3 Recycling Scrap Metals

A total of 1,414 tonnes of scrap metal was shipped offsite for recycling in 2012 (Figure 24). This amount comprised of legacy scrap metal from construction including mill liners and light gauge steel which had been accumulating over time. The second quarter of 2012 saw the largest amount of scrap metal removed from site. The amount taken offsite progressively decreased towards the end of the year as legacy scrap metal were cleared up.

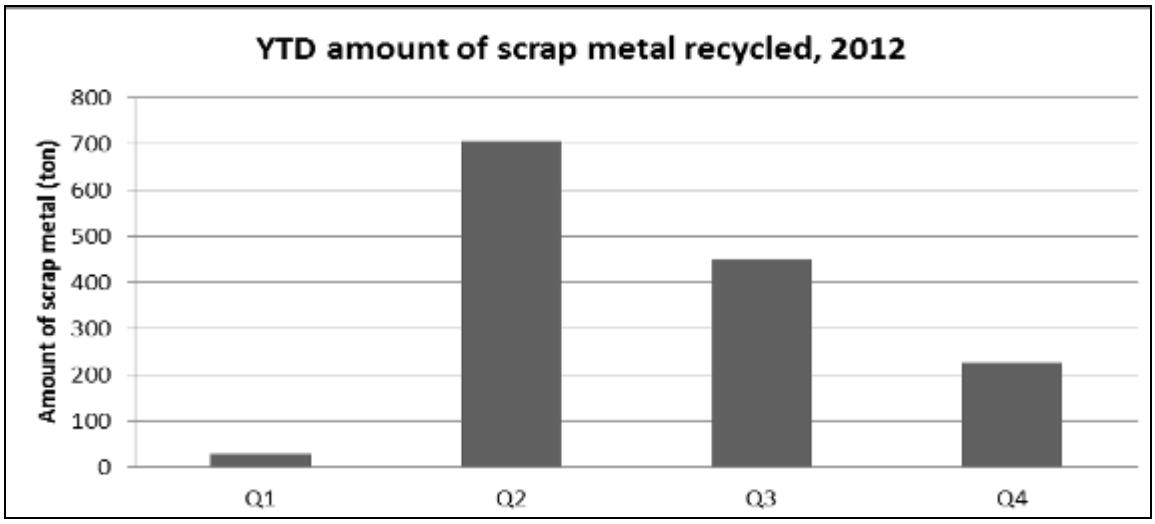

Figure 26: Quantity of scrap metal recycled in 2012.

6.4.4 Waste Hydrocarbons

A total of 395,200 liters of waste oil was shipped off site to be reused by fire boilers at Mainland Holdings (Lae) and Ramu-Agri Industries (Madang) in 2012. This amount comprised waste oil generated on site and inherited from other sites. The main generators of waste oil included the power station and mechanical workshops.

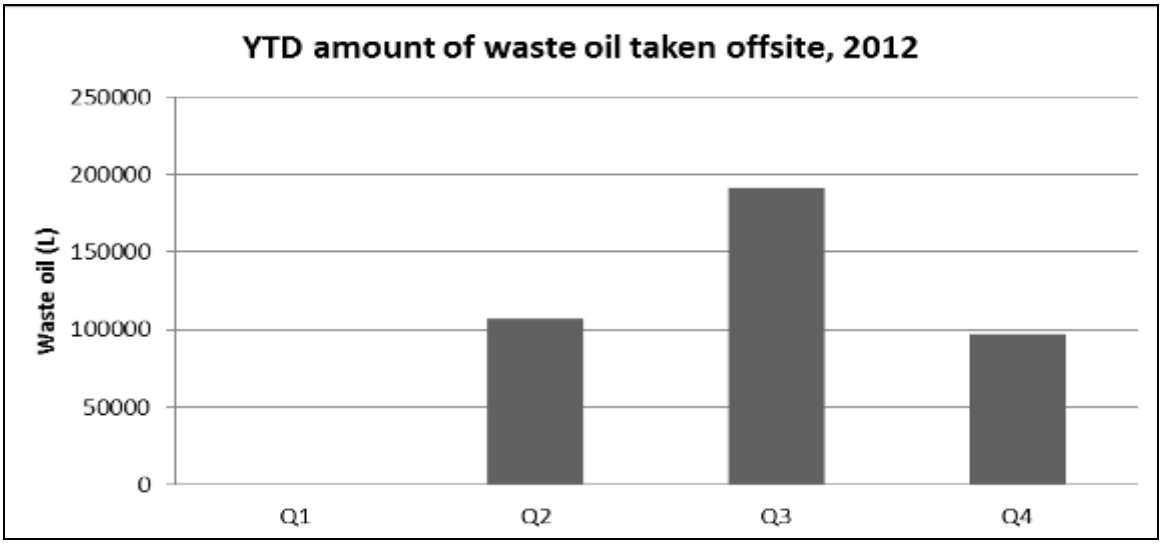

Figure 27: Amount of waste oil (L) shipped off site in Q3.

6.5 Rehabilitation and Mine Closure

6.5.1 Rehabilitation

HVJV maintained an intensive revegetation and stabilisation program during 2012. Key activities included;

- stabilisation of steep slopes (refer Figure 21);
- Relocation of the site nursery ;
- Maintenance and new area rehabilitation.

The rehabilitation and revegetation team was responsible for the control and approval of land-clearing and rehabilitation. This included the use of Map Info GIS to track the status of disturbances occurring and rehabilitation completed and ongoing rehabilitation activities carried out by the team.

A total of 27.59 ha were cleared in 2012 and 20.25 ha of newly disturbed areas were rehabilitated including the planting of 23,519 seedlings (refer to Table 15).

Table 15: Summary of Rehabilitation Activities in 2012

Month	Area Cleared (ha)	New area rehabilitated(ha)	Seedlings Planted(No)
January	0	1.26	3,384
February	0	5.09	5,144
March	0	1.72	934
April	21.45	0.58	5,253
May	0	0	2,260
June	0.08	0.52	0
July	0	2.25	103
August	1.52	1.54	3,996
September	0	0.62	1,232
October	4.54	2.63	813
November	0	2.20	0
December	0	1.84	400
Total	**27.59**	**20.25**	**23,519**

6.5.2 Disturbance Status

The disturbance footprint at HVJVincreased from 654 ha at the end of 2010 to 678 ha at the end of 2011, in 2012 this figure was 705 ha.

Table 16: Annual YTD Categories of Disturbance (hectares)

Aspect	Category	2010	2011	2012
Infrastructure (unavailable)	Total Infrastructure	291.2	315.0	342.59
	New Disturbance	NA	23.8	27.59
Potentially available	New Rehabilitation completed in the year	NA	15.6	20.25
	Total area available for rehabilitation at the end of year	240.2	224.7	203.81
End of year Total Completed Lease of Mine (LOM) Revegetation		123.0	138.6	159.49
Total Disturbance Footprint including unavailable areas		654.5	678.3	705.89

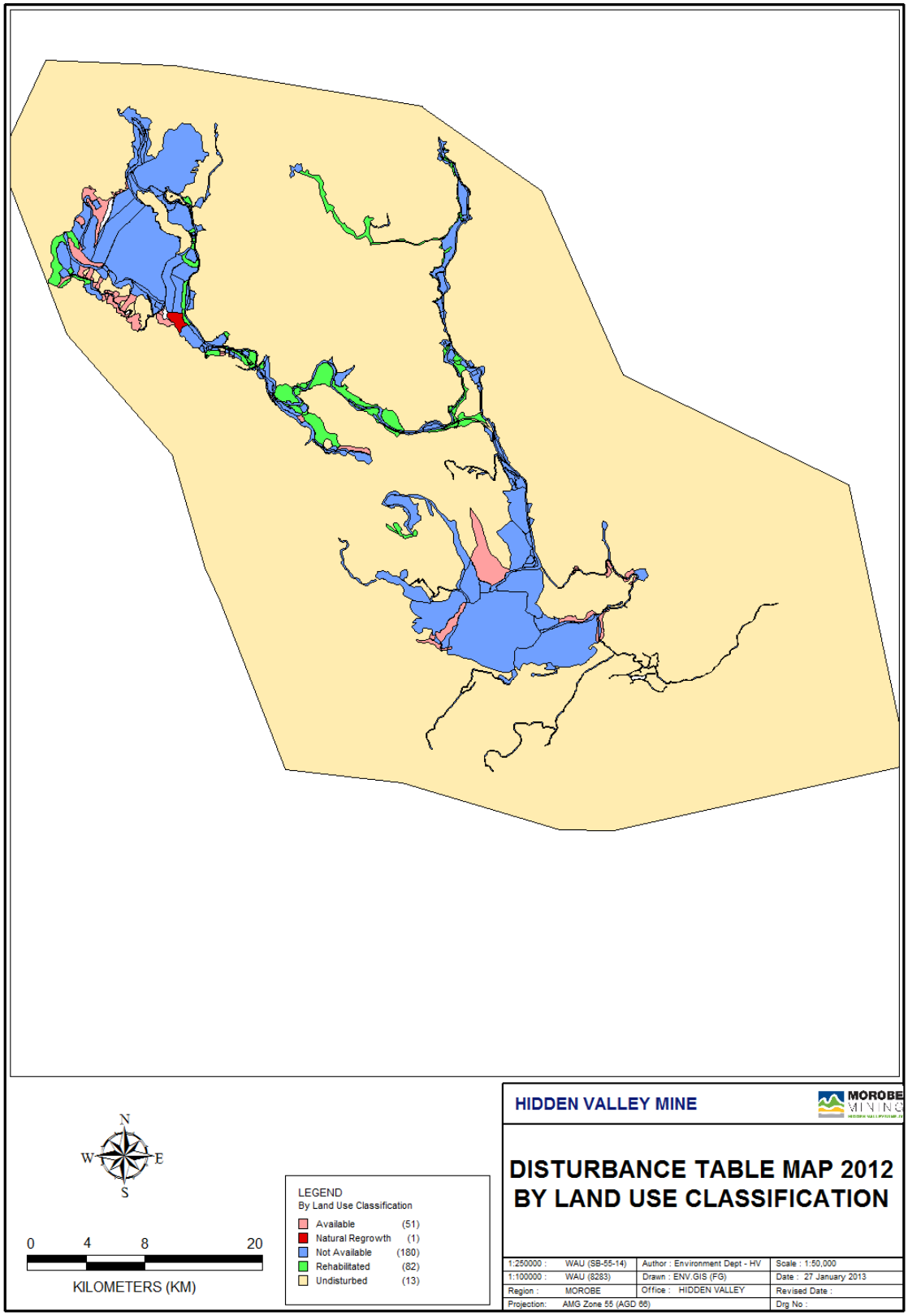

Figure 28: Land Disturbance Map

6.5.3 Decommissioning and Mine Closure

HVJV developed a Conceptual Closure Plan during 2011 and was further developed through 2012. Stage one of this process was completed in October 2011 and included a gap analysis as well as defining biophysical and social completion criteria. The developed closure criteria will inform the future mine planning.

In addition to developing a framework for closure planning, HVJV continued to undertake research programs on closure relevant aspects including the design of waste dumps and their covers, the trialling of different species for rehabilitation and ongoing flora and fauna surveys. The HVJV workforce contributed to this process by reporting sightings of fauna which in the past 2 years have included a sighting of the Rare and Endangered Long Beaked Echidna on the Ridgeline, a New Guinea Quoll on the Ridgeline and a sighting of Doria's Tree Kangaroo crossing the Hamata access road near its intersection with the Ridgeline.

6.6 Improved Environmental Monitoring

The SMEC audit identified areas for improvement with regard to data collection, data management and quality assurance (QA). The situation has significantly improved in the past 24 months with greater management focus and the development of the Hydstra water quality data management system. This has been particularly significant in enabling real time tracking of key hydrological parameters such as rainfall, river turbidity and water flows throughout the Watut River Catchment. In addition to this, a comprehensive routine on-site and offsite water and sediment sampling program along with routine waste tracking, sewage effluent monitoring, CDP discharge monitoring and rehabilitation monitoring is in place.

The in-house monitoring program is being supplemented by a number of campaign studies using specialist experts.

A predictive model for water quality outcomes at Nauti continues to be refined and is routinely used to make informed decisions on the volume of treated water to be discharged from the TSF and lime dosing into Pihema Creek to maintain water quality within Permit criteria.

6.7 Hydrology and Sediment Transport Monitoring

HVGM has increased the intensive Hydrology and Sediment load study monitoring network along the full length of the Watut River system into Markham. The field equipment installations are state of the art scientific sensors to measure the following parameters;

Offsite from Nauti to Markham River (D/S Watut junction)

- River Discharge (measured initially as Water Level)
- pH of the river
- Electrical Conductivity of the river
- Turbidity of the river

- Rainfall in the different catchments

The stations form part of a Near Real-Time Telemetry Network and data from them are downloaded twice a day and transmitted via satellite back to the Environmental Centralised Database at Hidden Valley. Eight hydrological monitoring stations were installed between 2010 and 2011 along the stretch of the Watut and the Markham River as part of the Watut River impact Monitoring program (WRIMP).

The second annual report showed a decline in the sediment input from Hidden valley from 1 million tonnes per annum in 2010 -2011 to 0.6million tonnes in the 2011 – 2012 reporting period. The monitoring network also picks up various other natural and anthropogenic contributions to the river system.

The river flow data from this monitoring network shows how the spatial variability of rainfall in different catchments impacts upon on flow and subsequent sediment loadings into the system. For details on the report refer to appendix 3.

6.8 Water Quality Stations

Water Quality stations are sampling points along the full length of the Watut River which terminate at Huon Gulf in the Bismarck Sea , including sections of the Markham river after the Watut and Markham River Junction. Over the past 12 months the sampling campaign has intensified including the number of extra samples collected to comply with the Emergency Authorisation granted by DEC in January 2012. A total of 135 sampling sites have been established and serviced on a regular basis.

6.9 Watut River long profile survey

The Watut River long profile water quality sampling program was initiated in December 2010 and has continued in 2011 and 2012 as part of the HVJV EMP. The program objectives are to gather water (and sediment) quality information for the Watut River catchment including the major tributaries under similar conditions on the same day. The program extends from the Upper Watut to the Lower Markham Rivers. Sample sites were strategically selected to enable a point in time understanding of the relative contributions of chemical concentrations from potential chemical sources within the Watut River system. Water samples were collected from 17 sampling locations between Nauti and the Markham River Mouth. Sampling events were undertaken on ten occasions between December 2010 and September 2012. Results from 2010 and 2011 have been reported previously. The program was initiated as a biannual survey; however, the frequency of the survey was increased to monthly during the high volume CDP discharge period between January and June 2012. In general the program indicates that concentration of Ag, Co, Mn and Cu in Upper Watut water are influenced by the mining operation. At Nauti, concentrations of these metals are elevated relative to background concentrations and decrease rapidly between Nauti and Bulolo. Downstream of Bulolo, dissolved concentrations of Ag, Cd, Co and Cu remain constant or continue to decrease slightly with minimal (background) inputs from other tributaries within the catchment.

Of these metals Co was the only metal to exceed permit criteria at Nauti. Cu concentrations were below permit criteria at all sample locations for all sampling events. The average Co concentration exceeded permit criteria at Nauti and Leklu only.

The study indicated that the major sources of filtered Fe, Al, As, Ni, Cr were from Watut Catchment tributaries that are not influenced by the HVJV mining operation (such as As from the Bulolo River, Cr from the Snake, Langimar, Banir, Wafi and Markham Rivers, Ni from Wafi Creek and Pb from the Snake and Langimar Rivers).

6.10 Monitoring River Ecology

An ongoing assessment of the aquatic biology of the Watut River has indicated that populations of fish and prawns in the upper Watut collapsed during 2007 to 2009. It is likely that most of this impact was associated with physical sedimentation. To date there is little evidence populations of fish and prawns are recovering despite lower sediment levels, however, populations of diatoms, which are at the base of the food chain for fish, are recovering. Investigations are continuing to assist with understanding the conditions necessary for the return of healthy populations of fish and prawns into the upper Watut and its tributaries. The return of native fish species to the river system is dependent on a recruitment source and the prevention of invasive feral species establishing in the absence of competition and preventing native fish recruitment. The two native species of concern are the Sepik Grunter and the Blue Rainbow Fish (refer Figure 24). The Sepik Grunter (*Hephaestus transmontanus*) once common in the Ramu and Sepik Rivers, has experienced a dramatic population collapse possibly due to competition from invasive fish species which have established in the river systems.

The recent rediscovery of Sepik Grunter in the Watut River catchment in November 2011 survey is a promising sign for ecosystem recovery. Surveys will be undertaken within other catchments to source an intact population of Sepik Grunter for possible use in future reintroductions once river conditions are suitable. Surveys are also being undertaken to locate intact populations of Blue Rainbow Fish in ox-bow lakes following the collapse of known populations possibly due to over-fishing. Local species aquaculture support will be considered in 2012 to promote a native species fish industry and will be further investigated.

Figure 29: Blue Rainbow Fish

6.11 Environmental Management System

The EMS at HVJV has developed significantly since the SMEC audit and assisted through the development of an upgraded Environmental Management Plan (EMP) submitted to DEC in March 2011.

Standards for facilities and equipment are being developed, maintained and reviewed through a regular inspection and monitoring regime and appropriate operating procedures continue to be developed. The competence of the HVJV employee and contract workforce also continues to improve through an ongoing program of training and coaching by the environmental team particularly with respect to key processes including waste management, hydrocarbon management, the operation of the CDP and the maintenance of sediment and drainage controls. Monitoring, surveillance and action management systems have also improved and the IBIS system is being routinely used to track the progress of preventative and corrective actions and the management of incidents. The improved functionality of the EMS is delivering improved performance outcomes. HVJV will continue to develop the functionality of the EMS and its Plan Do Review framework. An external gap audit was conducted during 2012 which identified components of the EMS which required attention.

Activities conducted in 2012 to progress the EMS included:

- Completion of the Aspects and impacts Register
- Uploading of EMS documentation into IBIS
- Training of site personnel to conduct inspections and internal audits
- Initiate scheduled inspections of site facilities and completion of follow up actions identified.

6.12 Monitoring Data Management Systems

The HVJV Environment Department utilises two main data base systems and they are;

- Hydstra - used as the final storage Database Management System for all Time Series and Water Chemistry Data. This is the final storage for all verified data for both external and internal stakeholder reporting.
- Monitor-Pro 5 (MP5) - also used to process and store Data especially the Water Chemistry and Sample Management. MP5 also is used for data verification, storage, analysis and reporting outputs.
- MapInfo isthe Geographical Information system used to manage spatial data mostly to monitor and manage rehabilitation and Lease of Mine (LoM) land management.

6.13 Engaging Stakeholders on River Impacts

HVJV is committed to effective engagement with stakeholders and a philosophy of transparency and openness. This is particularly important with downstream communities on the Watut River. HVJV is implementing the Watut Riverine Monitoring program to measure mine related impacts on the Watut River and its communities in addition to directly engaging the communities. The appointment of an External Stakeholder Advisory Panel (ESAP) of prominent PNG citizens and expert international specialists in June 2011 was particularly relevant to this program. The ESAP endorsed the general approach of HVJV with respect to technical improvement programs but advised that a greater degree of engagement was necessary with downstream communities. This resulted in the organisation of a down-river patrol including representatives of the Hidden Valley Environment and Community Affairs Departments and the DEC to discuss issues with downstream communities in August 2011 and again in November 2012 (refer Figure 27). This patrol greatly strengthened the relationship between HVJV and the local community as well as ensuring that communities were much better informed about the scope and scale of mine related impacts on the river systems and the mitigation programs that HVJV were implementing. This in turn reduces misunderstandings and conflict and the potential of communities to disrupt monitoring programs necessary to secure the long term health of the river.

The HVJV Environment Department continued an organised program involving a selection of community members from impacted and some non-impacted villages to visit the mine site and observe the mine operations first hand. The communities appreciated these visits and indicated that they were comfortable knowing how process waste was stored in the TSF and how lime was added to lower dissolved metal levels and other activities. It was an eye opener for most visitors and they appreciated what HVJV was doing to minimise environmental impact to the Watut River.

The ESAP supplements ongoing advice and direction from the Watut River Impact Management (WRIMP) Technical Advisory Committee that has been in place for several years. This group provides direction and technical oversight for all WRIMP programs and hold regular workshops with the internal HVJV program specialists.

Figure 30: Hidden Valley Environment Superintendent with Local Communities

6.14 Eco-Efficiency

HVJV will increase the focus on eco-efficiency reporting in 2013 including water efficiency, greenhouse gas emissions and solid wastes as discussed previously. The focus will be on close tracking of performance in combination with capitalising on improvement opportunities.

6.14.1 Greenhouse gas emissions

The main sources of greenhouse gasses at HVJV are combustion of diesel fuel in mining machinery and power generators as well as CO_2 released from explosives.

HVJV released about 142,000 tonnes of CO_2e in 2010 to produce 197,000 ounces of gold equivalent (i.e. gold plus equivalent value of silver). Emissions in 2011 increased to about 192,000 tonnes of CO_2e for the production of 246,000 ounces of gold equivalent. This represents a slight decrease in emissions efficiency to about 0.78 tonnes of CO_2e per ounce of gold equivalent from the 2010 level of 0.72 tonnes of CO_2 per ounce of gold equivalent despite sourcing a proportion of the site power as hydro-power (with zero emissions) from the PNG National grid. The decrease in emissions efficiency was largely the result of increasing the total volume of ore and waste rock mined (refer Table 17).

Table 17: Greenhouse Gas Emissions 2010 and 2011

Parameter	2010		2011		2012	
	Quantity	CO_2e* (tons)	Quantity	CO_2e (tons)	Quantity	CO_2e (tons)
Ore mined (tonnes)	3,954,153		3,017,488		3,875,213	
Waste rock mined (tonnes)	11,055,822		16,815,094		16,924,186	
Diesel Power (MWH)	66,074		64,778		69,581	
Grid Power (Hydro-MWH)	4,067	0	32,838	0	36,952	0
Total Power (MWH)	70,141		96,716		106,533	
Diesel for Power (kL)	17,194	63,618	27,699	102,486 t	21,107	78,096
Mining diesel (kL)	21,320	78,884	24,165	89,410 t	26,010	96,237
Total diesel (kL)	38,514	142,502	51,862L	191,889 t	47,117	174,333
Gold production (oz)	169,241		207,542		159,811	
Silver production (oz)	1,047,474		1,688,603		1,643,240	

6.14.2 Reagents

The amount of ore milled in 2010 and 2011 were similar as was the reagent use with the exception of peroxide and Sodium Metabisulphide (SMBS) used in the INCO cyanide destruct circuit (refer Table 18). Cyanide use between the two years was similar despite an increase in gold production. Quantities of ore milled and reagents used in 2012 were higher compared to previous years, but gold production was lower. The increased consumption of peroxide and sulphuric acid was directly related to treatment and detoxification of increased volumes of TSF decant water that resulted due to large inputs of rainwater into the TSF and had to be removed from it.

Table 18: Comparison of reagent use for 2010, 2011 and 2012

Reagent	2010	2011	2012
Tonnes Milled	3,426,439	3,431,457	3,733,399
Cyanide (t)	3,429	3,527	2,379
Peroxide (t)	379	714	2,346
Sulphuric Acid (t)	915	919	1,929
Caustic (t)	1,265	1,591	4,458
SMBS	1742	4301	5,801
Chlorine	14	4	N/A

Appendix 1 : Daily Read Rainfall at the HV Automated Weather Stations in 2012

Automate Weather Station at Coms Tower (MHCOMWS)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.5	2	5	0	31	6.5	0	18.5	1.5	0	0	0
2	2	0	0	0.5	6	4.5	0	1.5	35	1	6.5	0
3	0.5	11	31.5	1	10	14.5	5	15.5	22.5	7	2.5	0
4	43.5	11.5	0.5	0	2	4.5	0	16	4	38.5	28.5	0
5	16	7.5	0	0	13	0.5	15.5	3	0	21.5	8.5	0.5
6	4.5	4.5	0	0	7.5	2	2	50.5	10	29.5	9	0
7	0	0.5	0	0	27	43	2	0.5	17	4	0	0.5
8	0.5	0	1	23	30	9.5	0	20.5	20.5	39.5	10.5	0
9	0	0	0	9.5	1.5	13.5	0.5	2	1.5	15	9	3.5
10	0	0	5	0	52	1	3	0	6	3.5	7.5	9
11	0	3.5	0	0	0.5	2	0	20.5	3.5	0.5	8.5	0
12	0	23.5	2	0	0	24.5	3.5	12	18.5	0	3	27
13	1.5	46	1.5	6	30	2.5	1	35	2.5	0	26	20
14	42.5	1	0	3	39	0	4	10.5	9.5	1	1.5	0
15	9	22	0	0	1	0	1.5	19	14.5	26.5	77.5	4.5
16	10	0	0	0	4	3	4.5	0.5	24.5	50.5	2.5	0
17	28	0	5.5	0	37	6	0	8	4.5	0.5	8	0
18	45.5	0	5.5	0	11.5	0.5	6.5	10	0.5	18.5	24.5	0
19	47	16.5	12	0	5.5	0.5	7.5	1	0	23	22.5	0
20	22.5	0.5	15	30	16.5	0	0.5	2	8.5	0.5	6.5	0
21	37.5	0	5	3.5	4	13.5	0	1	2.5	0.5	12.5	0
22	35.5	0	0	15	0.5	2	0	1.5	35.5	5	5.5	0
23	2.5	0.5	0.5	11	1	13	6.5	0	9.5	0.5	0	13
24	6.5	1	2	4	0	2.5	0	7.5	18.5	23	0	0
25	25	1	1	26	13.5	0.5	6.5	3	0	14.5	0	4
26	23.5	0	5.5	0.5	1.5	8.5	11.5	2.5	0.5	8	0	0
27	0	6.5	9.5	0.5	0	1.5	5.5	6.5	23.5	9.5	0	30
28	8.5	9	0	11	10.5	9.5	12.5	4.5	21	1.5	0	40.5
29	1.5	25	0	27	11	0	0.5	4	0	14.5	0	17
30	3.5		0.5	5.5	19.5	1.5	0	4.5	0	7.5	0	4
31	9		0		2.5		0.5	0.5		0.5		0
Monthly Total	**427.5**	**193**	**108.5**	**177**	**389**	**191**	**100.5**	**282**	**315.5**	**365.5**	**280.5**	**173.5**

Automated Weather Station at Hamata (MHHPSWS)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2.5	9.5	0	20.5	6.5	0.5	0	0	1	0	0
2	0.5	0.5	0	11	5.5	19	0	0	0	0	3	0
3	1	11.5	26.5	0.5	2	23.5	5.5	0	0	7.5	2	0
4	23	16.5	0	0	0.5	0.5	0	0	0	11	35.5	0
5	22	20	0	0	13.5	0	27.5	0	0	18	10.5	0
6	4.5	10	0	0	13	0.5	1	0	0	15	3.5	0
7	0.5	1	0	2	13	15	0.5	0	0	5.5	0	0
8	0	0	0.5	36	18	10	0.5	0	0	7.5	13.5	1
9	0	0	0	19	1.5	8	0	0	0	5	10	2.5
10	0	0	1.5	0.5	46	0.5	1	0	0	6	7.5	10
11	0	4.5	1.5	0	0.5	0	0	0	0	0	5.5	0
12	0	19	1.5	1	0	11.5	3	0	0	0	3	10
13	0.5	38.5	0	11	22	0	0.5	0	0	0	13	15
14	25	3	0	8.5	22.5	0	3	0	0	0.5	0	0.5
15	6	10	0	2	2.5	0	5	0	0	26	53	2.5
16	8	0.5	1.5	0.5	8	3	2	0	0	25.5	1	0.5
17	10.5	0	0	0	42.5	8	0	0	0	0	14.5	0
18	33	0	7.5	0	6	0.5	2.5	0	0	8	15	0
19	31.5	13.5	21	0	1.5	0	0	0	0	5	14	0
20	21.5	0	6.5	0	19.5	0	0	0	0	0	4	0
21	29.5	0	6	0	2.5	11.5	0	0	4	3	2	0
22	32.5	0	0	0	0.5	2.5	0	0	23.5	4.5	1.5	1
23	4	2.5	0	0	1	7	0	0	8	0.5	0	16
24	8.5	0.5	4.5	0	0	0.5	0	0	9	19.5	0	0
25	11	0.5	0	10	1.5	0	0	0	0.5	13	0	0
26	30.5	0	0	0	1.5	13	0	0	0.5	7.5	0	4.5
27	3	3	0.5	0.5	4.5	0.5	0	0	12	13	0	2
28	3.5	7	0	0	8.5	6	0	0	5	8	0	56.5
29	0.5	14.5	0	23	3.5	0.5	0	0	0	5	0	11
30	3.5		0	4.5	8	1	0	0	0	10	0	0.5
31	7.5		0		1.5		0	0		0		1
Monthly Total	**322.5**	**179**	**88.5**	**130**	**291.5**	**149**	**52.5**	**0**	**62.5**	**225.5**	**212**	**134.5**

Appendix 2: Daily Data for Meteorological Parameters at HV AWS Stations in 2012

Meteorological Parameters at Coms Tower (MHCOMWS)

(Temperature; °C)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	14.6	12.9	14.5	14.8	15.0	14.5	13.1	13.9	14.5	12.7	15.2	15.3
2	14.7	14.1	15.3	14.9	13.6	14.6	13.3	14.5	14.3	13.8	14.4	14.5
3	15.5	15.0	14.0	14.6	14.3	15.0	13.8	13.0	13.4	14.3	14.9	15.3
4	15.4	12.8	14.2	12.4	13.8	15.1	13.7	12.9	13.5	13.1	14.8	16.3
5	15.0	12.7	13.9	12.5	14.5	15.0	13.7	14.1	14.5	14.2	13.7	15.3
6	16.1	12.4	15.2	14.0	15.5	14.8	12.9	13.0	13.0	12.8	14.1	15.3
7	14.6	13.6	15.5	15.3	14.6	14.4	13.0	13.2	13.9	13.5	14.6	15.9
8	15.2	14.6	15.1	13.8	14.3	14.3	14.0	12.9	14.4	15.2	14.6	13.8
9	15.6	15.0	14.9	13.7	15.1	14.5	14.1	13.6	14.2	14.0	13.8	15.3
10	15.8	15.4	13.9	14.2	14.1	13.7	12.9	13.7	12.9	14.4	14.8	13.8
11	15.9	14.4	14.5	14.8	14.5	15.5	15.0	13.2	14.0	14.1	15.1	14.6
12	15.2	14.2	13.7	14.4	13.7	13.8	13.8	14.0	13.3	14.9	14.5	14.5
13	14.4	14.2	15.2	14.1	13.7	15.3	12.6	12.4	13.2	14.2	14.4	14.4
14	13.8	14.6	15.3	15.0	15.0	14.4	13.4	13.3	13.3	14.2	14.1	15.7
15	14.4	14.4	14.6	14.5	14.8	13.8	13.1	12.1	14.0	13.9	14.6	14.8
16	14.5	14.4	15.6	15.1	15.1	12.9	13.8	12.4	13.7	14.1	14.2	15.8
17	14.4	15.0	14.8	14.4	14.8	13.1	12.9	13.5	13.8	13.4	14.9	15.7
18	14.4	14.8	14.6	15.2	14.9	14.2	14.0	14.1	13.4	13.6	14.9	14.2
19	14.2	13.3	14.6	15.7	14.4	13.7	13.2	12.5	13.8	13.7	14.7	15.2
20	14.3	13.5	13.4	15.0	14.5	14.5	14.0	13.1	14.3	14.3	15.1	15.2
21	14.2	14.9	15.6	14.8	13.0	13.7	13.9	13.6	14.1	15.1	14.4	16.1
22	14.3	15.3	15.3	14.8	14.4	13.7	13.9	13.0	13.7	14.4	14.6	15.7
23	15.4	15.2	15.5	14.4	13.2	14.3	12.8	13.5	14.9	14.1	14.4	15.3
24	15.2	14.5	14.6	15.2	13.8	14.0	12.8	12.7	14.1	14.5	14.2	15.4
25	15.0	13.8	14.1	15.1	14.5	13.9	13.3	12.9	14.4	14.5	14.8	15.5
26	14.3	15.0	14.4	15.0	14.6	14.2	12.9	13.4	14.9	15.4	14.5	15.9
27	14.9	15.2	14.5	14.2	15.1	13.3	13.3	13.3	13.8	14.7	14.5	14.9
28	14.5	14.3	15.0	15.1	13.9	13.9	13.4	13.7	13.7	15.2	14.8	15.1
29	14.8	14.2	14.2	14.8	14.4	14.5	13.5	13.7	13.0	14.5	14.9	15.0
30	14.2		13.4	15.3	13.6	13.5	13.4	13.3	13.1	14.4	15.2	14.8
31	13.7		14.6		13.6		13.6	13.7		14.8		15.7
Total	**458.4**	**413.7**	**454.0**	**437.4**	**444.1**	**426.5**	**417.1**	**411.8**	**415.3**	**439.8**	**437.8**	**470.5**

Relative Humidity (%)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	91.4	97.5	95.4	79.4	78.2	95.8	95.5	90.3	84.8	67.1	95.8	83.5
2	89.1	87	92.3	85.8	97.4	97.4	96.8	95.8	99	82.2	99.9	99.7
3	84.9	80.5	99.7	90.8	83.4	78.1	89.9	100	91.2	88.4	92.1	93.9
4	89.5	98.7	84.8	86.3	100	86.1	95.4	100	100	93.7	89.5	69.2
5	100	87.4	98.7	72.3	91.1	89	91.9	72.2	100	81.7	98.2	82.5
6	100	91.4	77.3	48.1	74.2	91.2	100	100	91.4	100	93	99.7
7	87	90	88.1	58.6	96.3	97.6	100	100	90.5	90.1	90.4	93.1
8	83.1	91	91	99.5	90	100	90	97.4	98.4	75.3	89	100
9	80.6	81.3	100	96.8	91.2	86.5	95.5	96.3	92.4	100	100	85.4
10	83.5	74.1	91.4	100	100	100	100	96.9	94.4	100	87.8	100
11	77.1	97.9	84.3	66.3	91.5	81.5	72.9	97.9	100	99.9	87.2	97.5
12	82.5	97.9	96.9	98.3	100	100	89.3	92.1	100	90.4	100	96.8
13	93.7	100	87.7	89.9	87.4	89.3	87.5	100	100	94.3	80.2	100
14	100	92.4	85.5	80.2	88	100	100	100	100	94.1	100	68.3
15	96	80.5	89.8	100	100	94.6	91.7	99	66.5	95.2	85	100
16	97.8	100	82.6	94	100	87.9	92.6	100	94.4	92.9	100	55.4
17	96.4	91.7	99.85	97.9	90.1	98.3	98.2	90.9	99.5	98.1	90.4	66.6
18	68.4	71.1	80.9	87.4	96.8	100	95.3	91.4	81.9	97.7	95.5	59
19	100	95.2	84.7	84.3	96.3	99.6	88.2	100	90.6	99.8	83.7	47.4
20	100	92.9	98	80.5	93.5	97.5	100	100	91.4	97.4	79.2	55.6
21	80.2	54.4	93.2	100	100	85.3	93.7	99.7	100	85.2	97.9	80
22	97.2	50.1	93.1	98	77.9	91.1	99.7	100	100	93.3	94.3	100
23	99.5	86.8	87.1	100	100	100	96.9	95.7	83.9	96	100	93.3
24	100	80.9	91.7	96.2	100	49.1	99.9	100	91.3	87.1	81.6	100
25	100	78.3	93.9	97.5	88.6	94.8	97.2	84.7	97.2	99.1	76	81.7
26	99.9	91.5	100	93.3	91.3	71.3	93.9	100	90.6	94.5	99.8	90.4
27	100	63.5	86.1	95.9	94.4	100	100	100	100	100	68.5	100
28	100	100	99.8	90.4	85.7	80.5	82.9	98.7	89.2	76.7	84	74.2
29	97.8	94.9	86.2	81.2	79.1	91.2	89.7	100	100	95.1	94.6	97.8
30	83.9		89.9	91.2	93.5	85.4	100	87.3	54.2	82	96.4	100
31	96.1		86.4		88		100	91		69.4		95.1
Total	**2855.6**	**2498.9**	**2816.35**	**2640.1**	**2843.9**	**2719.1**	**2924.6**	**2977.3**	**2772.8**	**2816.7**	**2730**	**2666.1**

Barometric Pressure (hPa)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	769.7	767.7	767.8	769.2	770.5	769.7	769.4	770.3	770.2	770.5	771.0	770.1
2	769.4	766.0	767.7	769.5	770.6	769.3	769.8	770.4	770.6	770.3	770.6	770.0
3	769.6	764.7	767.6	770.3	769.9	769.0	769.0	770.6	769.9	771.1	769.7	770.2
4	770.2	765.3	768.0	770.8	768.8	769.4	768.1	770.5	770.2	769.9	768.9	770.0
5	770.8	766.2	768.3	770.0	769.2	769.7	768.7	770.8	771.1	769.8	769.0	770.0
6	770.2	766.7	767.8	769.7	769.2	769.4	769.2	771.0	770.8	770.4	769.4	769.9
7	770.2	767.1	766.9	769.9	769.4	769.7	769.2	771.2	770.3	771.2	769.4	771.0
8	769.9	767.2	766.3	770.1	769.7	770.3	768.6	771.0	770.9	771.0	768.7	771.2
9	770.1	767.9	766.6	770.2	769.6	771.0	768.7	771.7	770.7	770.3	769.0	770.6
10	769.2	767.9	767.6	770.5	770.5	770.8	770.3	771.4	770.0	770.1	769.4	769.1
11	768.7	768.5	768.0	770.2	770.8	770.4	769.7	771.1	771.5	771.1	769.8	768.5
12	769.4	768.9	768.0	769.5	769.9	770.0	770.4	770.8	771.0	771.8	770.4	769.2
13	769.2	770.1	768.3	769.4	769.4	770.1	770.0	770.2	771.6	772.5	769.9	769.4
14	769.2	770.1	769.3	770.5	770.4	770.0	769.6	770.8	770.2	772.1	769.3	769.2
15	769.0	769.6	769.2	770.4	769.8	769.4	769.9	771.0	769.7	771.9	769.6	769.4
16	768.4	769.2	768.7	770.1	770.0	769.1	770.4	771.4	770.5	771.7	770.4	769.0
17	767.8	769.5	768.3	769.8	768.9	771.1	770.8	771.2	771.1	771.7	770.6	768.2
18	768.6	768.9	768.4	769.2	769.7	772.4	770.3	769.9	770.9	771.2	770.1	769.0
19	769.5	769.5	768.6	768.8	769.8	771.8	770.0	770.0	771.3	770.4	770.2	768.2
20	768.1	770.1	768.7	769.4	770.2	771.1	770.0	771.2	770.3	770.2	771.0	768.3
21	767.1	770.1	768.2	769.8	769.4	770.3	770.6	770.2	770.5	769.7	770.4	768.3
22	767.2	769.3	768.9	769.1	769.2	770.2	770.4	770.7	770.7	769.3	770.3	768.5
23	768.4	768.9	769.6	769.3	769.9	770.6	769.0	770.6	770.1	769.3	769.1	766.9
24	768.2	769.1	769.7	769.6	770.3	770.1	768.9	771.0	769.3	768.9	770.4	767.4
25	768.1	768.6	769.3	769.3	770.4	770.6	770.1	770.7	769.6	769.7	770.0	767.9
26	768.7	768.0	769.7	769.7	770.4	769.8	770.1	770.9	769.9	769.2	769.7	768.2
27	769.2	768.6	769.7	770.7	770.7	770.9	769.6	770.0	770.6	769.4	769.3	767.4
28	769.5	766.8	769.6	771.5	769.9	769.4	769.2	770.4	770.7	769.4	769.1	767.5
29	768.7	766.4	768.7	770.8	769.1	768.9	769.9	770.7	770.7	770.2	769.1	768.6
30	767.1		768.3	770.5	769.6	768.9	769.9	771.4	769.7	770.5	769.2	768.2
31	767.6		769.2		769.4		769.5	771.3		769.5		767.6
Total	**23837.0**	**22276.7**	**23820.8**	**23097.8**	**23864.7**	**23103.2**	**23859.2**	**23894.0**	**23114.3**	**23884.2**	**23093.1**	**23837.0**

Wind Speed (m/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.6	2.8	0.7	1.3	0.6	1	1.2	0.8	0.9	0.1	1.5	1.1
2	2.1	2.6	0.6	1.2	1.2	2.1	2.4	0.6	1.7	1.8	0	0.3
3	1.2	2.1	0.5	0.9	2.6	0.5	1.3	0.9	1.6	0.3	0.9	0.5
4	0.3	2.6	1.1	2.4	0.3	1.4	2.1	1.8	1.2	3.2	2.2	2.9
5	0.4	2.6	1.3	1.1	2.1	1.7	1.2	1	1.5	1.7	1.3	1.6
6	0.2	3.2	2.3	1.5	0.5	0.9	0.5	1.3	2	0.1	0.9	1.6
7	0.5	1.7	0.2	0.7	1.9	0.1	1.1	0.6	1	0.9	0.7	1.3
8	0.9	1.4	1.5	0.4	1.1	1.7	0.9	0.5	1.6	0.7	1	1.2
9	0.5	1.8	0.6	0.2	1.5	0.5	2	1.4	0.4	0.2	1.5	1.4
10	1.3	2.6	0.8	0.7	0.5	0.1	1.8	1.3	1	0.2	1.5	0.2
11	1.7	0.6	1.6	1.8	1.3	1.1	1.9	0.7	1	1.2	0.3	0.3
12	0.4	1.2	0.8	0.2	1.2	1.1	2.3	2.4	1.8	1.4	1.5	1.2
13	0.8	0.1	1	2.2	0.6	0.5	1.2	0.3	1	1.1	1.5	1.6
14	0.1	1.1	1.7	2	0.1	1.4	2.8	0.6	0.9	1.2	1.1	0.6
15	0.7	1.8	0.8	0.4	0.8	1	1.6	0.7	1.3	1.4	1.2	1.7
16	0.2	0.8	1.3	2	0.8	3.4	1.5	0.8	0.4	0.5	0.9	0.9
17	0.6	1.8	0.1	1.1	1.1	0.2	2.2	1.4	0.8	0.1	1.4	1
18	2.2	1.4	0.5	1.2	0.4	0.9	0.8	1.4	0.6	0.7	1.3	0.8
19	1	0.4	1	0.5	0.6	0.7	0.9	1.5	0.8	0.2	1	0.4
20	0.1	1.1	1.8	0.9	0.6	0.8	0.8	0.6	1.5	1.9	0.5	1.1
21	2.4	1.3	0.8	0.4	0.9	1	1.9	1	1.2	0.4	1.4	0.3
22	0.4	1.7	1.5	1.6	2.4	2.8	1.6	1.5	0	1.2	1.7	0.1
23	0.1	0.8	3.1	2.1	1.5	0.7	0.2	1	0.9	1	1.7	1.8
24	0.6	1	1.5	0.3	1.6	0.9	0.7	0.8	1.3	0.6	0.5	0.1
25	0.3	1.1	1.5	0.7	1	1.3	1.5	1.6	1.1	1.6	0.7	2
26	0.9	1	0.3	0.3	1.6	1.5	0.5	1.7	0.7	1.6	0.1	1.8
27	0.5	1.3	0.5	1.8	0.5	1.5	0.2	1	0.3	0.5	1.7	0.1
28	1.2	0.3	0.6	0.5	0.5	1.8	1.1	1.2	1	2.4	2.2	0.4
29	0.3	0.5	1.4	0.9	0.3	0.5	1.1	0.8	0.1	2.1	1.2	0.2
30	1		1.8	1.4	0.1	1.8	0.9	1	0.3	0.2	0.5	0.6
31	2.3		0.9		0.3		0.5	1.6		2.2		0.3
Total	**26.8**	**42.7**	**34.1**	**32.7**	**30.5**	**34.9**	**40.7**	**33.8**	**29.9**	**32.7**	**33.9**	**29.4**

Solar Radiation (watt/m2)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	91.4	97.5	95.4	79.4	78.2	95.8	95.5	90.3	84.8	67.1	95.8	83.5
2	89.1	87	92.3	85.8	97.4	97.4	96.8	95.8	99	82.2	99.9	99.7
3	84.9	80.5	99.7	90.8	83.4	78.1	89.9	100	91.2	88.4	92.1	93.9
4	89.5	98.7	84.8	86.3	100	86.1	95.4	100	100	93.7	89.5	69.2
5	100	87.4	98.7	72.3	91.1	89	91.9	72.2	100	81.7	98.2	82.5
6	100	91.4	77.3	48.1	74.2	91.2	100	100	91.4	100	93	99.7
7	87	90	88.1	58.6	96.3	97.6	100	100	90.5	90.1	90.4	93.1
8	83.1	91	91	99.5	90	100	90	97.4	98.4	75.3	89	100
9	80.6	81.3	100	96.8	91.2	86.5	95.5	96.3	92.4	100	100	85.4
10	83.5	74.1	91.4	100	100	100	100	96.9	94.4	100	87.8	100
11	77.1	97.9	84.3	66.3	91.5	81.5	72.9	97.9	100	99.9	87.2	97.5
12	82.5	97.9	96.9	98.3	100	100	89.3	92.1	100	90.4	100	96.8
13	93.7	100	87.7	89.9	87.4	89.3	87.5	100	100	94.3	80.2	100
14	100	92.4	85.5	80.2	88	100	100	100	100	94.1	100	68.3
15	96	80.5	89.8	100	100	94.6	91.7	99	66.5	95.2	85	100
16	97.8	100	82.6	94	100	87.9	92.6	100	94.4	92.9	100	55.4
17	96.4	91.7	99.85	97.9	90.1	98.3	98.2	90.9	99.5	98.1	90.4	66.6
18	68.4	71.1	80.9	87.4	96.8	100	95.3	91.4	81.9	97.7	95.5	59
19	100	95.2	84.7	84.3	96.3	99.6	88.2	100	90.6	99.8	83.7	47.4
20	100	92.9	98	80.5	93.5	97.5	100	100	91.4	97.4	79.2	55.6
21	80.2	54.4	93.2	100	100	85.3	93.7	99.7	100	85.2	97.9	80
22	97.2	50.1	93.1	98	77.9	91.1	99.7	100	100	93.3	94.3	100
23	99.5	86.8	87.1	100	100	100	96.9	95.7	83.9	96	100	93.3
24	100	80.9	91.7	96.2	100	49.1	99.9	100	91.3	87.1	81.6	100
25	100	78.3	93.9	97.5	88.6	94.8	97.2	84.7	97.2	99.1	76	81.7
26	99.9	91.5	100	93.3	91.3	71.3	93.9	100	90.6	94.5	99.8	90.4
27	100	63.5	86.1	95.9	94.4	100	100	100	100	100	68.5	100
28	100	100	99.8	90.4	85.7	80.5	82.9	98.7	89.2	76.7	84	74.2
29	97.8	94.9	86.2	81.2	79.1	91.2	89.7	100	100	95.1	94.6	97.8
30	83.9		89.9	91.2	93.5	85.4	100	87.3	54.2	82	96.4	100
31	96.1		86.4		88		100	91		69.4		95.1
Total	**2855.6**	**2498.9**	**2816.35**	**2640.1**	**2843.9**	**2719.1**	**2924.6**	**2977.3**	**2772.8**	**2816.7**	**2730**	**2666.1**

Meteorological Parameters at Hamata (MHHPSWS) in 2012

Note: Hamata AWS station was decommissioned in July 21st, 2012 and recommissioned in Dec 28th, 2012, hence a period of 4.7 Months of data were lost.

Temperature (Oc)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	16.5	15.4	17.3	17.0	17.5	17.2	14.9	-	-	-	-	-
2	17.1	16.7	17.6	17.9	15.5	16.8	15.6	-	-	-	-	-
3	17.5	17.3	15.8	16.2	16.5	16.6	15.8	-	-	-	-	-
4	18.5	15.0	17.2	14.1	16.7	17.2	15.9	-	-	-	-	-
5	17.6	14.9	16.5	14.5	16.5	17.6	16.4	-	-	-	-	-
6	18.1	14.6	17.6	15.5	17.6	17.1	15.4	-	-	-	-	-
7	16.4	15.9	18.3	17.9	16.7	16.7	15.4	-	-	-	-	-
8	17.5	16.9	17.4	17.0	16.4	16.3	16.8	-	-	-	-	-
9	17.6	17.3	17.7	16.6	17.3	16.7	16.8	-	-	-	-	-
10	18.0	17.4	16.6	15.8	16.2	15.4	15.7	-	-	-	-	-
11	18.2	16.8	17.3	16.8	17.1	17.9	17.3	-	-	-	-	-
12	17.3	16.8	16.5	16.6	16.1	15.3	16.4	-	-	-	-	-
13	17.3	16.3	17.8	16.5	16.1	17.9	15.4	-	-	-	-	-
14	15.9	16.7	17.8	17.5	17.2	17.5	16.3	-	-	-	-	-
15	16.8	16.8	17.0	16.4	16.9	16.2	15.6	-	-	-	-	-
16	16.5	16.5	17.7	17.6	17.4	14.5	16.4	-	-	-	-	-
17	16.2	17.4	17.1	16.9	17.0	14.9	15.1	-	-	-	-	-
18	16.0	17.1	16.6	17.4	17.7	16.4	16.9	-	-	-	-	-
19	16.5	15.2	16.5	0.0	16.9	16.6	14.8	-	-	-	-	-
20	16.1	16.1	15.2	0.0	16.7	16.9	0.0	-	-	-	-	-
21	16.3	16.9	17.5	0.0	15.5	16.1	-	-	-	-	-	-
22	16.5	17.8	17.5	0.0	17.2	16.5	-	-	-	-	-	-
23	17.7	17.2	18.0	0.0	16.3	15.9	-	-	-	-	-	-
24	17.9	17.1	16.7	0.0	16.1	15.9	-	-	-	-	-	-
25	17.5	16.5	15.9	17.6	16.9	16.5	-	-	-	-	-	-
26	17.0	17.3	16.5	17.8	17.3	16.6	-	-	-	-	-	-
27	17.2	17.5	16.8	16.9	17.3	15.9	-	-	-	-	-	-
28	16.5	15.9	17.1	17.3	16.2	15.9	-	-	-	-	-	16.5
29	16.9	16.9	15.5	16.7	16.4	15.7	-	-	-	-	-	16.3
30	16.0		15.2	17.1	16.0	15.7	-	-	-	-	-	16.5
31	15.9		16.6		16.2		-	-	-	-	-	17.4
Total	**527.0**	**480.1**	**524.7**	**401.4**	**517.4**	**492.4**	**303.0**	**0.0**	**0.0**	**0.0**	**0.0**	**66.8**

Relative Humidity (%)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	86.0	89.5	92.4	90.7	80.6	91.8	89.0	-	-	-	-	-
2	83.3	72.8	90.4	88.7	93.1	92.9	88.3	-	-	-	-	-
3	79.3	66.5	92.3	90.8	83.5	90.8	80.6	-	-	-	-	-
4	92.1	85.9	82.8	72.7	90.1	85.5	84.5	-	-	-	-	-
5	92.9	71.2	83.5	75.6	90.4	86.0	89.5	-	-	-	-	-
6	92.9	85.4	75.1	55.6	88.4	88.0	91.8	-	-	-	-	-
7	92.4	78.9	79.4	73.3	91.2	86.4	86.9	-	-	-	-	-
8	67.7	78.1	86.8	90.9	85.3	91.5	85.2	-	-	-	-	-
9	87.2	69.4	88.0	92.2	91.3	90.4	84.5	-	-	-	-	-
10	82.0	58.3	82.5	93.0	89.8	92.4	87.7	-	-	-	-	-
11	73.9	87.9	83.6	60.8	87.3	89.0	83.0	-	-	-	-	-
12	88.7	91.8	90.1	85.8	90.4	92.9	91.1	-	-	-	-	-
13	89.2	90.8	85.1	84.5	87.1	89.9	92.3	-	-	-	-	-
14	88.5	90.5	81.2	86.1	86.2	88.4	85.7	-	-	-	-	-
15	92.8	85.0	80.9	89.6	93.1	85.6	85.7	-	-	-	-	-
16	92.5	92.4	81.1	90.6	91.9	77.6	84.8	-	-	-	-	-
17	91.5	79.4	92.0	87.2	92.4	91.6	91.3	-	-	-	-	-
18	87.3	60.6	90.7	78.1	93.2	88.2	87.1	-	-	-	-	-
19	92.4	91.4	92.5	85.3	91.8	72.1	92.9	-	-	-	-	-
20	92.3	85.3	92.2	0.0	87.9	81.4	93.0	-	-	-	-	-
21	87.1	60.8	86.8	0.0	92.0	86.8	0.0	-	-	-	-	-
22	92.1	63.4	87.9	0.0	87.3	92.1	0.0	-	-	-	-	-
23	93.0	82.1	80.1	0.0	86.7	92.2	0.0	-	-	-	-	-
24	91.8	73.3	82.4	0.0	86.9	74.5	0.0	-	-	-	-	-
25	93.0	80.0	86.6	91.8	78.8	91.1	0.0	-	-	-	-	-
26	92.9	81.3	92.5	89.9	85.1	76.3	0.0	-	-	-	-	-
27	92.8	65.0	88.0	88.8	87.0	92.8	0.0	-	-	-	-	-
28	93.1	89.0	92.6	89.5	89.4	86.9	0.0	-	-	-	-	83.6
29	91.2	85.6	75.4	80.9	90.9	91.1	0.0	-	-	-	-	94.9
30	77.7		83.1	84.9	91.7	81.3	0.0	-	-	-	-	98.8
31	83.0		69.6		89.9		0.0	-	-	-	-	86.5
Total	**2732.6**	**2291.6**	**2647.6**	**2097.3**	**2750.7**	**2617.5**	**1754.9**	**0.0**	**0.0**	**0.0**	**0.0**	**363.8**

Barometric Pressure (hPa)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	806.1	804.4	804.6	806.3	807.4	805.8	805.8	-	-	-	-	-
2	805.9	803.4	804.3	806.7	807.6	805.2	806.0	-	-	-	-	-
3	806.1	801.9	804.2	807.4	805.7	804.9	805.4	-	-	-	-	-
4	806.8	802.8	804.8	808.0	804.9	805.3	804.4	-	-	-	-	-
5	807.4	803.9	805.1	807.4	805.2	805.6	804.8	-	-	-	-	-
6	806.7	803.9	804.4	807.0	805.0	805.3	805.4	-	-	-	-	-
7	806.8	803.7	803.5	807.2	805.3	805.6	805.5	-	-	-	-	-
8	806.4	803.8	802.9	807.3	805.6	806.3	804.7	-	-	-	-	-
9	806.7	804.5	803.3	807.3	805.4	806.9	804.9	-	-	-	-	-
10	805.7	804.7	804.3	807.3	806.6	806.8	806.6	-	-	-	-	-
11	805.4	805.2	804.5	807.2	806.8	806.4	805.7	-	-	-	-	-
12	806.0	805.6	804.6	806.6	805.7	806.1	806.8	-	-	-	-	-
13	805.8	806.7	804.7	806.5	805.2	806.3	806.3	-	-	-	-	-
14	805.7	806.6	806.0	807.6	806.2	806.2	806.0	-	-	-	-	-
15	805.5	806.2	805.9	807.5	805.8	805.5	806.2	-	-	-	-	-
16	804.9	805.8	805.2	807.1	805.9	805.3	806.5	-	-	-	-	-
17	804.2	806.1	805.0	806.9	804.9	807.4	807.1	-	-	-	-	-
18	805.1	805.7	805.1	806.2	805.6	808.7	806.6	-	-	-	-	-
19	806.1	806.5	805.3	805.7	805.8	808.1	806.2	-	-	-	-	-
20	804.7	806.9	805.3	0.0	806.8	807.5	806.2	-	-	-	-	-
21	803.4	806.9	804.7	0.0	806.2	806.6	0.0	-	-	-	-	-
22	803.7	806.4	805.5	0.0	804.9	806.4	0.0	-	-	-	-	-
23	805.0	805.9	806.2	0.0	805.8	806.9	0.0	-	-	-	-	-
24	804.8	806.1	806.5	0.0	806.4	806.3	0.0	-	-	-	-	-
25	804.7	805.7	805.8	806.1	806.4	807.0	0.0	-	-	-	-	-
26	805.3	805.1	806.4	806.5	806.4	806.2	0.0	-	-	-	-	-
27	805.7	805.4	806.3	807.6	806.7	807.4	0.0	-	-	-	-	785.3
28	806.2	803.7	806.3	808.3	806.2	805.6	0.0	-	-	-	-	785.2
29	805.3	803.2	805.6	807.5	804.9	805.2	0.0	-	-	-	-	786.3
30	803.7		805.2	807.2	805.7	805.3	0.0	-	-	-	-	785.7
31	804.6		806.0		805.4		0.0	-	-	-	-	785.1
Total	**24970.4**	**23346.6**	**24957.5**	**20176.3**	**24982.4**	**24188.2**	**16116.9**	**0.0**	**0.0**	**0.0**	**0.0**	**3927.6**

Wind Speed (m/s)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.2	1	1.1	0.8	1	0.2	0.3	-	-	-	-	-
2	0.8	2.1	1.3	0.7	0.3	0.6	1.3	-	-	-	-	-
3	1.7	3.5	0.4	0.4	2.6	1	2	-	-	-	-	-
4	0.6	2.8	2.3	3.4	0.7	0.8	2.1	-	-	-	-	-
5	0	3.6	0.8	1.4	0.4	0.9	0.7	-	-	-	-	-
6	1.9	2.1	2.6	0.8	1	0.1	0.6	-	-	-	-	-
7	0.1	1.5	2.6	0.6	2.4	0.5	0.2	-	-	-	-	-
8	2.2	1.2	0.4	0.1	0.5	0.3	0.5	-	-	-	-	-
9	0.5	2.4	1.2	0.7	1.9	0.5	0.28	-	-	-	-	-
10	0	2.4	2.4	0.025	0.6	0	0.4	-	-	-	-	-
11	0.5	0.3	0.3	3.3	1.5	0.9	2.2	-	-	-	-	-
12	1	1	0.9	0.8	0.1	0.5	0.1	-	-	-	-	-
13	0.7	1.6	2.5	1	0.2	1.1	0.6	-	-	-	-	-
14	0.9	2.8	2.6	0.5	2.3	0.1	1.8	-	-	-	-	-
15	0.2	2	0.9	0.6	0.9	0.2	0.9	-	-	-	-	-
16	2	0.1	0.9	2.4	1	0.4	0.6	-	-	-	-	-
17	1	1.2	0	1.1	0.5	0.2	0.2	-	-	-	-	-
18	0.5	2.1	0.2	1	0.3	1.9	0.1	-	-	-	-	-
19	0.6	0.3	1.1	0.2	0.1	1.1	0.3	-	-	-	-	-
20	0.8	0.1	0	0	1.6	2.6	0.1	-	-	-	-	-
21	1.6	3.6	0.9	0	0.7	0.1	0	-	-	-	-	-
22	0.8	3.1	1.1	0	1	0.5	0	-	-	-	-	-
23	1.9	2.1	1.4	0	0.8	0.2	0	-	-	-	-	-
24	0.52	1.2	0.6	0	0.7	0.9	0	-	-	-	-	-
25	0.2	0.6	0.9	0.2	0.075	1.2	0	-	-	-	-	-
26	0.4	0.7	0.2	1.9	0.9	0.2	0	-	-	-	-	-
27	0	3.1	0.7	0.6	1	0	0	-	-	-	-	0.4
28	0.2	0.6	0.4	0.6	0.2	0.5	0	-	-	-	-	0.8
29	0.3	0.4	0.8	1.5	0.9	0.9	0	-	-	-	-	0
30	0.7		1.5	1.6	0	0.9	0	-	-	-	-	0.1
31	0.6		3.3		0.8		0	-	-	-	-	0.1
Total	**24.42**	**49.5**	**36.3**	**26.225**	**26.975**	**19.3**	**15.28**	**0**	**0**	**0**	**0**	**1.4**

Solar Radiation (watt/m2)

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	86	89.5	92.4	90.7	80.6	91.8	89	-	-	-	-	-
2	83.3	72.8	90.4	88.7	93.1	92.9	88.3	-	-	-	-	-
3	79.3	66.5	92.3	90.8	83.5	90.8	80.6	-	-	-	-	-
4	92.1	85.9	82.8	72.7	90.1	85.5	84.5	-	-	-	-	-
5	92.9	71.2	83.5	75.6	90.4	86	89.5	-	-	-	-	-
6	92.9	85.4	75.1	55.6	88.4	88	91.8	-	-	-	-	-
7	92.4	78.9	79.4	73.3	91.2	86.4	86.9	-	-	-	-	-
8	67.7	78.1	86.8	90.9	85.3	91.5	85.2	-	-	-	-	-
9	87.2	69.4	88	92.2	91.3	90.4	84.5	-	-	-	-	-
10	82	58.3	82.5	93	89.8	92.4	87.7	-	-	-	-	-
11	73.9	87.9	83.6	60.8	87.3	89	83	-	-	-	-	-
12	88.7	91.8	90.1	85.8	90.4	92.9	91.1	-	-	-	-	-
13	89.2	90.8	85.1	84.5	87.1	89.9	92.3	-	-	-	-	-
14	88.5	90.5	81.2	86.1	86.2	88.4	85.7	-	-	-	-	-
15	92.8	85	80.9	89.6	93.1	85.6	85.7	-	-	-	-	-
16	92.5	92.4	81.1	90.6	91.9	77.6	84.8	-	-	-	-	-
17	91.5	79.4	92	87.2	92.4	91.6	91.3	-	-	-	-	-
18	87.3	60.6	90.7	78.1	93.2	88.2	87.1	-	-	-	-	-
19	92.4	91.4	92.5	85.3	91.8	72.1	92.9	-	-	-	-	-
20	92.3	85.3	92.2	0	87.9	81.4	93	-	-	-	-	-
21	87.1	60.8	86.8	0	92	86.8	-	-	-	-	-	-
22	92.1	63.4	87.9	0	87.3	92.1	-	-	-	-	-	-
23	93	82.1	80.1	0	86.7	92.2	-	-	-	-	-	-
24	91.8	73.3	82.4	0	86.9	74.5	-	-	-	-	-	-
25	93	80	86.6	91.8	78.8	91.1	-	-	-	-	-	-
26	92.9	81.3	92.5	89.9	85.1	76.3	-	-	-	-	-	-
27	92.8	65	88	88.8	87	92.8	-	-	-	-	-	-
28	93.1	89	92.6	89.5	89.4	86.9	-	-	-	-	-	83.6
29	91.2	85.6	75.4	80.9	90.9	91.1	-	-	-	-	-	94.9
0	77.7		83.1	84.9	91.7	81.3	-	-	-	-	-	98.8
31	83		69.6		89.9		-	-	-	-	-	86.5
Total	**2732.6**	**2291.6**	**2647.6**	**2097.3**	**2750.7**	**2617.5**	**1754.9**	**0**	**0**	**0**	**0**	**363.8**

Appendix 3: Flow Measurement (m^3/s) Data for Mine Site Local Creeks in 2012

Daily Average Flow (m^3/s) for Watut River at Nauti in 2012 populated from Hydstra Database

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	7.293	7.414	6.388	6.172	8.839	7.338	6.071	6.323	9.096	7.817	7.133	6.850	7.230
2	6.814	7.056	7.408	6.140	6.790	8.521	6.349	6.820	9.757	7.757	7.200	6.830	7.287
3	6.450	12.465	8.886	6.984	6.087	8.117	6.312	6.833	10.330	8.765	7.652	6.739	7.970
4	7.892	11.601	6.767	6.075	6.138	7.235	6.501	10.332	8.431	9.128	10.260	6.792	8.095
5	9.539	11.306	6.293	5.723	7.885	7.165	7.211	21.894	8.263	21.762	6.754	6.865	10.073
6	6.800	9.075	6.074	5.574	9.577	8.144	6.385	11.134	8.272	12.527	6.229	6.760	8.048
7	6.402	8.483	5.946	5.919	7.743	8.593	6.207	9.753	11.153	11.856	7.111	6.494	7.975
8	6.151	8.047	5.629	7.616	7.369	7.705	6.129	9.509	9.364	11.767	7.417	6.661	7.783
9	5.814	7.634	5.459	6.942	7.661	11.876	6.050	8.112	8.107	9.188	6.262	7.593	7.558
10	5.617	7.527	5.335	5.797	7.769	7.998	5.933	10.043	8.433	8.325	8.833	6.909	7.372
11	5.493	9.097	5.240	5.682	6.456	9.179	5.817	8.918	7.851	7.793	7.801	7.499	7.228
12	5.444	12.931	5.282	6.403	6.256	8.058	5.699	10.024	9.374	7.373	8.219	8.232	7.772
13	6.040	15.602	5.586	6.376	10.499	7.206	5.563	16.874	8.703	7.118	8.556	8.186	8.860
14	6.336	8.290	5.504	6.232	11.118	6.846	5.991	10.958	16.540	10.066	14.602	7.077	9.130
15	7.867	8.547	5.495	6.247	7.678	6.699	5.696	10.149	14.342	14.710	17.604	6.799	9.332
16	8.914	7.609	5.753	5.799	7.341	6.813	5.786	8.764	11.918	17.668	15.499	6.003	8.994
17	9.095	7.201	6.199	5.336	11.279	6.761	5.593	8.383	9.439	10.282	18.852	5.745	8.699
18	7.912	7.517	8.004	5.224	10.085	6.704	5.840	8.752	8.469	10.268	24.167	5.700	9.058
19	13.073	7.101	8.115	6.243	8.455	6.481	5.790	7.974	8.053	8.967	14.617	5.441	8.359
20	12.611	6.822	6.712	6.467	9.445	6.557	5.516	7.730	8.407	8.308	15.757	5.391	8.324
21	21.488	6.609	6.866	6.114	7.239	8.231	5.370	7.577	14.338	8.059	11.557	5.335	9.069
22	22.022	6.557	6.162	5.665	6.942	7.374	5.295	7.413	12.829	8.154	10.564	5.329	8.698
23	8.733	6.554	6.006	5.546	6.718	7.108	5.318	7.599	10.880	8.708	9.198	5.448	7.291
24	10.276	6.444	6.334	6.102	6.565	6.520	5.223	7.340	9.517	9.826	8.571	5.318	7.337
25	15.322	6.317	6.076	7.032	6.383	6.540	5.496	7.350	8.772	9.354	7.940	6.189	7.731
26	16.474	6.258	6.282	5.318	6.230	6.877	6.341	7.302	12.089	8.634	7.644	6.138	7.966
27	8.255	6.438	6.012	5.483	6.414	6.967	6.440	8.488	9.832	8.110	7.512	9.789	7.477
28	7.515	6.448	6.676	8.881	7.284	6.982	6.508	8.390	8.847	8.153	7.632	10.875	7.851
29	7.552	8.631	6.664	8.290	7.498	6.356	5.811	8.153	8.311	8.290	7.275	7.069	7.497
30	8.959		6.360	6.406	7.251	6.199	5.885	8.435	8.119	7.497	6.807	5.578	7.045
31	14.239		6.308		6.660		6.630	8.002		7.121		5.582	7.804
Total	**9.438**	**8.330**	**6.316**	**6.262**	**7.731**	**7.439**	**5.959**	**9.207**	**9.928**	**9.792**	**10.231**	**6.684**	**8.101**

Appendix 4: Physical Parameters for HV Mine Site Local Creeks in 2012

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
Apu Creek at Toe of South Dump	1/01/2012 13:08	5.22		102		6.29	
	2/01/2012 9:50	4.95		154		6.3	
	3/01/2012 9:20	4.92		133		5.6	
	4/01/2012 14:35	6.52		77		6.85	
	5/01/2012 13:52	4.81		106		5.83	
	6/01/2012 10:50	3.36		116		6.41	
	7/01/2012 11:24	4.92		128		5.9	
	8/01/2012 10:42	3.4		128		6.28	
	9/01/2012 14:03	4.83		133		6.1	
	11/01/2012 15:16	5.01		159		5.52	
	1/04/2012			220			
	1/04/2012 11:06	4.45				8.76	
	2/04/2012			197			
	2/04/2012 13:06	4.52				7.14	
	3/04/2012			191			
	3/04/2012 13:29	4.79				6.2	
	5/04/2012 11:53	4.68		183		5.05	
	7/04/2012 8:23	4.7				6.7	
	8/04/2012 8:43	5.45				4.57	
	9/04/2012 9:35	5.57	1720	135	15.197595	6.03	100
	10/04/2012 14:03			127	19.539765		
	11/04/2012 17:22	5.59		135	17.36868	4.82	
	12/04/2012 13:12			118	15.197595		
	13/04/2012			132			
	13/04/2012 12:10	5.41				5.65	
	15/04/2012 13:25	5				7	
	16/04/2012 11:06	6		197		7.46	
	17/04/2012 13:42			168			
	17/04/2012 13:46	5.78				8.13	
	18/04/2012 13:25	5.6				6.87	
	19/04/2012 8:25	5.23		176	< 3	4.39	
	25/04/2012 10:14	3.2				8.43	
	25/04/2012 10:15			392	< 3		
	26/04/2012 10:15			390	< 3		
	26/04/2012 13:08	2.77				6.03	
	1/05/2012 17:00	3.12				6.44	
	2/05/2012 11:21	3.66	2330	450	<1	6.14	59
	20/05/2012 8:10		1830		<1		235

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	20/05/2012 10:34	5.03		247		7.46	
	2/06/2012 12:05	6.35				8.02	
	2/06/2012 12:05		1460	51	36.228105		198
	3/06/2012 14:05	4.98		275		10.26	
	5/06/2012 14:59	4.85				9.52	
	5/06/2012 14:59			334			
	6/06/2012 15:28	5.32				8.76	
	8/06/2012 11:41	4.83				7.06	
	8/06/2012 11:41			283			
	9/06/2012 10:02	4.87		244		7.68	
	10/06/2012						126
	10/06/2012 9:59	5.03	2040	315	<1	7.51	
	17/06/2012 15:53	4.69	2220		<1	7.16	71
	21/06/2012 11:01	4.87		429		6.98	
	24/06/2012 14:03	4.56				7.47	135
	26/06/2012 15:19	4.57		435		6.86	
	28/06/2012 15:17	4.47		384		6.71	
	29/06/2012 10:13	4.57		482		8.19	
	30/06/2012 17:57	4.95	2320	456	<1	13.44	
	2/07/2012 7:40	4.77		495		7.09	
	4/07/2012 11:25	4.8		472		10.22	
	5/07/2012 10:39	4.58				8.51	
	6/07/2012 10:28	4.2		462		5.99	
	7/07/2012 14:28	4.61		375		8.5	
	9/07/2012 13:30	4.61		512		7.98	
	10/07/2012			574			
	10/07/2012 10:27	4.12		574		7.72	
	11/07/2012 9:45	4.32				7.93	
	12/07/2012 11:44	4.71		648		9.54	
	13/07/2012 13:53	4.69		652		6.95	
	14/07/2012 10:12	4.78	1800		<1	8.23	
	14/07/2012 13:53			500			220
	16/07/2012 11:29	4.69		252		8.61	
	17/07/2012 13:12	4.65		671		8.52	
	18/07/2012 13:12	4.65				8.52	
	21/07/2012 7:47	4.1				7.52	
	21/07/2012 7:50			460			
	22/07/2012 8:26		2130	328	<1		39
	25/07/2012 14:25	4.86	2200	606	<1	6.94	21
	27/07/2012 13:31	5.17		506		7.44	
	28/07/2012 9:20	4.35		504		9.02	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	29/07/2012 9:32	4.23		562		6.94	
	30/07/2012 9:20	4.48		574		6.33	
	31/07/2012 17:25	4.81		523		7.61	
	1/08/2012 12:37	4.35		293	< 3	10.04	
	2/08/2012 16:34	4.64	2120	432	<1	7.94	65
	4/08/2012 15:00	3.59		531	< 3	9.61	
	5/08/2012 15:07	3.65		225	< 3	Not Done	
	6/08/2012 16:05	4.62		500	< 3		
	7/08/2012 16:15	4.39		85	< 3	Not Done	
	8/08/2012 10:49	4.6		876	< 3	No Data	
	9/08/2012 15:30	4.3				Not Done	
	10/08/2012 12:56	4.7		434	< 3	Not Done	
	11/08/2012 13:40	4.2		419	< 3	Not Done	
	12/08/2012 16:30	5		428	< 3	DO sensor error	
	13/08/2012 9:16	4.73	1820	424	<1	DO sensor error	166
	14/08/2012 12:33	5.3		444	< 3	8.37	
	15/08/2012 15:57	3.17		399	< 3	4.08	
	16/08/2012 8:10	3.19		411	< 3	6.73	
	17/08/2012 15:40	3.1		537	< 3	6.06	
	18/08/2012 14:05	4.7		465	< 3	5.5	
	19/08/2012 16:02	4.44		463	< 3	6.54	
	20/08/2012 18:03	4.83		426	< 3	5.9	
	22/08/2012 16:34	4.8	2190		<1	6.89	82
	23/08/2012 11:38	4.7		449		6.55	
	24/08/2012 14:10	4.81		503	< 3	6.57	
	25/08/2012 17:15	4.63		492	< 3	6.99	
	26/08/2012 17:15	4.77		522	< 3	6.71	
	27/08/2012 15:57	4.87		525	< 3	6.44	
	28/08/2012 15:18	5.3	2440	540	<1	5.82	107
	31/08/2012 9:03	4.95		463	< 3	5.17	
	1/09/2012 9:00	4.66		334	< 3	7.81	
	2/09/2012 14:50	4.93		588	< 3	10.75	
	3/09/2012 18:07	4.57		482	< 3	7.92	
	4/09/2012 12:14	4.7		533	< 3	5.9	
	5/09/2012 17:35	4.96		565	< 3	10.63	
	6/09/2012 9:53	4.58	2570	580	<1	6.36	169
	7/09/2012 13:10	4.84		547	< 3	7.43	
	8/09/2012 12:57	4.91		551	< 3	7.24	
	9/09/2012 16:45	4.94		682	< 3	6.93	
	10/09/2012 16:15	4.67		511	< 3	4.65	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	11/09/2012 16:21	4.61		496	< 3	5.43	
	12/09/2012 17:28	4.73	2080	511	< 3	8.5	135
	13/09/2012 16:28	4.81		546	< 3	6.87	
	14/09/2012 7:54	4.64		354	< 3	5.97	
	16/09/2012 16:35	4.86		497	< 3	5.44	
	17/09/2012 18:32	4.87		506	< 3	5.68	
	19/09/2012 17:50	3.6		546	<1	5.44	150
	20/09/2012 12:08	4.75		677	< 3	8.82	
	21/09/2012 15:33	6.47				7.56	
	21/09/2012 15:33			546	< 3		
	22/09/2012 9:20	4.21		497	< 3	6.64	
	23/09/2012 9:55	4.54		515	< 3	6.4	
	24/09/2012 9:12	4.91		519	< 3	6.43	
	25/09/2012 15:11	4.84	1740	470	<1	6.54	163
	26/09/2012 11:40	4.59		474	< 3	6.44	
	27/09/2012 11:05	5.27		239	< 3	7.26	
	28/09/2012 14:46	4.8		519	< 3	7.57	
	29/09/2012 18:13	4.55		244	< 3	6.36	
	30/09/2012 15:39	5.75				5.31	
	1/10/2012 16:10	4.81				6.13	
	2/10/2012 11:47	4.48	1820	574	<1	8.33	38
	3/10/2012 11:33	4.84		226	< 3	9.49	
	5/10/2012 15:30	6.48		21	< 3	6.18	
	6/10/2012 15:10	5.12		574	< 3	6.2	
	7/10/2012 17:05			610	< 3		
	9/10/2012 16:25	4.5		420	< 3	5.14	
Kaveroi Creek upstream Watut River	1/01/2012 8:19	6.53		7	< 3	6.91	
	2/01/2012 6:46	6.53		12	4	6.83	
	3/01/2012 8:10	6.85		8	8	6.67	
	4/01/2012 10:05	7.09		9	13	7.78	
	5/01/2012 9:18	6.93		13	18	7.25	
	6/01/2012 8:47	7.13		6	15	7.02	
	7/01/2012 8:05	5.9		7	17	7.42	
	8/01/2012 8:23	5.95		7	20	6.79	
	9/01/2012 8:27	6.1		9	22	7.25	
	10/01/2012 8:28	7.31		6	25	5.62	
	11/01/2012 8:05	7.28		11	25	6.17	
	12/01/2012 7:58	7.91		7	26	6.55	
	13/01/2012 8:27	7.43		8	26	7.2	
	14/01/2012 8:42	6.86	180	9	31	7.19	
	15/01/2012 8:12	6.8		5	18	6.37	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	16/01/2012 7:55	7.06		9	21	7.76	
	17/01/2012 11:20	6.86		19	14	7.63	
	18/01/2012 8:29	5.77				5.75	
	18/01/2012 8:29			14	4		
	19/01/2012 8:53	6.04		9	< 3	8.65	
	20/01/2012 7:51	6.52				8.05	
	20/01/2012 7:51			9	< 3		
	21/01/2012 11:23	5.86		15	< 3	7.71	
	22/01/2012 9:00	5.73		13	< 3	11.97	
	23/01/2012			10	< 3		
	23/01/2012 9:39	6.57				9.73	
	24/01/2012 8:29	6.31		6.84	7.88	9.38	
	25/01/2012 8:26	6.09		4	9	11.02	
	26/01/2012 8:06	6.66		5	11	9.33	
	27/01/2012 8:13			8	6		
	28/01/2012 7:10			7	11		
	29/01/2012 7:40			7	12		
	30/01/2012 8:15			7	10		
	31/01/2012 9:45	6.97		8	13	11.01	
	1/02/2012 13:01	7.07		7	15	8.08	
	2/02/2012 8:25	7.4		9	27	7.97	
	3/02/2012 8:02	7.3		9	17	8.46	
	4/02/2012 8:21	7.5		7	21	6	
	5/02/2012 7:48	7.21		8	13	6.97	
	6/02/2012 8:00	6.96		5	14	6.75	
	7/02/2012 15:18	7.59		6	14	7.07	
	8/02/2012 8:16	6.88		8	23	11.91	
	9/02/2012 8:13	6.87		7	30	8.79	
	10/02/2012 8:48	7.61				6.83	
	11/02/2012 7:49	7.82		7	31	9.47	
	12/02/2012 8:04	7.01		6	26	8.29	
	13/02/2012 7:44	6.7		7	10	9.88	
	14/02/2012 7:58	7.21		11	18	9.75	
	15/02/2012 8:13	6.87	210	< 3	12	8.31	
	16/02/2012 7:50	7.32		10	23	7.48	
	17/02/2012 7:21			7	25		
	18/02/2012 7:41			7	26		
	19/02/2012 8:21			6	27		
	20/02/2012 8:05	6.64		7	30	7.85	
	21/02/2012 8:06	7.47		4	30	9.56	
	22/02/2012 7:53	7.08		5	32	7.28	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	23/02/2012 7:57	7.21		4	38	6.39	
	24/02/2012 7:33	7.84		6	36	7.18	
	25/02/2012 8:00	7.55		4	39	7.97	
	26/02/2012 7:42	7.05		4	41	7.38	
	27/02/2012 8:02	7.03		4	41	8.69	
	28/02/2012 8:15			7	36		
	29/02/2012 8:16			7	23		
	1/03/2012 8:02	7.68					
	2/03/2012 7:46	7.67					
	3/03/2012 8:16	6.61					
	4/03/2012 8:35	6.67					
	4/03/2012 8:35					6.65	
	5/03/2012 9:08	6.44					
	5/03/2012 9:08					10.77	
	6/03/2012 8:27	6.81					
	6/03/2012 8:27					9.05	
	7/03/2012 8:52	6.95					
	7/03/2012 8:52					13.13	
	8/03/2012 10:08	7.27				9.98	
	9/03/2012 8:27	7.54					
	9/03/2012 8:27					10.07	
	10/03/2012 8:10	7.12				13.75	
	11/03/2012 8:34	7.01				6.39	
	12/03/2012 8:10	7.06				7.8	
	13/03/2012 7:59	7.11				7.65	
	14/03/2012 8:44	7.39				10.05	
	15/03/2012 8:10	7.25				6.77	
	16/03/2012 7:27	7.22				6.4	
	17/03/2012 7:38	7.08				7.01	
	18/03/2012 8:37	7.52				7.88	
	19/03/2012 7:44	7.41				7.1	
	20/03/2012 8:28	7.28				6.3	
	21/03/2012 8:32	7.62				8.76	
	22/03/2012 8:23	6.69				12.12	
	23/03/2012 7:06	7.54				9.78	
	24/03/2012 8:09	7.6				6.35	
	25/03/2012 8:03	6.84				6.56	
	26/03/2012 8:10	7.16				6.75	
	27/03/2012 8:12	6.77				8.55	
	29/03/2012 7:49	7.42				7.47	
	30/03/2012 7:54	7.63				8.74	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	31/03/2012 8:06	7.63				6.38	
	1/04/2012			6	41		
	1/04/2012 7:46	6.81				7.92	
	2/04/2012			5	43		
	2/04/2012 10:08	7.07				6.58	
	3/04/2012			5	40		
	3/04/2012 8:20	7.37				9.94	
	4/04/2012 8:06	7.29				6.56	
	4/04/2012 8:06			5	59		
	5/04/2012 10:45	7.78		4	49	6.12	
	6/04/2012 8:14			7	58		
	7/04/2012 8:11			4	55		
	7/04/2012 8:11	7.88				9.19	
	8/04/2012 8:18	7.51				9.63	
	8/04/2012 8:18			4	43		
	9/04/2012 8:30	7.73	176	4	29	6.04	3180
	10/04/2012			4	48		
	11/04/2012 8:06	7.41		4	53	11.2	
	12/04/2012 7:30			5	52		
	13/04/2012			4	45		
	13/04/2012 7:55	7.46				8.04	
	14/04/2012 7:30	8.11		< 3	54	7.93	
	15/04/2012 7:40			< 3	49		
	15/04/2012 7:40	7.79				10.02	
	16/04/2012 7:55	7.46		< 3	56	7.43	
	17/04/2012 8:16	8.24		< 3	55	10.12	
	18/04/2012 7:59	8.06			58	9.65	
	19/04/2012 8:09	7.74		5	33	9.09	
	20/04/2012 7:55	7.6		4	35	6.99	
	21/04/2012 8:08	7.5		5	37	11.66	
	22/04/2012 8:00	7.78		4	33	7.91	
	23/04/2012 7:58	7.67		5	30	9.7	
	24/04/2012 7:49	7.51		6	29	9.36	
	25/04/2012 7:34	6.99		7	28	9.22	
	26/04/2012 7:34			9	21		
	26/04/2012 8:04	7.34				8.94	
	27/04/2012 8:07	7.71		6	26	7.06	
	28/04/2012 8:51	7.86		5	31	9.86	
	29/04/2012 7:35	7.36				10.28	
	29/04/2012 7:35			6	15		
	30/04/2012 8:12			5	28		

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	30/04/2012 8:12	7.41				6.59	
	1/05/2012						29254
	1/05/2012 8:35	5.74	501	10	<1	5.43	
	2/05/2012 7:31			9	4		
	2/05/2012 7:31	7.25				6.52	
	3/05/2012 8:14	7.32		8	8	8.72	
	4/05/2012 8:38	7.6		6	8	6.49	
	5/05/2012 7:51	7.48				10.67	
	5/05/2012 7:51			6	21		
	6/05/2012 8:40			5	31		
	6/05/2012 8:40	6.52				7.85	
	7/05/2012 8:15	7.49		6	30	10.41	
	8/05/2012 9:12	6.92		7	7	7.25	
	9/05/2012 8:14	7.38	388	7	23	9.42	11800
	10/05/2012			6	19		
	10/05/2012 8:48	7.49		6	19	8.68	
	11/05/2012 7:46	7.43		8	16	9.5	
	12/05/2012 7:55	6.51		6	20	9.74	
	13/05/2012 7:57	7.16		7	20	11.82	
	14/05/2012 8:04	6.92		8	16	10.47	
	15/05/2012 17:22	6.5		7	13	10.42	
	16/05/2012 8:20	6.2		7	15	8.61	
	16/05/2012 9:15		331		22		5910
	17/05/2012 8:35	6.84		7	13	10.3	
	18/05/2012 7:49	6.93		7	17	6.96	
	19/05/2012 8:21	6.65		6	21	8.34	
	20/05/2012 8:40	6.62		7	17	9.38	
	21/05/2012 8:49	7.03		4	13	7.75	
	22/05/2012 8:43	6.83		21	10	6.78	
	23/05/2012			17	18		
	23/05/2012 8:50	7.11	270	17	18	6.96	2440
	24/05/2012			5	49		
	24/05/2012 10:10	7.14		5	49	6.66	
	25/05/2012 10:39	7.49				8.49	
	26/05/2012			7	29		
	26/05/2012 8:41	7.5		7	29	8.54	
	27/05/2012 9:27	7.3		5	33	8.49	
	28/05/2012 11:10	7.24		5	38	8.12	
	29/05/2012 8:48	7.68		4	33	10.18	
	30/05/2012 8:33	7.15		4	29	10.41	
	31/05/2012			4	29		

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	31/05/2012 8:33	7.14		4	29	9.39	
	1/06/2012 7:56	7.16		5	30	9.56	
	2/06/2012 7:25	7.53				9.97	
	2/06/2012 7:25			6	23		
	3/06/2012 7:50	7.2		5	19	9.78	
	4/06/2012 8:40	7.16		5	29	10.71	
	5/06/2012 8:11	7.72		5	27	8.73	
	6/06/2012 8:23	6.99	267	6	31	9.23	3220
	7/06/2012 7:45	6.98		9	13	10.53	
	8/06/2012 7:45	7.09		8	15	7.08	
	9/06/2012 8:24	7.11		12	14	9.91	
	10/06/2012						3782
	10/06/2012 7:45	7.04		7	7	8.5	
	11/06/2012 7:50	7.01		9	17	8.12	
	12/06/2012 7:56	7.43		6	22	8.27	
	13/06/2012 8:16	6.96	309	9	20	8.88	4031
	14/06/2012 8:07	7.13		8	18	8.7	
	15/06/2012 7:51	7.19		7	23	8.25	
	16/06/2012 7:33	6.8		6	18	8.21	
	17/06/2012 7:48	7.23		6	20	8.1	
	18/06/2012 8:17	7.21		6	32	7.42	
	19/06/2012 8:54	7.08	203	5	34	8.44	946
	20/06/2012 8:34	7.12		6	42	7.64	
	21/06/2012 8:18	7.11		5	40	9.96	
	22/06/2012 8:28	7.43		6	33	8.71	
	23/06/2012 9:37	7.83		6	30	8.74	
	24/06/2012 7:57	7.49		9	43	7.83	
	25/06/2012 9:25	7.58		8	47	8.49	
	26/06/2012 8:59	7.31		6	40	10.53	
	27/06/2012 7:27	7.42		10	43	8.15	
	28/06/2012 7:39	7.19		5	41	9.36	
	29/06/2012 7:54	7.99		6	41	9.8	
	30/06/2012			5	46		
	30/06/2012 7:25	7.35				7.91	
	1/07/2012 9:07	7.12		5	43	8.4	
	2/07/2012 7:48	7.59		5	46	8.54	
	3/07/2012 7:52	7.79				8.6	
	3/07/2012 8:10	7.18				10.29	
	4/07/2012 8:04	7.54	155	5	49	8.22	470
	5/07/2012 8:02	7.62		8	42	13.39	
	6/07/2012 7:27	7.01		7	43	6.99	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	7/07/2012 8:50	6.7		6	45	9	
	8/07/2012 16:20	7.53		5	47	8.51	
	9/07/2012 8:21	7.6				7.1	
	10/07/2012				49		
	10/07/2012 7:40	7.69			49	7.3	
	11/07/2012 8:02	7.47				9.54	
	12/07/2012 8:23	7.81		8	46	11.3	
	13/07/2012 8:10	7.8		9	47	7.33	
	14/07/2012 8:02		151		52		
	14/07/2012 8:10			11	46		2222
	14/07/2012 8:43	7.06				7.64	
	15/07/2012 8:56	7.51		8	47	10.03	
	16/07/2012 8:21	7.12		6	49	6.4	
	17/07/2012 7:50	7.59	126	9	52	8.89	
	18/07/2012 8:42	7.64		8	52	10	
	19/07/2012 8:40	7.53		8	47	8.42	
	20/07/2012 7:47	7.85		6	52	6.77	
	21/07/2012 8:57	7.95		5	53	12.57	
	22/07/2012 8:43			5	56		
	23/07/2012 9:00	7.98				11.56	
	24/07/2012 9:00	7.63		5	53	6.71	
	25/07/2012 8:55	7.73	141	7	54	7.33	1280
	26/07/2012 7:55	7.71		7	46	9.71	
	27/07/2012 7:39	7.64		7	41	9.36	
	28/07/2012 9:20	7.32				11.86	
	28/07/2012 9:31			7	45		
	29/07/2012 7:50	7.44		6	52	10.08	
	30/07/2012 9:15	7.6		7	52	11.81	
	31/07/2012 8:09	7.24		7	51	9.36	
	1/08/2012 7:15	6.95		7	29	8.49	
	2/08/2012 7:43	7.12	253	6	25	8.37	
	3/08/2012 8:10			7	34		
	4/08/2012 7:35	7.32		6	29	8.08	
	5/08/2012 7:35	6.49		9	35	Not Done	
	6/08/2012 8:05	6.86		7	27		
	7/08/2012 9:09	6.7		8	27	Not Done	
	8/08/2012 8:19	6.75		10	12	No Data	2743
	9/08/2012 7:51	6.3				Not Done	
	10/08/2012 7:36	6.75		12	11	Not Done	
	11/08/2012 7:22	6.4		9	8	Not Done	
	12/08/2012 7:42	6.28		12	7	DO sensor	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
						error	
	13/08/2012 8:38	5.54	637	31	<1	DO sensor error	
	14/08/2012 7:45	6.9		15	< 3	DO sensor error	
	15/08/2012 8:47	6.4		31	< 3	6.82	
	16/08/2012 8:20	5.5		9	18	12.69	
	17/08/2012 8:36	7.33		8	20	7.89	
	18/08/2012 8:32	7.45		9	24	8.16	
	19/08/2012 7:57	7.17		8	18	8.8	
	20/08/2012 8:31	8.06		< 3	24	9.43	
	21/08/2012 10:12	7.21	225	6	38	6.51	2350
	22/08/2012 7:53	7.4		24	8	9.99	
	23/08/2012 7:45	7.04		6	31	8.33	
	24/08/2012 8:11	7.32		7	35	9.96	
	25/08/2012 9:17	7.05		7	35	7.69	
	26/08/2012 7:24	7.65				6.93	
	26/08/2012 7:24			7	34		
	27/08/2012 7:39	7.68		8	41	11.6	
	28/08/2012 9:17	7.37	193	8	39	10.27	258
	29/08/2012 8:41	7.8		7	39	8.62	
	30/08/2012 8:56	7.76		8	40	8.55	
	31/08/2012 8:02	7.51		7	43	8.6	
	1/09/2012 8:06	7.07				8.39	
	1/09/2012 8:06			7	42		
	2/09/2012 7:21			9	25		
	2/09/2012 7:21	7.62				10.35	
	3/09/2012 7:33	7.39				11.07	
	3/09/2012 7:33			9	30		
	4/09/2012 7:33			9	28		
	4/09/2012 7:33	7.29				10.17	
	5/09/2012 7:43		262	8	22		3600
	5/09/2012 7:43	7.7				10.81	
	6/09/2012 7:53	7.5				9.11	
	6/09/2012 7:53			7	36		
	7/09/2012 7:32			4	21		
	7/09/2012 7:32	7.43				9.38	
	8/09/2012 7:21	7.29		11	19	10.81	
	9/09/2012 8:49	7.27		9	25	10.38	
	10/09/2012 7:47	7.53		10	37	8.46	
	11/09/2012 15:36	6.98		8	45	6.88	
	12/09/2012 7:55	7.43				9.7	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	12/09/2012 7:55		322	10	12		11012
	13/09/2012 8:06			5	21		
	13/09/2012 8:06	7.12				8.27	
	14/09/2012 7:23	7.12		8	15	8.86	
	15/09/2012 8:08	7.12		10	24	8.4	
	16/09/2012 7:53	7.28		14	7	9.69	
	17/09/2012 7:44	7.51		10	19	7.83	
	18/09/2012			11	11		
	18/09/2012 9:15	7.49		11	11	7.77	
	19/09/2012 7:34	7.56		16	10	10.21	
	20/09/2012 7:40	6.66		7	44	12.57	8420
	21/09/2012 8:09	6.53		9	31	7.18	
	22/09/2012 7:39	6.44		8	28	8.52	
	23/09/2012 9:36	6.52		9	28	7.49	
	24/09/2012 8:16	6.93		10	23	6.49	
	25/09/2012 8:21	7.07	278	10	23	9.29	3920
	26/09/2012 7:48	6.57		10	18	7.59	
	27/09/2012 7:11	6.47		8	23	8.88	
	28/09/2012 7:28	7.12		9	29	8.84	
	29/09/2012 7:31	7.16		10	27	7.82	
	30/09/2012 9:07	7.08				10.58	
	1/10/2012 7:58	7.12	225		25	7.07	1720
	2/10/2012 7:12	5.98		9	29	7.15	
	3/10/2012 7:06	6.84		10	31	9.12	
	4/10/2012 7:11	7.07		5	27	10.02	
	5/10/2012 7:21	7.31		21	21	8.96	
	6/10/2012 8:35	5.95		18	14	9.22	
	7/10/2012 7:38			15	6		
	8/10/2012 7:16	6.98		10	15	7.67	
	9/10/2012 7:34	6.5		7	8	7.68	
	10/10/2012 7:53	7.16		10	17	8.37	
	11/10/2012 9:18	7.46		10	18	9.36	
	12/10/2012 7:30	7.26		6	15	8.68	
	13/10/2012 7:48	7.54		7	21	6.71	
	14/10/2012 7:58	7.5		4	29	6.79	
	15/10/2012 7:50	7.01		8	25	6.84	
	16/10/2012 8:05			11	5		
	16/10/2012 8:05	6.14				8.67	
	17/10/2012 7:42	7.13	282	8	21	8.94	8030
	18/10/2012 8:30	6.62		9	4	7.58	
	19/10/2012 7:18	7.47		10	7	10.03	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	20/10/2012 9:05	6.25		10	< 3	8.15	
	21/10/2012 7:45	7.03		7	14	9.41	
	22/10/2012 7:50	7.35		7	13	8.92	
	23/10/2012 7:41	7.01		6	21	8.75	
	24/10/2012	7.04		6	20	8.48	
	25/10/2012 8:06			7	32		
	26/10/2012 7:23	6.88		8	17	8.16	
	27/10/2012 7:17	7.54		6	25	9.79	
	28/10/2012			4	25		
	28/10/2012 7:43	7.24				7.62	
	29/10/2012			5	28		
	29/10/2012 7:11	7.48				7.44	
	30/10/2012 7:28	7.67		6	30	7.5	
	31/10/2012 7:23	7.52		5	29	8.05	
	1/11/2012 7:39	7.56		4	32	8.52	
	2/11/2012 7:40	7.81		8	34	9.76	
	3/11/2012 8:33	7.87		4	40	10.05	1870
	4/11/2012 8:00	7.45		4	29	8.68	
	5/11/2012 7:43	7.51		4	26	8.13	
	6/11/2012 8:02	7.35		5	35	7.76	
	7/11/2012 8:05	7.83		6	32	10.76	
	8/11/2012 7:27	7.31		5	26	9.16	
	9/11/2012 7:45	7.61		4	16	9.05	
	10/11/2012 8:53	7.55		5	35	10.13	
	11/11/2012 8:36	7.15		4	17	10.99	
	12/11/2012 8:57	7.14		3	14	9.88	11900
	13/11/2012 7:47	6.83				7.29	
	14/11/2012 7:45	7.25		7	21	7.43	
	15/11/2012 7:56	6.83		11	7	10.64	
	16/11/2012 7:28	6.81		10	10	7.6	
	17/11/2012 8:21	6.86		7	11	10.19	
	18/11/2012 8:03	7.4		6	27	6.4	
	19/11/2012 7:21	7.13		9	42	7.21	21554
	20/11/2012 7:31	7.21		6	10	8.98	
	21/11/2012 7:04	6.83		7	14	8.93	
	22/11/2012 7:30	7.56		7	26	6.76	
	23/11/2012 7:04	5.4		7	< 3	5.96	
	24/11/2012 7:22	6.59		6	15	7.02	
	25/11/2012 8:16	7.33		6	33	8.48	
	26/11/2012 7:19	5.77		7	4	8.4	
	27/11/2012 7:14				25		

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	27/11/2012 7:15	7.08		6	24	7.34	
	28/11/2012 7:13	7.35		8	26	7.88	
	28/11/2012 8:27						4100
	29/11/2012 7:15	7.22		7	27	8.26	
	30/11/2012 7:42	7.39		7	34	9.38	
	1/12/2012 8:17	7.54		7	33	6.93	
	2/12/2012 7:32	7.02		6	40	7.28	
	3/12/2012 7:41	7.59		7	39	8.75	
	4/12/2012			6	35		
	4/12/2012 7:03	7.79				8.62	
	5/12/2012 7:10	7.76				8.64	
	6/12/2012 7:05	7.63		7	44	9.73	
	7/12/2012 7:32	7.59				8.44	
	8/12/2012 8:14	7.58		5	41	10.99	
	9/12/2012 8:34	7.38		6	39	10.52	3526
	9/12/2012 8:53				48		
	10/12/2012 7:32	7.51		6	42	6.52	
	11/12/2012 7:26	7.87		4	46	8.76	
	12/12/2012 7:31			6	43		6460
	12/12/2012 7:31	7.55				7.22	
Nosave Creek at Toe of Nosave Dump	6/01/2012 10:25	3.72				11.22	
	14/01/2012 13:48	3.62	1760		<1	9.5	
	18/02/2012 11:55		589		76		52800
	1/03/2012 11:57	4.47					
	10/03/2012 12:19	4.38				11.39	
	14/03/2012 14:06	4.07				9.68	
	29/03/2012 12:51	4.61				7.14	
	8/04/2012 8:21	4.57				7.48	
	15/04/2012 18:10	4.71				8.37	
	12/05/2012 16:49	3.75	1810		<1	7.14	67
	20/05/2012 9:04	3.84	2030		<1	6.4	483
	1/06/2012 11:10	4.33	1230		<1	11.28	108
	5/06/2012			175			
	5/06/2012 15:00	4.5	1820		<1	9.39	25
	17/06/2012 16:25	3.85	1400		<1	7.64	118
	24/06/2012						4
	24/06/2012 13:35	4.45				9.72	
	30/06/2012			283			
	30/06/2012 18:20	4.58	1360		<1	8.37	
	3/07/2012	Not Done				Not Done	
	15/07/2012 9:50		1190		<1		14

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	22/07/2012 10:54		1050		<1		28
	29/07/2012 8:34	5.96	1090	34	11	7.22	26
	5/08/2012	Not Done				Not Done	
	7/08/2012 10:30	4.25	1650		<1	Not Done	42
	16/08/2012 9:22	4.56	2830	721	< 3	5.84	29
	26/08/2012 16:42	4.38	1520	332	<1	6.03	<5
	2/09/2012 15:36	4.54	1450	256	< 3	8.96	292
	12/09/2012 16:40	4.45	1500	379	<1	8.89	93
	20/09/2012 15:05	4.21		321	<1	12.32	39
	26/09/2012 15:50	4.16	1700	583	<1	6.8	56
	2/10/2012 11:26	3.87	1540		<1	8.74	<5
	12/10/2012 14:00	3.98				5.62	
	17/10/2012			157	< 3		
	17/10/2012 11:00	5.3	713		<1	6.15	15200
	24/10/2012 15:34	3.97		500	< 3	10.7	
	4/11/2012 14:15	4.3		437	<1	6.73	20
	12/11/2012 15:04	4.72				9.83	
	12/11/2012 15:10				<1		85
	21/11/2012 10:52	4.1		661	< 3	8.4	20
	29/11/2012 14:41	4.32		447	<1	7.39	
	9/12/2012						28
	9/12/2012 9:20	4.59			<1	6.79	
Ross Creek upstream Watut River	8/01/2012 17:20	7.98				7.16	
	12/02/2012 11:30				133		
	13/02/2012 16:55	7.67				7.14	
	19/02/2012 9:36		93		120		2020
	4/03/2012 13:26	7.48					
	4/03/2012 13:26					7.13	
	14/03/2012 9:01	7.84				6.61	
	18/03/2012 17:00		150		99		3390
	2/04/2012 10:30	7.52				6.71	
	14/04/2012 10:21	7.67				6.78	
	21/04/2012 9:42	7.92				8.37	
	30/04/2012		112		76		
	30/04/2012 14:58	7.56				4.45	
	12/05/2012 11:03	7.61	141		118	8.41	1560
	26/05/2012 10:05	7.99	149		118	8.35	7180
	4/06/2012			< 3	124		
	4/06/2012 9:20	7.95	96		135	10.71	325
	13/06/2012						82
	13/06/2012 8:32	7.51	111		137	8.21	

Sample Point	Date	pH-field (pH Units)	Sulfate as SO4 (mg/L)	Acidity (mg/L CaCO3)	Alkalinity (mg/L CaCO3)	Dissolved Oxygen (mg/L)	Total Suspended Solids (mg/L)
	23/06/2012			10	116		2908
	23/06/2012 9:37	8.08				7.86	
	1/07/2012			6	127		
	1/07/2012 11:12		102		147		
	6/07/2012 17:45	6.31	114	6	143	8.65	
	15/07/2012 13:10		100		144		19
	28/07/2012 10:42		113		129		255
	28/07/2012 14:42	6.93		9	122	6.56	
	2/08/2012 10:42	7.03		4	136	7.64	244
	16/08/2012 8:18	7.64		14	95	6.7	9183
	16/08/2012 8:30		163		101		
	25/08/2012 9:23	7.91	121	6	143	7.26	41
	30/08/2012			8	143		
	30/08/2012 8:09		84		141		161
	9/09/2012 10:26	7.34		< 3	107	8.16	
	9/09/2012 11:18		140		117		6740
	16/09/2012 9:50	6.83	166	16	80	6.24	3600
	23/09/2012 10:01	6.95		20	72	6.32	7960
	30/09/2012 11:06	7.36	127		124	6.13	7280
	6/10/2012 13:38	8.06			131	9.79	16200
	11/10/2012 10:42	7.6		10	71	5.08	
	20/10/2012 14:57	7.57		8	142	7.97	40000
	26/10/2012 11:26	7.83		10	131	13.13	
	10/11/2012 8:20	7.71			126	7.18	25800
	17/11/2012 11:18	7.93		9	121	6.4	3653
	25/11/2012 7:59	7.91		7	141	7.77	346
	28/11/2012 18:00						529
	2/12/2012 11:30	7.27			133	4.92	18900
	10/12/2012 12:38	8.3		4	143	7.01	8956

Appendix 5: Dissolved Metal Data for Upper Watut in 2012

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
5/01/2012 8:10	<0.0001	0.0072	<0.0001	0.0007	<0.0001	0.0025	0.025	<0.0001	0.2870	<0.0003	0.0003	<0.0001	0.022
5/01/2012 8:50	<0.0001	0.0063	<0.0001	0.0007	<0.0001	0.011	0.036	<0.0001	0.2600	<0.0003	0.0006	<0.0001	0.011
5/01/2012 9:10	<0.0001	0.0063	<0.0001	0.0008	<0.0001	0.0066	0.039	<0.0001	0.2590	0.0008	0.0003	<0.0001	0.011
5/01/2012 10:10	<0.0001	0.0058	<0.0001	0.0008	<0.0001	0.0052	0.040	<0.0001	0.2550	0.0005	0.0004	<0.0001	0.007
5/01/2012 10:15	<0.0001	0.0057	<0.0001	0.0008	<0.0001	0.0049	0.044	<0.0001	0.2610	<0.0003	0.0005	<0.0001	0.010
5/01/2012 11:10	<0.0001	0.0057	<0.0001	0.0008	<0.0001	0.0048	0.038	<0.0001	0.2460	<0.0003	0.0003	<0.0001	0.007
5/01/2012 12:10	<0.0001	0.0056	<0.0001	0.0008	<0.0001	0.0101	0.042	<0.0001	0.2460	<0.0003	0.001	<0.0001	0.012
5/01/2012 13:10	<0.0001	0.0055	<0.0001	0.0003	<0.0001	0.0036	0.046	<0.0001	0.2230	<0.0003	0.0006	<0.0001	0.007
5/01/2012 13:15	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0010	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	0.003
8/01/2012 12:00	<0.0001	0.0045	<0.0001	0.0005	<0.0001	0.0017	0.050	<0.0001	0.3320	0.0006	0.0003	<0.0001	0.004
8/01/2012 13:00	<0.0001	0.0049	<0.0001	0.0007	<0.0001	0.0034	0.084	<0.0001	0.3370	<0.0003	0.0006	<0.0001	0.006
8/01/2012 14:00	<0.0001	0.0048	<0.0001	0.0005	<0.0001	0.0039	0.048	<0.0001	0.3150	0.0006	0.0007	<0.0001	0.005
8/01/2012 15:00	<0.0001	0.0050	<0.0001	0.0006	<0.0001	0.0014	0.041	<0.0001	0.3420	<0.0003	0.0002	<0.0001	0.003
9/01/2012 13:00	<0.0001	0.0042	<0.0001	0.0008	<0.0001	0.0021	0.038	<0.0001	0.3390	<0.0003	0.0004	<0.0001	0.004
9/01/2012 14:00	<0.0001	0.0043	<0.0001	0.0009	<0.0001	0.0029	0.036	<0.0001	0.3420	<0.0003	0.0003	<0.0001	0.004
9/01/2012 15:00	<0.0001	0.0042	<0.0001	0.0009	<0.0001	0.0041	0.072	<0.0001	0.3460	0.0006	0.0013	<0.0001	0.008
9/01/2012 16:00	<0.0001	0.0041	<0.0001	0.0008	<0.0001	0.0017	0.031	<0.0001	0.3260	<0.0003	0.0002	<0.0001	0.007
10/01/2012 10:00	<0.0001	0.0038	0.0001	0.0011	<0.0001	0.0031	0.036	<0.0001	0.3740	0.0014	0.0018	<0.0001	0.008
10/01/2012 11:00	<0.0001	0.0043	0.0001	0.0009	<0.0001	0.0032	0.018	<0.0001	0.4170	0.0006	0.0013	<0.0001	0.003
10/01/2012 12:00	<0.0001	0.0040	<0.0001	0.0011	<0.0001	0.0035	0.038	<0.0001	0.3510	0.0041	0.0012	<0.0001	0.006
10/01/2012 13:00	<0.0001	0.0040	0.0001	0.0011	<0.0001	0.0043	0.040	<0.0001	0.3520	0.001	0.0004	<0.0001	0.004
10/01/2012 14:00	<0.0001	0.0045	<0.0001	0.0010	<0.0001	0.0028	0.032	<0.0001	0.2850	<0.0003	0.0003	<0.0001	0.004
10/01/2012 15:00	<0.0001	0.0044	<0.0001	0.0010	<0.0001	0.0023	0.032	<0.0001	0.2950	0.0005	0.0003	<0.0001	0.005

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
11/01/2012 10:00	<0.0001	0.0042	0.0001	0.0011	<0.0001	0.0018	0.035	<0.0001	0.3500	<0.0003	0.0002	<0.0001	0.002
11/01/2012 11:00	<0.0001	0.0044	0.0001	0.0010	<0.0001	0.0018	0.028	<0.0001	0.3560	<0.0003	0.0003	<0.0001	0.003
11/01/2012 12:00	<0.0001	0.0043	0.0001	0.0012	<0.0001	0.0019	0.040	<0.0001	0.3470	<0.0003	0.0003	<0.0001	0.003
11/01/2012 13:00	<0.0001	0.0049	0.0001	0.0009	<0.0001	0.0018	0.032	<0.0001	0.2770	<0.0003	0.0004	<0.0001	0.003
11/01/2012 14:00	<0.0001	0.0043	0.0001	0.0011	<0.0001	0.0017	0.037	<0.0001	0.3290	<0.0003	0.0003	<0.0001	0.003
11/01/2012 15:00	<0.0001	0.0045	0.0001	0.0010	<0.0001	0.0018	0.041	<0.0001	0.3150	<0.0003	0.0003	<0.0001	0.020
12/01/2012 15:30	0.0001			0.0010		0.0042			0.3380	0.0007			
14/01/2012 13:00	<0.0001			0.0013		0.0088			0.3060	0.0006			
18/01/2012 11:50	<0.0001	0.0045	<0.0001	0.0015	<0.0001	0.0063	0.030	<0.0001	0.3470	0.0008	0.0026	<0.0001	0.019
18/01/2012 12:50	<0.0001	0.0052	0.0001	0.0023	0.000	0.0188	0.128	<0.0001	0.4260	0.0044	0.0232	<0.0001	0.119
18/01/2012 13:50	<0.0001	0.0045	<0.0001	0.0016	<0.0001	0.0025	0.022	<0.0001	0.3260	0.0008	0.0016	<0.0001	0.012
18/01/2012 14:50	<0.0001	0.0048	0.0001	0.0020	0.000	0.0103	0.058	<0.0001	0.3500	0.0026	0.014	<0.0001	0.068
18/01/2012 15:50	<0.0001	0.0047	0.0001	0.0020	0.000	0.0109	0.051	<0.0001	0.3510	0.0025	0.013	<0.0001	0.065
19/01/2012 9:50	<0.0001	0.0039	<0.0001	0.0010	<0.0001	0.0028	0.032	<0.0001	0.2530	0.0008	0.0012	<0.0001	0.010
19/01/2012 10:00	0.0001	0.0048	<0.0001	0.0003	0.000	0.0037	0.023	<0.0001	0.1360	0.001	0.0035	<0.0001	0.041
19/01/2012 10:50	<0.0001	0.0043	0.0001	0.0019	0.001	0.0192	0.117	<0.0001	0.3650	0.0051	0.0246	<0.0001	0.132
19/01/2012 11:00	<0.0001	0.0051	<0.0001	0.0003	0.000	0.0031	0.019	<0.0001	0.1340	0.001	0.0032	<0.0001	0.024
19/01/2012 11:50	<0.0001	0.0040	<0.0001	0.0012	<0.0001	0.0036	0.021	<0.0001	0.2730	0.0005	0.0007	<0.0001	0.009
19/01/2012 12:00	<0.0001	0.0056	0.0001	0.0006	0.001	0.0141	0.069	<0.0001	0.1940	0.004	0.0199	<0.0001	0.105
19/01/2012 12:50	<0.0001	0.0044	0.0001	0.0014	0.000	0.0125	0.065	<0.0001	0.2840	0.0031	0.0159	<0.0001	0.078
19/01/2012 13:50	<0.0001	0.0044	<0.0001	0.0013	<0.0001	0.0051	0.032	<0.0001	0.2520	0.0009	0.0028	<0.0001	0.015
19/01/2012 14:50	<0.0001	0.0046	<0.0001	0.0014	<0.0001	0.0045	0.032	<0.0001	0.2490	<0.0003	0.0001	<0.0001	0.008
20/01/2012 8:25	0.0002	0.0040	<0.0001	0.0003	<0.0001	0.0047	0.016	<0.0001	0.2690	0.001	0.0023	<0.0001	0.022
20/01/2012 9:25	<0.0001	0.0040	0.0001	0.0006	0.001	0.0054	0.068	<0.0001	0.3300	0.0019	0.0053	<0.0001	0.041
20/01/2012 10:25	0.0003	0.0040	<0.0001	0.0002	<0.0001	0.0014	0.014	<0.0001	0.2590	<0.0003	0.0004	<0.0001	0.008

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
20/01/2012 11:25	0.0001	0.0040	<0.0001	0.0002	0.001	0.0021	0.028	<0.0001	0.2520	<0.0003	0.0008	<0.0001	0.018
20/01/2012 12:25	<0.0001	0.0041	<0.0001	0.0008	0.000	0.0032	0.022	<0.0001	0.2720	0.0005	0.0009	<0.0001	0.015
20/01/2012 13:25	<0.0001	0.0042	<0.0001	0.0013	0.001	0.0036	0.018	<0.0001	0.2740	0.0006	0.0009	<0.0001	0.017
20/01/2012 14:25	<0.0001	0.0042	<0.0001	0.0013	<0.0001	0.004	0.014	<0.0001	0.2670	<0.0003	0.001	<0.0001	0.020
21/01/2012 10:20	<0.0001	0.0047	<0.0001	0.0002	<0.0001	0.0042	0.126	<0.0001	0.1800	<0.0003	0.0004	<0.0001	0.010
22/01/2012 12:24	<0.0001	0.0039	<0.0001	<0.0001	<0.0001	0.004	0.015	<0.0001	0.0845	<0.0003	0.0001	<0.0001	0.008
23/01/2012 11:00	<0.0001	0.0038	<0.0001	<0.0001	0.000	0.004	0.041	<0.0001	0.1420	<0.0003	0.0002	<0.0001	0.009
23/01/2012 12:00	<0.0001	0.0039	<0.0001	<0.0001	<0.0001	0.0047	0.031	<0.0001	0.1480	<0.0003	0.0002	<0.0001	0.011
23/01/2012 13:00	0.0002	0.0040	<0.0001	<0.0001	<0.0001	0.0037	0.018	<0.0001	0.1420	<0.0003	<0.0001	<0.0001	0.008
23/01/2012 14:00	<0.0001	0.0039	<0.0001	0.0002	<0.0001	0.0046	0.019	<0.0001	0.1450	<0.0003	0.0002	<0.0001	0.008
24/01/2012 10:00	<0.0001	0.0049	<0.0001	0.0001	<0.0001	0.0011	0.163	<0.0001	0.1300	<0.0003	0.0005	<0.0001	0.002
24/01/2012 11:00	<0.0001	0.0054	<0.0001	0.0001	<0.0001	0.0009	0.126	<0.0001	0.1560	<0.0003	0.0003	<0.0001	0.002
24/01/2012 12:00	<0.0001	0.0058	<0.0001	0.0001	<0.0001	0.001		<0.0001	0.1560		0.0003	<0.0001	
24/01/2012 13:00	<0.0001	0.0064	<0.0001	0.0005	<0.0001	0.0014	0.146	<0.0001	0.2020	<0.0003	0.0003	<0.0001	0.002
26/01/2012 9:08	<0.0001	0.0049	<0.0001	<0.0001	<0.0001	0.0038	0.093	<0.0001	0.0798	<0.0003	0.0002	<0.0001	0.018
27/01/2012 11:00	<0.0001	0.0050	<0.0001	0.0012	<0.0001	0.0023	0.054	<0.0001	0.2300	<0.0003	0.0002	<0.0001	0.010
27/01/2012 12:00	<0.0001	0.0051	<0.0001	0.0012	<0.0001	0.0024	0.050	<0.0001	0.2260	<0.0003	0.0001	<0.0001	0.004
27/01/2012 13:00	0.0002	0.0056	<0.0001	0.0012	0.001	0.0034	0.087	<0.0001	0.2220	0.0011	0.0005	0.0002	0.007
27/01/2012 14:00	<0.0001	0.0055	<0.0001	0.0012	0.001	0.0021	0.059	<0.0001	0.2400	0.001	0.0005	<0.0001	0.004
27/01/2012 15:00	0.0003	0.0058	<0.0001	0.0011	0.001	0.0019	0.044	<0.0001	0.2370	0.0011	0.0005	0.0003	0.006
28/01/2012 10:00	0.0002	0.0059	<0.0001	0.0016	0.001	0.0032	0.056	<0.0001	0.2650	0.001	0.0006	0.0002	0.006
28/01/2012 11:00	0.0001	0.0060	<0.0001	0.0015	0.001	0.0025	0.054	<0.0001	0.2570	0.002	0.0005	<0.0001	0.005
28/01/2012 12:00	0.0001	0.0060	<0.0001	0.0017	0.001	0.0025	0.043	<0.0001	0.2690	0.001	0.0004	<0.0001	0.005
28/01/2012 13:00	0.0001	0.0052	<0.0001	0.0018	0.001	0.0034	0.049	<0.0001	0.2810	0.0012	0.0006	<0.0001	0.011
28/01/2012 14:00	0.0002	0.0059	<0.0001	0.0018	0.001	0.0058	0.038	<0.0001	0.2650	0.0011	0.0004	<0.0001	0.109

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
28/01/2012 15:00	<0.0001	0.0060	<0.0001	0.0018	0.001	0.0028	0.046	<0.0001	0.2640	0.001	0.0004	<0.0001	0.006
29/01/2012 11:00	<0.0001	0.0059	<0.0001	0.0016	0.001	0.0064	0.045	<0.0001	0.2810	0.0013	0.0006	<0.0001	0.052
29/01/2012 12:00	0.0001	0.0057	<0.0001	0.0016	0.001	0.0066	0.109	<0.0001	0.2920	0.0011	0.0006	<0.0001	0.039
29/01/2012 13:00	<0.0001	0.0058	<0.0001	0.0017	0.001	0.0061	0.122	<0.0001	0.2950	0.0011	0.0005	<0.0001	0.016
29/01/2012 14:00	<0.0001	0.0056	<0.0001	0.0016	0.001	0.0049	0.052	<0.0001	0.2980	0.001	0.0005	<0.0001	0.022
29/01/2012 15:00	<0.0001	0.0057	<0.0001	0.0017	0.001	0.0053	0.060	<0.0001	0.2920	0.0011	0.0005	<0.0001	0.022
30/01/2012 12:00	<0.0001	0.0080	<0.0001	0.0015	0.001	0.0058	0.042	<0.0001	0.2290	0.0012	0.0004	<0.0001	0.017
30/01/2012 13:00	<0.0001	0.0063	<0.0001	0.0015	0.001	0.0079	0.081	<0.0001	0.2590	0.0012	0.0006	<0.0001	0.024
30/01/2012 14:00	0.0001	0.0062	<0.0001	0.0014	0.001	0.0078	0.101	<0.0001	0.2600	0.0011	0.0006	<0.0001	0.079
31/01/2012 13:00	0.0001	0.0060	<0.0001	0.0010	0.001	0.0089	0.083	<0.0001	0.2100	0.001	0.0008	<0.0001	0.010
31/01/2012 14:00	<0.0001			0.0009		0.0207			0.2210	<0.0003			
1/02/2012 16:12	0.0001		0.0004	0.0023		0.0199			0.3470	<0.0003			
2/02/2012 16:00	0.0002			0.0031		0.0206			0.3320	<0.0003			
3/02/2012 12:00	0.0002	0.0054	<0.0001	0.0015	0.001	0.0228	0.118	<0.0001	0.2610	0.001	0.0005	<0.0001	0.008
3/02/2012 13:00	0.0001	0.0050	<0.0001	0.0014	0.001	0.023	0.101	<0.0001	0.2510	0.0011	0.0005	<0.0001	0.009
3/02/2012 14:00	0.0002	0.0040	<0.0001	0.0011	<0.0001	0.0157	0.102	<0.0001	0.2250	<0.0003	0.0002	<0.0001	0.006
3/02/2012 15:00	0.0001	0.0042	<0.0001	0.0012	<0.0001	0.015	0.119	<0.0001	0.2540	<0.0003	0.0002	<0.0001	0.004
4/02/2012 13:00	0.0002	0.0039	<0.0001	0.0012	<0.0001	0.0204	0.077	<0.0001	0.2730	<0.0003	0.0002	<0.0001	0.006
4/02/2012 14:00	0.0002	0.0039	<0.0001	0.0012	<0.0001	0.0229	0.066	<0.0001	0.2760	<0.0003	0.0001	<0.0001	0.005
4/02/2012 15:00	0.0002	0.0038	<0.0001	0.0014	<0.0001	0.0244	0.090	<0.0001	0.2870	<0.0003	0.0002	<0.0001	0.007
4/02/2012 16:00	0.0002	0.0035	<0.0001	0.0014	<0.0001	0.0307	0.095	<0.0001	0.2860	<0.0003	0.0002	<0.0001	0.164
5/02/2012 13:00	0.0002	0.0032	<0.0001	0.0014	<0.0001	0.0334	0.085	<0.0001	0.2730	<0.0003	0.0002	<0.0001	0.007
5/02/2012 14:00	0.0002	0.0031	<0.0001	0.0017	<0.0001	0.0348	0.071	<0.0001	0.2840	<0.0003	0.0004	<0.0001	0.220
5/02/2012 15:00	0.0002	0.0040	<0.0001	0.0017	<0.0001	0.0368	0.084	<0.0001	0.3320	<0.0003	0.0003	<0.0001	0.034
5/02/2012 16:00	0.0002	0.0031	<0.0001	0.0016	<0.0001	0.0497	0.083	<0.0001	0.2940	<0.0003	0.0001	<0.0001	0.006

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
6/02/2012 13:00	0.0001	0.0035	<0.0001	0.0018	0.000	0.0485	0.064	<0.0001	0.3790	<0.0003	0.0001	<0.0001	0.012
6/02/2012 14:00	0.0002	0.0033	<0.0001	0.0018	<0.0001	0.0446	0.067	<0.0001	0.3640	<0.0003	0.0002	<0.0001	0.011
6/02/2012 15:00	0.0002	0.0048	<0.0001	0.0020	<0.0001	0.0388	0.055	<0.0001	0.3730	<0.0003	0.0002	<0.0001	0.007
6/02/2012 16:00	0.0004	0.0039	<0.0001	0.0023	0.000	0.0639	0.062	<0.0001	0.3080	<0.0003	0.0009	<0.0001	0.070
7/02/2012 10:30	0.0002		0.0003	0.0026		0.0693			0.3450	0.0006			
9/02/2012 10:10	0.0002	0.0029	0.0001	0.0017	<0.0001	0.037	0.072	<0.0001	0.4160	0.0006	0.0001	<0.0001	0.113
11/02/2012 9:00	<0.0001	0.0038	<0.0001	0.0010	<0.0001	0.0095	0.070	<0.0001	0.3270	<0.0003	0.0004	<0.0001	0.038
11/02/2012 12:05	0.0001	0.0029	<0.0001	0.0018	<0.0001	0.0129	0.057	<0.0001	0.4340	0.0007	0.0005	<0.0001	0.030
11/02/2012 12:06	<0.0001	0.0026	<0.0001	0.0018	<0.0001	0.0323	0.042	<0.0001	0.3210	0.0006	0.0004	<0.0001	0.040
14/02/2012 8:30	0.0002	0.0038	<0.0001	0.0017	<0.0001	0.0082	0.051	<0.0001	0.3910	0.0006	0.0002	<0.0001	0.023
15/02/2012 12:10	0.0003	0.0044	<0.0001	0.0018	0.000	0.0133	0.065	<0.0001	0.2880	<0.0003	0.001	<0.0001	0.021
16/02/2012 9:10	<0.0001	0.0047	<0.0001	0.0022	<0.0001	0.0105	0.043	<0.0001	0.4020	0.0006	0.0003	<0.0001	0.023
17/02/2012 12:50	<0.0001	0.0041	0.0001	0.0034	<0.0001	0.0158	0.056	<0.0001	0.4170	0.0012	0.0002	<0.0001	0.010
18/02/2012 14:15	<0.0001	0.0048	0.0001	0.0015	<0.0001	0.0047	0.018	<0.0001	0.4260	0.0009	0.0002	<0.0001	0.020
19/02/2012 13:02	<0.0001	0.0048	0.0001	0.0034	<0.0001	0.0171	0.049	<0.0001	0.4380	0.0006	0.0004	<0.0001	0.024
20/02/2012 14:28	0.0001	0.0045	0.0001	0.0048	0.000	0.129	0.081		0.5440	0.0013	0.001	<0.0001	0.102
21/02/2012 9:43	0.0002	0.0032	<0.0001	0.0040	<0.0001	0.0265	0.044		0.4860	0.0006	0.0003	<0.0001	0.028
22/02/2012 11:00	<0.0001	0.0034	<0.0001	0.0030	<0.0001	0.0156	0.043	<0.0001	0.5290	0.0009	0.0001	<0.0001	0.069
23/02/2012 10:15	0.0002	0.0032	0.0001	0.0043	<0.0001	0.0358	0.056	<0.0001	0.5170	0.001	<0.0001	<0.0001	0.007
24/02/2012 10:35	0.0001	0.0029	0.0001	0.0048	<0.0001	0.044	0.018	<0.0001	0.5340	0.0009	<0.0001	<0.0001	0.007
25/02/2012 12:45	0.0004	0.0032	0.0001	0.0048	0.000	0.0308	0.049	<0.0001	0.4860	0.0008	<0.0001	<0.0001	0.006
26/02/2012 11:35	0.0003	0.0029	0.0001	0.0050	<0.0001	0.0326	0.041	<0.0001	0.5220	0.0009	<0.0001	<0.0001	0.007
27/02/2012 11:43	0.0002	0.0030	0.0001	0.0048	<0.0001	0.0193	0.020	<0.0001	0.5050	0.0006	<0.0001	<0.0001	0.006
1/03/2012 0:00	<0.0001	0.0048	<0.0001	0.0024	<0.0001	0.0049	0.050	<0.0001	0.1570	<0.0003	<0.0001	<0.0001	0.008
2/03/2012 0:00	0.0002	0.0041	<0.0001	0.0113	<0.0001	0.0246	0.038	<0.0001	0.1690	<0.0003	<0.0001	<0.0001	0.006

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
3/03/2012 0:00	<0.0001	0.0045	<0.0001	0.0046	<0.0001	0.0057	0.067	<0.0001	0.1520	<0.0003	<0.0001	<0.0001	0.007
4/03/2012 0:00	0.0001	0.0040	<0.0001	0.0104	<0.0001	0.0185	0.030	<0.0001	0.1740	<0.0003	<0.0001	<0.0001	0.006
5/03/2012 0:00	0.0003	0.0039	<0.0001	0.0114	<0.0001	0.0182	0.053	<0.0001	0.1870	<0.0003	<0.0001	<0.0001	0.007
5/03/2012 8:38	0.0001	0.0036		0.0001		0.0124	0.024		0.4310	0.0004		0.0001	0.003
6/03/2012 8:26	<0.001	0.0030	<0.0001	0.0060	<0.0005	0.027	0.150	<0.0001	0.3790	<0.001	0.003		0.025
7/03/2012 8:07	0.0005	0.0035	0.0001	0.0139	<0.0001	0.0236	0.151	<0.0001	0.1820	0.0007	<0.0001	<0.0001	0.007
8/03/2012 9:00	0.0006	0.0036	0.0001	0.0064	<0.0001	0.0386	0.080	<0.0001	0.4070	0.0007	0.0004	<0.0001	0.032
9/03/2012 13:15	0.0005	0.0034	0.0001	0.0064	<0.0001	0.0445	0.075	<0.0001	0.4140	0.0009	0.0004	<0.0001	0.035
10/03/2012 14:30	0.0003	0.0035	0.0001	0.0050	<0.0001	0.0341	0.063	<0.0001	0.3940	0.0008	0.0004	<0.0001	0.037
11/03/2012 13:39	0.0004	0.0034	0.0001	0.0065	<0.0001	0.0411	0.063	<0.0001	0.4490	0.0009	0.0004	<0.0001	0.042
12/03/2012 11:30	0.0004	0.0036	0.0001	0.0055	<0.0001	0.0373	0.059	<0.0001	0.4440	0.0006	<0.0001	<0.0001	0.002
15/03/2012 7:30	0.0004	0.0033	0.0001	0.0053	<0.0001	0.0461	0.038	<0.0001	0.3880	0.0013	0.0004	<0.0001	0.008
16/03/2012 12:58	0.0003	0.0032	0.0001	0.0054	<0.0001	0.0524	0.044	<0.0001	0.3650	0.0007	0.0001	<0.0001	0.019
17/03/2012 11:28	0.0004	0.0035	<0.0001	0.0045	<0.0001	0.0796	0.071	<0.0001	0.3200	0.0006	0.0008	<0.0001	0.006
18/03/2012 14:00	0.0004	0.0030	<0.0001	0.0040	<0.0001	0.0623	0.067	<0.0001	0.2760	0.0007	0.0004	<0.0001	0.021
19/03/2012 14:04	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0010	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0005
20/03/2012 9:45	0.0001	0.0044	<0.0001	0.0009	<0.0001	0.0131	0.034	<0.0001	0.2900	0.0008	<0.0001	<0.0001	0.005
20/03/2012 15:58	<0.0001	0.0038	<0.0001	0.0017	<0.0001	0.0089	0.034	<0.0001	0.2900	<0.0003	<0.0001	<0.0001	0.008
22/03/2012 8:30	0.0003	0.0036	0.0001	0.0046	0.000	0.0541	0.040	<0.0001	0.3720	0.0008	0.0002	<0.0001	0.019
23/03/2012 12:00	0.0001	0.0034	<0.0001	0.0051	<0.0001	0.043	0.029	<0.0001	0.3350	0.0006	0.0002	<0.0001	0.008
24/03/2012 12:50	<0.0001	0.0037	<0.0001	0.0044	<0.0001	0.0438	0.029	<0.0001	0.2860	0.0006	0.0001	<0.0001	0.008
25/03/2012 11:39	0.0001	0.0032	0.0001	0.0048	<0.0001	0.0598	0.038	<0.0001	0.3160	0.0006	<0.0001	<0.0001	0.013
26/03/2012 13:00	0.0002	0.0033	0.0001	0.0045	<0.0001	0.0592	0.049	<0.0001	0.3170	0.0011	0.0002	<0.0001	0.016
27/03/2012 10:10	0.0002	0.0035	<0.0001	0.0044	<0.0001	0.0436	0.058	<0.0001	0.3510	<0.0003	0.0003	<0.0001	0.033
28/03/2012 10:45	0.0002	0.0033	0.0001	0.0048	<0.0001	0.0621	0.047	<0.0001	0.3740	0.0007	0.0001	<0.0001	0.003

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
29/03/2012 10:00	0.0003	0.0036	0.0002	0.0033	<0.0002	0.0601	0.065	<0.0001	0.3440	<0.0005	0.0002	<0.0002	0.003
30/03/2012 13:05	0.0002	0.0032	0.0002	0.0035	<0.0002	0.08	0.078	<0.0001	0.3160	0.0007	0.0002	<0.0002	0.003
31/03/2012 11:43	0.0002	0.0032	0.0002	0.0036	<0.0002	0.0337	0.078	<0.0001	0.3230	0.0008	0.0002	<0.0002	0.005
1/04/2012 13:40	<0.0001	0.0030	0.0002	0.0035	<0.0002	0.0155	0.051	<0.0001	0.3380	0.0008	0.0002	<0.0002	0.033
2/04/2012 15:30	0.0002	0.0031	0.0002	0.0035	<0.0002	0.0189	0.077	<0.0001	0.3380	0.0006	0.0002	<0.0002	0.003
3/04/2012 8:30	0.0002	0.0030	<0.00005	0.0022	<0.0002	0.0327	0.112	<0.0001	0.2430	<0.0005	0.0003	<0.0002	0.002
4/04/2012 15:50	0.0003	0.0030	0.0002	0.0035	<0.0002	0.0203	0.086	<0.0001	0.3390	0.0006	0.0002	<0.0002	0.008
5/04/2012 12:45	0.0002	0.0028	0.0001	0.0039	<0.0002	0.0147	0.038		0.3840	0.0007	<0.0001		0.002
6/04/2012 15:00	0.0004	0.0028	0.0001	0.0043	<0.0002	0.0367	0.065	<0.0001	0.3500	0.0007	0.0003	<0.0002	0.024
8/04/2012 14:25	<0.0001	0.0038	0.0004	0.0008	<0.0002	0.027	0.100	<0.0001	0.3200	0.0006	0.0015	<0.0002	0.040
10/04/2012 9:10	<0.0001			0.0004	0.000		0.060	0.0	0.3150			<0.0002	
10/04/2012 9:10		0.0034	<0.0001	0.0004	0.000	0.0069		0.0	0.3150		0.0003		0.072
11/04/2012 9:10	<0.0001	0.0036	<0.0001	0.0003	<0.0002	0.0036	0.047	<0.0001	0.3240	<0.0005	0.0001	<0.0002	0.002
26/04/2012 0:00	<0.0001	0.0048	0.0001	0.0025	<0.0001	0.0184	0.043	<0.0001	0.4470	<0.0003	0.0003	<0.0001	0.017
27/04/2012 0:00	<0.0001	0.0045	<0.0001	0.0029	<0.0001	0.0156	0.049	<0.0001	0.4120	0.0005	0.0003	<0.0001	0.008
28/04/2012 0:00	0.0001	0.0041	<0.0001	0.0032	<0.0001	0.0233	0.051	<0.0001	0.4290	0.0007	0.0001	<0.0001	0.005
29/04/2012 0:00	<0.0001	0.0041	<0.0001	0.0033	<0.0001	0.0213	0.037	<0.0001	0.4330	<0.0003	0.0001	<0.0001	0.002
1/05/2012 10:20	<0.0001	0.0048	0.0032	0.0003	<0.0002	0.0052	0.043	<0.0001	0.3040	0.0006	0.0001	<0.0002	0.007
2/05/2012 13:40	<0.0001	0.0042	0.0012	0.0022	<0.0002	0.0128	0.034	<0.0001	0.5270	0.001	0.0008	<0.0002	0.026
3/05/2012 13:45	<0.0001	0.0045	0.0007	0.0017	<0.0002	0.0101	0.042	<0.0001	0.4420	0.0005	0.0003	<0.0002	0.014
4/05/2012 12:45	<0.0001	0.0045	0.0006	0.0024	<0.0002	0.0198	0.025	<0.0001	0.4960	<0.0005	0.0009	<0.0002	0.006
5/05/2012 13:35	<0.0001	0.0045	0.0008	0.0016	<0.0002	0.0121	0.076	<0.0001	0.3540	<0.0005	0.0002	<0.0002	0.006
6/05/2012 14:15	<0.0001	0.0045	0.0005	0.0011	<0.0002	0.0118	0.087	<0.0001	0.3180	<0.0005	0.0003	<0.0002	0.009
7/05/2012 16:00	<0.0001	0.0046	0.0018	0.0011	<0.0002	0.0064	0.030	<0.0001	0.3090	<0.0005	0.0001	<0.0002	0.009
8/05/2012 8:30	0.0001	0.0040	0.0013	0.0012	<0.0002	0.0058	0.029	<0.0001	0.3740	<0.0005	0.0001	<0.0002	0.007

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
9/05/2012 11:40	<0.0001	0.0061	0.0014	0.0007	0.000	0.0037	0.309	<0.0001	0.4470	0.0006	0.0025	<0.0002	0.053
10/05/2012 9:42	<0.0001	0.0041	0.0010	0.001	<0.0002	0.0042	0.032	<0.0001	0.3990	<0.0005	<0.0001	<0.0002	0.005
11/05/2012 13:02	<0.0001	0.0045	0.0004	0.0014	<0.0002	0.0075	0.033	<0.0001	0.4380	<0.0005	<0.0001	<0.0002	0.133
12/05/2012 15:35	<0.0001	0.0041	0.0006	0.0016	<0.0002	0.0112	0.026	<0.0001	0.4290	<0.0005	<0.0001	<0.0002	0.008
13/05/2012 12:20	<0.0001	0.0047	0.0007	0.0002	<0.0002	0.0013	0.015	<0.0001	0.3120	<0.0005	<0.0001	<0.0002	0.003
14/05/2012 10:32	<0.0001	0.0041	0.0015	0.0002	<0.0002	0.0018	0.015	<0.0001	0.2520	<0.0005	<0.0001	<0.0002	0.014
15/05/2012 8:10	<0.0001	0.0042	0.0002	0.0010	0.000	0.0094	0.029	<0.0001	0.3830	0.0009	0.0006	<0.0002	0.026
16/05/2012 12:59	<0.0001	0.0044	0.0009	0.0010	<0.0002	0.0057	0.030	<0.0001	0.3440	<0.0005	<0.0001	<0.0002	0.002
17/05/2012 10:00	<0.0001	0.0038	0.0014	0.0008	<0.0002	0.0048	0.070	<0.0001	0.3470	0.0007	0.0009	<0.0002	0.021
20/05/2012 15:00	<0.0001	0.0051	0.0002	0.0008	<0.0002	0.005	0.056	<0.0001	0.3690	<0.0005	<0.0001	<0.0002	0.004
21/05/2012 16:54	0.0001	0.0054	0.0007	0.0010	<0.0002	0.0203	0.033	<0.0001	0.3970	0.0005	0.0002	<0.0002	0.008
22/05/2012 7:30	<0.0001	0.0046	0.0005	0.0011	<0.0002	0.0158	0.047	<0.0001	0.4520	0.0008	0.0001	<0.0002	0.006
23/05/2012 13:00	<0.0001	0.0044	0.0007	0.0012	<0.0002	0.0189	0.046	<0.0001	0.4450	0.0005	0.0001	<0.0002	0.006
24/05/2012 10:05	0.0002	0.0039	0.0001	0.0011	<0.0002	0.0136	0.056	<0.0001	0.4900	0.0005	0.0001	<0.0002	0.003
25/05/2012 14:04	<0.0001	0.0044	<0.00005	0.0002	<0.0002	0.0018	0.042	<0.0001	0.3640	<0.0005	<0.0001	<0.0002	0.002
26/05/2012 16:15	0.0001	0.0042	0.0001	0.0013	<0.0002	0.0138	0.025	<0.0001	0.4770	<0.0005	0.0003	<0.0002	0.005
27/05/2012 11:34	0.0002	0.0037	<0.00005	0.0012	0.000	0.0089	0.045	<0.0001	0.4350	0.0005	0.0002	<0.0002	0.019
28/05/2012 16:00	0.0003	0.0047	<0.00005	0.0009	<0.0002	0.0066	0.049	<0.0001	0.4330	<0.0005	0.0002	<0.0002	0.027
29/05/2012 15:12	<0.0001	0.0040	0.0001	0.0006	<0.0002	0.0032	0.044	<0.0001	0.3900	0.001	0.0006	<0.0002	0.026
30/05/2012 9:10	0.0002	0.0038	<0.00005	0.0002	<0.0002	0.003	0.089	<0.0001	0.3100	0.0005	0.0003	<0.0002	0.040
2/06/2012 14:15	0.0002	0.0035	0.0005	0.0015	<0.0002	0.0219	0.034	<0.0001	0.3700	<0.0005	0.0002	<0.0002	0.003
4/06/2012 17:25	0.0002	0.0038	0.0008	0.0008	0.000	0.0132	0.010	<0.0001	0.2640	<0.0005	<0.0001	<0.0002	0.002
5/06/2012 9:43	<0.0001	0.0044	0.0005	0.0007	<0.0002	0.0035	0.018	<0.0001	0.4290	<0.0005	<0.0001	<0.0002	<0.001
6/06/2012 9:25	<0.0001	0.0052	0.0006	0.0008	<0.0002	0.0015	0.026	<0.0001	0.4230	<0.0005	<0.0001	<0.0002	0.004
7/06/2012 7:55	<0.0001	0.0045	0.0010	0.0005	<0.0002	0.0173	0.015	<0.0001	0.3720	<0.0005	<0.0001	<0.0002	0.001

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
8/06/2012 13:20	<0.0001	0.0053	0.0005	0.0008	<0.0002	0.0027	0.009	<0.0001	0.4920	<0.0005	<0.0001	<0.0002	<0.001
9/06/2012 15:20	<0.0001	0.0042	0.0008	0.0004	<0.0002	0.0012	0.018	<0.0001	0.2770	<0.0005	<0.0001	<0.0002	0.015
10/06/2012 15:19	<0.0001	0.0046	0.0005	0.0009	<0.0002	0.0062	0.012	<0.0001	0.4010	<0.0005	<0.0001	<0.0002	0.001
12/06/2012 9:40	<0.0001	0.0047	0.0011	0.0006	<0.0002	0.0016	0.016	<0.0001	0.4260	<0.0005	<0.0001	<0.0002	0.002
13/06/2012 12:15	<0.0001	0.0042	0.0006	0.0008	<0.0002	0.0043	0.027	<0.0001	0.4580	<0.0005	0.0002	<0.0002	0.005
14/06/2012 15:40	<0.0001	0.0048	0.0008	0.0008	<0.0002	0.0033	0.020	<0.0001	0.4630	<0.0005	<0.0001	<0.0002	0.003
15/06/2012 13:47	<0.0001	0.0054	0.0007	0.0009	<0.0002	0.0035	0.019	<0.0001	0.4730	<0.0005	0.0001	<0.0002	0.004
18/06/2012 13:17	0.0003	0.0040	0.0006	0.0015	<0.0002	0.0304	0.039	<0.0001	0.4880	<0.0005	0.0004	<0.0002	0.028
19/06/2012 8:50	0.0004	0.0035	0.0006	0.0017	<0.0002	0.0163	0.036	<0.0001	0.5170	0.0008	0.0002	<0.0002	0.003
28/06/2012 10:00	<0.0001	0.0042	<0.00005	0.0011	<0.0002	0.0102	0.053	<0.0001	0.3760	0.0079	0.0009	<0.0002	0.017
29/06/2012 13:20	<0.0001	0.0042	<0.00005	0.0017	<0.0002	0.0318	0.037	<0.0001	0.3540	0.0005	<0.0001	<0.0002	<0.001
30/06/2012 14:50	<0.0001	0.0041	0.0001	0.0025	<0.0002	0.0231	0.040	<0.0001	0.4060	0.0005	0.0002	<0.0002	0.002
1/07/2012 14:55	<0.0001	0.0037	0.0001	0.0031	<0.0002	0.0186	0.052	<0.0001	0.4020	<0.0005	0.0001	<0.0002	<0.001
2/07/2012 17:24	<0.0001	0.0039	0.0004	0.0031	<0.0002	0.0444	0.042	<0.0001	0.4890	0.0006	<0.0001	<0.0002	0.001
3/07/2012 17:21	<0.0001	0.0041	<0.00005	0.0028	<0.0002	0.0056	0.051	<0.0001	0.3640	<0.0005	0.0002	<0.0002	0.001
5/07/2012 14:50	<0.0001	0.0037	<0.00005	0.0011	0.000	0.0664	0.052	<0.0001	0.3340	0.0006	0.0002	<0.0002	0.001
6/07/2012 9:05	<0.0001	0.0036	<0.00005	0.0009	<0.0002	0.0134	0.054	<0.0001	0.3900	0.0006	0.0001	<0.0002	<0.001
10/07/2012 16:18	<0.0001	0.0035	<0.00005	0.0027	0.000	0.0272	0.022	<0.0001	0.4000	<0.0005	<0.0001	<0.0002	0.002
11/07/2012 17:00	<0.0001	0.0034	0.0001	0.0035	<0.0002	0.0075	0.028	<0.0001	0.3980	<0.0005	<0.0001	<0.0002	0.002
12/07/2012 9:35	<0.0001	0.0032	<0.00005	0.0004	<0.0002	0.0447	0.078	<0.0001	0.3310	0.0007	0.0002	<0.0002	0.002
13/07/2012 10:55	<0.0001	0.0031	0.0002	0.0028	0.000	0.013	0.074	<0.0001	0.4810	0.0011	0.0015	<0.0002	0.017
20/07/2012 14:53	<0.0001	0.0017	0.0002	0.0013	<0.0002	0.0062	0.043	<0.0001	0.3470	0.0026	0.0008	<0.0002	0.013
21/07/2012 16:51	0.0001	0.0029	0.0004	0.0015	<0.0002	0.0126	0.036	<0.0001	0.3660	0.0015	0.0006	<0.0002	0.014
22/07/2012 18:00	<0.0001	0.0028	0.0004	0.0024	0.000	0.0112	0.054	<0.0001	0.3800	0.0027	0.0007	<0.0002	0.022
23/07/2012 17:16	<0.0001	0.0032	0.0003	0.0022	0.000	0.0043	0.043	<0.0001	0.3270	0.0008	0.0003	<0.0002	0.011

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
24/07/2012 17:04	<0.0001	0.0038	0.0004	0.0026	0.000	0.011	0.076	<0.0001	0.3480	0.0031	0.001	<0.0002	0.019
25/07/2012 9:42	<0.0001	0.0047	0.0005	0.0028	<0.0002	0.0037	0.028	<0.0001	0.4460	0.0006	0.0002	<0.0002	0.004
28/07/2012 10:00	<0.0001	0.0047	<0.00005	0.0011	<0.0002	0.0127	0.037	<0.0001	0.3720	<0.0005	0.0001	<0.0002	<0.001
29/07/2012 13:55	<0.0001	0.0036	0.0002	0.0017	<0.0002	0.0241	0.033	<0.0001	0.3660	<0.0005	0.0002	<0.0002	0.003
30/07/2012 14:34	<0.0001	0.0032	0.0002	0.0017	<0.0002	0.0036	0.023	<0.0001	0.3900	<0.0005	0.0001	<0.0002	0.002
3/08/2012 10:25	<0.001	0.0050	<0.0001	<0.001	<0.001	0.006	0.070	<0.0001	0.3840	<0.001	<0.001	<0.01	<0.005
4/08/2012 12:00	<0.001	0.0050	<0.0001	<0.001	<0.001	0.004	<0.05	<0.0001	0.3630	<0.001	<0.001	<0.01	<0.005
5/08/2012 9:36	<0.001	0.0060	<0.0001	<0.001	<0.001	0.004	0.080	<0.0001	0.0360	<0.001	<0.001	<0.01	<0.005
6/08/2012 10:20	<0.0001	0.0040	<0.00005	0.0007	<0.0002	0.0066	0.030	<0.0001	0.3460	<0.0005	0.0001	<0.0002	0.002
7/08/2012 11:00	<0.0001	0.0041	<0.00005	0.0012	<0.0002	0.0048	0.027	<0.0001	0.4360	<0.0005	0.0001	<0.0002	0.002
8/08/2012 7:35	<0.0001	0.0050	<0.00005	0.0009	<0.0002	0.0032	0.050	<0.0001	0.4860	<0.0005	0.0001	<0.0002	0.003
9/08/2012 11:30	<0.0001	0.0046	<0.00005	0.0012	<0.0002	0.0407	0.029	<0.0001	0.4860	0.0005	<0.0001	<0.0002	0.002
10/08/2012 11:00	<0.0001	0.0045	0.0001	0.0017	0.000	0.0186	0.024	<0.0001	0.4900	0.0011	0.0008	<0.0002	0.026
11/08/2012 11:05	<0.0001	0.0039	<0.00005	0.0012	0.000	0.015	0.039	<0.0001	0.5170	0.0012	0.0003	<0.0002	0.013
12/08/2012 11:10	<0.0001	0.0042	0.0001	0.0013	<0.0002	0.0047	0.026	<0.0001	0.5510	0.0008	0.0018	<0.0002	0.012
13/08/2012 13:00	<0.0001	0.0022	<0.00005	0.0010	<0.0002	0.0052	0.075	<0.0001	0.4020	0.0016	0.0007	<0.0002	0.043
14/08/2012 10:10	<0.0001	0.0039	0.0001	0.0015	<0.0002	0.0086	0.027	<0.0001	0.5090	0.0011	0.0007	<0.0002	0.025
16/08/2012 16:48	<0.0001	0.0041	0.0001	0.0012	<0.0002	0.0061	0.073	<0.0001	0.5020	0.0008	0.0002	<0.0002	0.026
19/08/2012 14:06	<0.0001			0.0007		0.0035			0.3690	0.0007			
20/08/2012 14:30	<0.0001	0.0046	0.0005	0.0012	0.001	0.0028	0.026	<0.0001	0.4230	0.0007	0.0012	<0.0002	0.009
21/08/2012 16:15	<0.0001			0.0012		0.0034			0.4260	0.0016			
22/08/2012 15:00	<0.0001			0.0011		0.0174			0.3690	0.0006			
23/08/2012 11:27	<0.0001			0.0016		0.0216			0.3640	<0.0005			
24/08/2012 7:40	<0.0001			0.0016		0.0084			0.4680	<0.0005			
25/08/2012 14:58	<0.0001			0.0018		0.0036			0.4340	<0.0005			

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
26/08/2012 13:24	<0.0001			0.0013		0.0027			0.4000	<0.0005			
27/08/2012 11:50	<0.0001			0.0015		0.0022			0.4200	<0.0005			
28/08/2012 8:36	<0.0001			0.0013		0.0042			0.4230	<0.0005			
29/08/2012 12:25	<0.0001	0.0031	<0.00005	0.0008	<0.0002	0.0032	0.031	<0.0001	0.3280	0.0013	<0.0001	<0.0002	0.003
31/08/2012 5:11	<0.001	0.0030	<0.0001	<0.001	<0.001	0.004	<0.05	<0.0001	0.3260	<0.001	<0.001	<0.01	0.008
5/09/2012 13:45	<0.0001	0.0052	<0.00005	0.0004	<0.0002	0.0016	0.082	<0.0001	0.3570	0.0006	0.0003	<0.0002	0.004
9/09/2012 13:46	<0.0001			0.0004		0.0013			0.0220	<0.0005			
11/09/2012 9:15	<0.001	0.0070	<0.0001	<0.001	<0.001	0.002	<0.05	<0.0001	0.1480	<0.001	<0.001	<0.01	0.005
17/09/2012 14:38	<0.0001			0.0003		0.0016			0.2290	0.0006			
20/09/2012 8:23	<0.0001	0.0048	0.0010	0.0012	<0.0002	0.0015	0.022	<0.0001	0.6580	0.0008	0.0002	<0.0002	0.009
21/09/2012 13:48	<0.0001			0.0012		0.0025			0.4530	0.0005			
30/09/2012 17:10	<0.0001	0.0040	0.0007	0.0004	<0.0002	0.0012	0.044	<0.0001	0.3960	0.0005	0.0001	<0.0002	0.002
6/10/2012 12:20	0.0001	0.0037	0.0009	0.0006	<0.0002	0.0095	0.043	<0.0001	0.3810	0.0008	0.0002	<0.0002	0.012
7/10/2012 11:05	<0.0001	0.0035	<0.00005	0.0003	<0.0002	0.0012	0.046	<0.0001	0.3160	0.0006	0.0001	<0.0002	0.004
8/10/2012 11:30	<0.0001	0.0046	0.0001	0.0007	<0.0002	0.0022	0.061	<0.0001	0.3200	0.0006	0.0003	<0.0002	0.005
9/10/2012 10:47	<0.0001	0.0040	<0.00005	0.0006	0.001	0.0034	0.056	0.0	0.3220	0.0008	0.0026	<0.0002	0.011
11/10/2012 16:56	<0.0001	0.0040	0.0001	0.0012	<0.0002	0.0043	0.034	<0.0001	0.3420	0.0006	0.0007	<0.0002	0.011
15/10/2012 11:42	<0.0001			0.0006		0.0066			0.2830	0.0009			
16/10/2012 8:08	0.0001			0.0015		0.0046			0.3630	0.0009			
17/10/2012 14:00	<0.0001	0.0039	<0.00005	0.0008	0.001	0.0018	0.030	<0.0001	0.3280	0.0013	0.0002	<0.0002	0.003
18/10/2012 8:32	<0.0001			0.0007		0.0016			0.3480	<0.0005			
19/10/2012 13:23	<0.0001			0.0009		0.0013			0.3790	0.0005			
21/10/2012 13:40	<0.0001			0.0010		0.0019			0.4250	0.0311			
4/11/2012 8:20	<0.0001	0.0045	0.0001	0.0009	0.000	0.0037	0.267	<0.0001	0.2790	0.0006	0.0009	<0.0002	0.028
8/11/2012 13:37	<0.0001			0.0008		0.0025			0.2650	<0.0005			

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
9/11/2012 14:36	<0.0001			0.0010		0.0025			0.3210	<0.0005			
10/11/2012 13:36	<0.0001			0.0006		0.0022			0.2770	<0.0005			
11/11/2012 12:42	<0.0001			0.0004		0.0014			0.3230	<0.0005			
12/11/2012 9:39	<0.0001	0.0046	<0.00005	0.0006	<0.0002	0.0025	0.094	<0.0001	0.3450	<0.0005	0.0003	<0.0002	<0.001
14/11/2012 12:37	<0.0001			0.0007		0.0018			0.3390	<0.0005			
15/11/2012 14:46	<0.0001			0.0006		0.0042			0.2680	<0.0005			
16/11/2012 7:57	<0.0001			0.0008		0.0015			0.3450	<0.0005			
17/11/2012 13:04	<0.0001			0.0006		0.0035			0.2310	0.001			
18/11/2012 14:18	<0.0001			0.0004		0.0027			0.1480	<0.0005			
25/11/2012 12:14	<0.0001	0.0036	<0.00005	0.0004	<0.0002	0.0011	0.066	<0.0001	0.3360	0.0007	0.0002	<0.0002	0.003
2/12/2012 14:56	<0.0001	0.0032	0.0001	0.0010	<0.0002	0.0098	0.039	<0.0001	0.3480	0.0019	0.0004	<0.0002	0.006
3/12/2012 14:33	<0.0001			0.0015		0.0096			0.4010	0.0024			
4/12/2012 10:15	<0.0001			0.0013		0.0025			0.3760	0.0012			
5/12/2012 11:10	<0.0001	0.0032	0.0001	0.0017	<0.0002	0.0079	0.049	<0.0001	0.3990	0.0012	0.0008	<0.0002	0.011
8/12/2012 9:17	<0.0001			0.0014		0.0026			0.5070	0.0047			
12/12/2012 8:05	<0.0001	0.0043	<0.00005	0.0006	<0.0002	0.0012	0.031	<0.0001	0.3440	<0.0005	0.0001	<0.0002	0.001

Appendix 6: Physicochemical Parameters Data for Upper Watut in 2012

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
1/01/2012 15:00	7.02	7.05			
1/01/2012 15:00			28	1947	
2/01/2012 11:37	6.17	7.32	32	793	
3/01/2012 15:00	7.29	8.08			
3/01/2012 15:00			40	1215	
4/01/2012 15:00	6.52	7.81	33	2289	
5/01/2012 8:50	6.63	7.84	38	4024	25
6/01/2012 0:00	6.27	7.71			
6/01/2012 11:26			34	1715	
7/01/2012 15:00	7.95	7.56	33		
8/01/2012 16:00	6.01	7.72	33		
9/01/2012 16:00	9.87	7.78	32	707	
10/01/2012 15:00	7.9	7.96	32	476	
11/01/2012 15:00	6.09	8.08	33	528	
12/01/2012 15:30	7.34	8.12	30	364	
13/01/2012 16:30	7.74	7.92			
13/01/2012 16:30			29	4013	
14/01/2012 13:00	6.29	7.59	30	1041	
15/01/2012 13:30			32	1067	
15/01/2012 13:30	7.01	7.50			
16/01/2012 12:00	6.91	7.46	31		
17/01/2012 8:59	7.49	7.33	30	1529	
18/01/2012 11:50	8.09	7.15	37	4511	47
18/01/2012 15:50			36		50
19/01/2012 10:00			50		30
19/01/2012 10:50			37		39
19/01/2012 11:50	9.02	7.91	28	715	
19/01/2012 14:50			35		37
20/01/2012 8:25			37		20
20/01/2012 10:25	7.61				
20/01/2012 10:25			23	2440	
20/01/2012 10:25		7.29			
20/01/2012 14:25			37		28
21/01/2012 10:20	9.86	7.46	40	2158	20
22/01/2012 12:24	6.67	7.12	47	3120	14
23/01/2012 0:00			29	2269	
23/01/2012 11:00			46		13
23/01/2012 12:57			45		17

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
23/01/2012 12:58			46		18
23/01/2012 13:00	9.35	7.51			
23/01/2012 14:00			46		15
24/01/2012 0:00			31	949	
24/01/2012 0:00	No data	No data			
24/01/2012 10:00			42		12
24/01/2012 11:00			38		16
24/01/2012 13:00			42		21
25/01/2012 10:00	7.85	7.51	31	2043	
26/01/2012 9:08	8.61	7.93	45	2491	13
27/01/2012 11:00			45		28
27/01/2012 13:00			32	902	
27/01/2012 15:00			46		29
28/01/2012 10:00			62		29
28/01/2012 14:00			31	1453	
29/01/2012 0:00			34	1161	
29/01/2012 11:00			44		30
29/01/2012 15:00			46		34
30/01/2012 12:00			43		30
30/01/2012 14:00			25		27
31/01/2012 13:00			41		21
31/01/2012 14:00	9.91	7.68	24	2140	
1/02/2012 16:12	9.55	7.23	30	1990	
2/02/2012 10:20			172		
2/02/2012 16:00	8.19	7.49			
3/02/2012 15:00	7.92	7.71	25		
4/02/2012 16:00	11.31	7.28	23	1175	
5/02/2012 16:00	9.66	7.33	25		
6/02/2012 16:00	6.9	7.57	34		35
7/02/2012 10:30	6.31	7.71	28		
8/02/2012 12:58	8.55	7.20	33	436	
9/02/2012 10:10	7.46	7.47	34	374	
10/02/2012 12:00	7.11	7.25			
11/02/2012 12:08	6.66	7.86	35		
12/02/2012 12:06	7.98	7.47	31		
12/02/2012 14:56			39		
13/02/2012 19:00	7.9	6.65	27		
14/02/2012 8:30	8.32	7.78	35		
15/02/2012 12:10	9.35	7.72	48	1622	33
16/02/2012 9:10	6.17	7.96	35		

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
17/02/2012 12:56			38		
18/02/2012 14:15			36		
19/02/2012 13:02			40		
20/02/2012 14:28	9.82	7.88	34		
21/02/2012 9:43	8.12	7.37	37		
21/02/2012 10:25			62		52
22/02/2012 11:00	7.09	7.69	35		
23/02/2012 10:15	7.2	7.67	41		
24/02/2012 10:35	6.36	7.70	38		
25/02/2012 12:45	5.65	7.71	39		
26/02/2012 11:35	6.25	7.70	39		
27/02/2012 11:43	4.73	7.60	39	273	
28/02/2012 9:24			36	508	
29/02/2012 12:13			35	1672	
1/03/2012 8:39		7.74			
2/03/2012 15:15		7.76			
3/03/2012 15:35		7.62			
4/03/2012 15:38	9.87	7.68			
5/03/2012 0:00			41	472	56
5/03/2012 10:25			44		75
5/03/2012 13:01		7.44			
5/03/2012 13:01	6.17				
6/03/2012 8:26		7.62			
6/03/2012 8:26	6.88				
7/03/2012 8:07		7.46			
7/03/2012 8:07	9.88				
8/03/2012 9:00	9.53	7.71			
9/03/2012 13:15		7.60			
9/03/2012 13:15	11.39				
10/03/2012 14:30	12.1	7.58			
11/03/2012 13:39	10.49	7.54			
12/03/2012 11:30	6.85	7.49			
13/03/2012 9:30	6.03	7.03			
14/03/2012 12:38	6.04	7.30			
15/03/2012 9:00	5.8	7.27			
16/03/2012 12:58	6.95	7.78			
17/03/2012 13:00	6.83	7.57			
18/03/2012 14:00	8.34	7.49			
19/03/2012 14:04	6.39	7.66			
20/03/2012 9:45	6.88	7.51	40	947	34

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
21/03/2012 14:58	8.08	7.80			
22/03/2012 8:30	7.04	7.41			
23/03/2012 12:00	9.97	7.73			
24/03/2012 12:50	7.52	7.76			
25/03/2012 11:39	7.22	7.61			
26/03/2012 13:00	6.49	7.64			
27/03/2012 10:10	6.83	7.49			
29/03/2012 10:00	6.09	7.48			
30/03/2012 13:05	7.03	8.30			
31/03/2012 11:43	8.21	7.54			
1/04/2012 0:00			39	196	
1/04/2012 13:40	7.74	8.11			
2/04/2012 0:00			41	277	
2/04/2012 15:30	6.41	7.35	32		62
3/04/2012 0:00			38	845	
3/04/2012 8:30	6.82	7.34			
4/04/2012 15:50	6.69	8.24			
4/04/2012 15:50			35	178	
5/04/2012 12:45			34		65
5/04/2012 13:40	6	8.01			
5/04/2012 13:40			37	129	
6/04/2012 13:40			42	56	
7/04/2012 13:08			35	104	
7/04/2012 13:08	6.26	7.93			
8/04/2012 13:35	8.74	7.88			
8/04/2012 13:35			37	445	
9/04/2012 11:05			35	1426	
9/04/2012 11:05	7.45	7.22			
10/04/2012 9:10			36		
11/04/2012 12:20			38		
11/04/2012 12:20	6.32	8.11			
12/04/2012 8:29			39	141	
13/04/2012 0:00			35	268	
13/04/2012 14:15	9.99	7.72			
14/04/2012 17:15	13.21	8.03	47	219	
15/04/2012 12:40	11.4	7.91	36	238	
16/04/2012 13:20	8.45	7.99			
16/04/2012 13:20			39	202	
17/04/2012 8:07			42		
17/04/2012 8:07	8.05	7.93			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
18/04/2012 15:07	10.67	7.94			
18/04/2012 15:07			33	216	
19/04/2012 16:00	12.29	8.21	41	214	
20/04/2012 8:20	6.36	7.80	39	950	
22/04/2012 14:50			35	670	
22/04/2012 14:50	7.09	7.32			
23/04/2012 13:00	10.02	7.86			
23/04/2012 13:00			33	850	
24/04/2012 8:08			34	630	
24/04/2012 8:08	7.21	7.75			
25/04/2012 14:16	10.3	7.91			
25/04/2012 14:16			31	829	
26/04/2012 14:16			40		
26/04/2012 17:50	6.01	7.86			
27/04/2012 17:00	12.2	8.16	40	931	
28/04/2012 13:42	9.9	8.28	37	288	
29/04/2012 18:26	5.5	7.75			
29/04/2012 18:26			31	893	
30/04/2012 18:46			38		
30/04/2012 18:46	5.55	8.28			
1/05/2012 10:20	6.37	7.08	30		
2/05/2012 13:40	9.56	7.84	37	967	82
3/05/2012 13:45	10.37	8.07			
3/05/2012 13:45			35	940	
4/05/2012 12:45			36	615	
4/05/2012 12:45	7.54	7.82			
5/05/2012 13:35	10.95	7.93			
5/05/2012 13:35			39	1197	
6/05/2012 14:15			31	1005	
6/05/2012 14:15	13.51	7.91			
7/05/2012 10:00	12.78	7.97			
7/05/2012 10:00			28	1577	
7/05/2012 16:00			39		52
8/05/2012 8:30	9.9	7.92	28	2568	
9/05/2012 11:40			37	1814	
9/05/2012 11:40	9.18	8.43			
10/05/2012 0:00			33	2611	
10/05/2012 9:12			33	2611	
10/05/2012 9:12	12.65	7.76			
11/05/2012 13:02	13.84	7.95			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
11/05/2012 13:02			32	1531	
12/05/2012 15:35			38	1297	
12/05/2012 15:35	13.68	7.72			
13/05/2012 12:20	10.71	7.73	31	2244	
14/05/2012 10:32	9.72	7.65	35	1627	
15/05/2012 17:10	7.65	7.63	39		
16/05/2012 17:10	9.16	7.42	37	1088	
17/05/2012 10:00	8.81	7.24			
17/05/2012 10:00			37	3113	
18/05/2012 10:17			29		
18/05/2012 10:17	7.39	7.46			
19/05/2012 8:35			35		26
19/05/2012 15:17	9.32	7.03			
19/05/2012 15:17			34	2005	
20/05/2012 15:00	9.09	7.84	40		
21/05/2012 12:26	7.39	7.78			
21/05/2012 12:26			37		
22/05/2012 7:30			38	1316	
22/05/2012 7:30	9.19	7.68			
23/05/2012 0:00			38	727	
23/05/2012 13:00			38	727	
23/05/2012 13:00	6.76	7.58			
24/05/2012 0:00			38	760	
24/05/2012 10:05			38	760	
24/05/2012 10:05	6.76	7.86			
25/05/2012 14:04	8.05	8.01			
25/05/2012 14:04			36	1144	
26/05/2012 0:00			44		
26/05/2012 16:15			47		
26/05/2012 16:15	7.73	7.96			58
26/05/2012 16:15			44		
27/05/2012 11:34			38	831	
27/05/2012 11:34	9.31	7.30			
27/05/2012 11:34			40		
27/05/2012 11:34					48
28/05/2012 16:00			38		
28/05/2012 16:00	9.74	7.98			47
28/05/2012 16:00			34	1406	
29/05/2012 15:12			33	1111	
29/05/2012 15:12	12.55	7.78			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
30/05/2012 9:10	12.33	8.04	29	878	
31/05/2012 0:00			35	758	
31/05/2012 9:17	8.11	6.90			
31/05/2012 9:17			35	758	
1/06/2012 15:10	13.47	7.71	31	1117	
2/06/2012 14:15	12.87	7.87			
2/06/2012 14:15			31	855	
3/06/2012 16:18			30		
3/06/2012 16:18	10.62	7.75			
4/06/2012 9:00			38	1720	50
4/06/2012 17:25	10.67	7.78	29	2428	38
5/06/2012 9:43	7.1	7.29	35	1021	
6/06/2012 9:25	8.22	7.78	36	1712	
7/06/2012 7:55	10.68	7.81	30	3166	
8/06/2012 13:20	8.67	7.06			
8/06/2012 13:20			32	1615	
9/06/2012 15:20			28	2399	
9/06/2012 15:20	11.53	7.80			
10/06/2012 15:19	8.2	7.99			
10/06/2012 15:19			37		
11/06/2012 16:48			34		
11/06/2012 16:48	11.6	7.91			
12/06/2012 9:40	8.46	7.42			
12/06/2012 9:40			30	1485	
13/06/2012 12:15			35	1003	
13/06/2012 12:15	9	7.27			
14/06/2012 15:40	9.57	7.88			
14/06/2012 15:40			28		
15/06/2012 13:47	12.13	7.64	37		
16/06/2012 13:35	9.04	7.93			
16/06/2012 13:35			35	493	
17/06/2012 14:00			32	641	
17/06/2012 14:00	11.22	7.81			
18/06/2012 13:17	10.36	7.90			
18/06/2012 13:17			42	823	
18/06/2012 13:17					48
18/06/2012 13:17			31	622	
19/06/2012 8:50			34	465	
19/06/2012 8:50	10.21	7.63			
20/06/2012 9:56	6.34	7.61			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
20/06/2012 9:56			36	324	
21/06/2012 8:36			32	1230	
21/06/2012 8:36	10.1	7.66			
22/06/2012 14:56	9.13	8.07			
22/06/2012 14:56			33	436	
23/06/2012 14:43			29		
23/06/2012 14:43	12.52	7.89			
24/06/2012 15:47			36		
24/06/2012 15:47	8.29	7.57			
25/06/2012 9:49	6.19	7.61			
25/06/2012 9:49			37		
26/06/2012 7:51			34		
26/06/2012 7:51	11.8	6.67			
27/06/2012 16:46	11.16	7.65			
27/06/2012 16:46			35	492	
28/06/2012 10:00	9.55	7.28	33	1163	
29/06/2012 13:20	9.67	7.64	32	925	
30/06/2012 14:50	6.81	7.85	41	685	69
1/07/2012 14:55	10.37	7.98			
1/07/2012 14:55			38	466	
2/07/2012 17:24			39		
2/07/2012 17:24					96
2/07/2012 17:24			39		
2/07/2012 17:24	11.82	7.86			
3/07/2012 12:00	11.87	7.58			
3/07/2012 17:40	10.9	7.97			
4/07/2012 8:50	7.23	7.39			
4/07/2012 8:50			37	329	
5/07/2012 14:50			33	892	
5/07/2012 14:50	12.08	7.20			
6/07/2012 9:05	9.35	7.09			
6/07/2012 9:05			34	1121	
8/07/2012 10:10			36	366	
8/07/2012 10:10	7.9	7.54			
8/07/2012 11:45			60		128
9/07/2012 17:17	8.81	7.18			
9/07/2012 17:17			35	368	
10/07/2012 0:00			37		
10/07/2012 16:12			37		
10/07/2012 16:12	12.6	7.98			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
11/07/2012 17:00	7.68	7.92			
12/07/2012 9:35	7.69	7.39			
12/07/2012 9:35			37		
13/07/2012 10:55	7.51	7.30	38	222	
14/07/2012 10:55			35	356	
14/07/2012 15:02	8.68	7.87			
15/07/2012 16:53	11.78	7.66			
15/07/2012 16:53			35	407	
16/07/2012 16:30			36		
16/07/2012 16:30	7.19	7.43			
17/07/2012 11:59			36	259	
17/07/2012 11:59	7.29	7.57			
18/07/2012 7:57			43	735	
18/07/2012 7:57	8.75	8.21			
19/07/2012 13:41	10.24	7.71			
19/07/2012 13:41			37	391	
20/07/2012 14:53	6.48	8.02	44	1476	46
21/07/2012 16:51	7.03	7.77	37	323	
22/07/2012 18:00			38		
23/07/2012 9:25			41	240	70
23/07/2012 17:16	7.15	7.58			
24/07/2012 17:04	6.85	8.20	37	587	
25/07/2012 9:42	6.28	7.65	43	386	96
26/07/2012 14:33			36	632	
26/07/2012 14:33	10.81	7.75			
27/07/2012 8:07	6.02	7.68			
27/07/2012 8:07			34	500	
28/07/2012 14:30			38	595	
28/07/2012 14:30	8.31	7.47			
29/07/2012 13:55	6.92	7.23	42	390	
30/07/2012 14:34	8.72	7.57	37	274	
31/07/2012 9:25			37	771	
31/07/2012 9:25	12.09	7.54			
1/08/2012 7:35			36	1036	
1/08/2012 7:35	11.17	7.23			
2/08/2012 15:00			38	783	
2/08/2012 15:00	12.62	7.45			25
2/08/2012 15:00			41		
3/08/2012 12:00			35	973	
4/08/2012 10:25	7.83	7.49	28	2900	

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
5/08/2012 9:36	7.88	7.64	26	3119	
6/08/2012 10:20		7.88	31	1249	
7/08/2012 11:00	Not Done	7.73	37	694	
8/08/2012 7:35	No Data	7.20			
8/08/2012 7:35			29		
9/08/2012 11:30	Not Done	6.99			
10/08/2012 11:00	Not Done	7.30	35	984	
11/08/2012 11:05	Not Done	7.29	31	1540	
12/08/2012 11:10	DO sensor error	7.34	32	2565	
13/08/2012 13:00	DO sensor error	7.03	30	2221	47
14/08/2012 10:10	DO sensor error	7.05	33		
15/08/2012 9:20	6.05	7.45	28	1714	
16/08/2012 16:48	6.72	6.59	28	1077	
17/08/2012 8:59			42	941	
17/08/2012 8:59	8.21	7.57			
18/08/2012 16:25	6.37	7.12			
18/08/2012 16:25			39	1949	
19/08/2012 14:06	8.03	7.64	32	960	
20/08/2012 14:30	9.58	7.16	42	820	49
21/08/2012 16:15	7.95	8.26	32	830	
22/08/2012 13:30	9.69	7.72	32	561	
23/08/2012 11:27	9.27	7.06	35	822	
24/08/2012 7:40	6.18	7.24	36	644	
25/08/2012 14:58	8.25	7.41	33	911	
26/08/2012 13:24	12.95	7.61			
26/08/2012 13:24			37	454	
27/08/2012 11:50	7.51	7.57	38	489	
28/08/2012 8:36	6.44	7.10	34	464	
29/08/2012 12:25	8.19	7.64	38	346	44
30/08/2012 13:06	7.16	7.70			
30/08/2012 13:06			35	584	
31/08/2012 15:11	7.33	7.19	39	413	
1/09/2012 10:23	7.39	7.69			
1/09/2012 10:23			36	459	
2/09/2012 12:00			31	946	
2/09/2012 12:00	11.23	8.08			
3/09/2012 13:13	11.07	7.67			
3/09/2012 13:13			35	1306	
4/09/2012 0:00	No vehicle	No vehicle			
5/09/2012 13:45	8.7	7.91			24

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
5/09/2012 13:45			36	818	
6/09/2012 15:39			32	946	
6/09/2012 15:39	7.43	8.05			
7/09/2012 7:39	8.96	7.21			
7/09/2012 7:39			28	6024	
8/09/2012 10:40			31	1115	
8/09/2012 10:40	10.07	7.87			
9/09/2012 13:46	10.97	7.71	34	705	
10/09/2012 13:43			34	2088	
10/09/2012 13:43	10.76	7.24			
11/09/2012 9:15	12.99	7.96	41	466	
12/09/2012 13:00			29	2336	
12/09/2012 13:00	10.97	7.46			
13/09/2012 14:25	10.44	7.77			
13/09/2012 14:25			28	853	
14/09/2012 13:08			34	1135	
14/09/2012 13:08	10.89	7.56			
15/09/2012 14:04	9.87	7.86			
15/09/2012 14:04			28	940	
16/09/2012 14:17			30	4096	
16/09/2012 14:17	9.86	7.63			
17/09/2012 14:38	10.47	7.67	32	1150	
18/09/2012 0:00			36	788	
18/09/2012 11:55	6.85	7.84	36	788	
19/09/2012 13:34			35	1098	
19/09/2012 13:34	15	8.32			
20/09/2012 8:23	10.82	6.77	38	1270	
21/09/2012 14:38	DO value is very high,hence data was omiited	7.83	41	1012	
22/09/2012 14:00			26	906	
22/09/2012 14:00	8	7.67			
23/09/2012 15:32	8.49	7.68			
23/09/2012 15:32			31	1010	
24/09/2012 16:09			35	600	
24/09/2012 16:09	9.27	7.41			
25/09/2012 9:20			36	732	
25/09/2012 9:20	8.17	7.28			
26/09/2012 12:35			36		
26/09/2012 12:35	7.24	7.17			
27/09/2012 12:16	11.12	7.50			

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
27/09/2012 12:16			31	802	
28/09/2012 8:03	8.53	7.51			
28/09/2012 8:03			30	1042	
29/09/2012 12:40			31	470	
29/09/2012 12:40	10.36	7.26			
30/09/2012 17:10	8.96	7.11			
1/10/2012 12:51	7.96	7.14			
2/10/2012 14:48	10.58	7.30			
2/10/2012 14:48			33		
3/10/2012 12:00			32		
3/10/2012 12:00	7.44	7.38			
4/10/2012 13:09	12.63	7.35			
4/10/2012 13:09			32		
5/10/2012 10:53			25		
5/10/2012 10:53	8.88	7.53			
6/10/2012 12:20	8.47	7.81	34		
7/10/2012 11:05			27		
8/10/2012 11:30	10.48	7.93	39		
9/10/2012 10:47	6.48	7.56	36		
10/10/2012 8:50	8.59	7.78	40		
11/10/2012 15:56	8.29	8.04	34		
12/10/2012 15:25	10.71	7.43	73		
13/10/2012 12:48	8.53	7.36			
13/10/2012 12:48			37		
14/10/2012 12:23			41		
14/10/2012 12:23	6.77	7.54			
15/10/2012 14:42	8.24	7.66	31		
16/10/2012 8:08			34		
16/10/2012 8:08	8.57	7.77			
17/10/2012 14:00	10.68	7.75			
17/10/2012 14:00			35		28
18/10/2012 8:52			32		
18/10/2012 8:52	7.11	7.80			
19/10/2012 13:23	11.69	7.89	32		
20/10/2012 13:24			36		
20/10/2012 13:24	10.11	8.04			
21/10/2012 13:40	10.58	8.05	36		
22/10/2012 13:50	11.01	7.85	36		
23/10/2012 8:10	6.9	8.02	38		
24/10/2012 10:10	7.67	7.60	35		

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
25/10/2012 12:57			27		
26/10/2012 13:15			32		
26/10/2012 13:15	10.64	7.80			
27/10/2012 12:31	9.91	7.99			
27/10/2012 12:31			33		
28/10/2012 0:00			33		
28/10/2012 12:00	10.28	7.86			
29/10/2012 0:00			42		
29/10/2012 13:49	9.38	8.18			
30/10/2012 12:27	10.44	7.75	32		
31/10/2012 11:56	10.83	7.96	33		
1/11/2012 12:51	10.84	7.83	32		
2/11/2012 13:18	10.33	7.99	31		
3/11/2012 12:25	7.37	7.99	34		
4/11/2012 8:20	7.7	7.71	47		
5/11/2012 12:10	8.31	7.86	30		
6/11/2012 12:00	7.43	7.85	33		
7/11/2012 7:56	8.46	7.91	37		
8/11/2012 13:37	10.52	7.73	36		
9/11/2012 14:36	10.63	7.98	36		
10/11/2012 13:21	5.97	8.05	36		
11/11/2012 12:42	9	8.12	30		
12/11/2012 9:39	8.46	7.45	33		
13/11/2012 8:00	8.05	8.23			
14/11/2012 12:37	7.62	7.68			
14/11/2012 12:37			32		
15/11/2012 14:46	10.66	7.82	28		
16/11/2012 7:57	9.89	7.79	35		
17/11/2012 13:04	11.28	8.04	31		
18/11/2012 14:18	10.13	7.94	32		
19/11/2012 13:38			34		
19/11/2012 13:38	9.87	7.55			
20/11/2012 8:20	9.16	7.84	33		
21/11/2012 11:35	12.23	7.90			
21/11/2012 11:35			34		
22/11/2012 10:12			36		
22/11/2012 10:12	8.67	7.73			
23/11/2012 8:05	6.01	7.71			
23/11/2012 8:05			36		
24/11/2012 10:20			36		

Date	Dissolved Oxygen (mg/L)	pH-field (pH Units)	Total alkalinity (mg/L CaCO3)	Tot. Suspended Solids (mg/L)	Sulfate as SO4 (mg/L)
24/11/2012 10:20	10.04	7.74			
25/11/2012 12:14			36		
25/11/2012 12:41	7.31	7.94			
25/11/2012 12:41			36		
26/11/2012 12:06			33		
26/11/2012 12:06	12.05	7.82			
27/11/2012 8:36	9.4	7.76			
27/11/2012 8:36			37		
28/11/2012 13:00			35		
28/11/2012 13:00	7.73	7.86			
29/11/2012 0:00	Not Done	Not Done			
30/11/2012 8:23	7.51	7.98			
30/11/2012 8:23			40		
1/12/2012 13:08	10.28	7.99			
1/12/2012 13:08			36		
2/12/2012 14:56	10.13	7.97	39		
3/12/2012 14:33	10.1	7.99	38		
4/12/2012 0:00			36		
4/12/2012 10:05	9.35	7.20			
5/12/2012 11:10	8.16	8.23	42		
6/12/2012 11:51			37		
6/12/2012 11:51	9.86	7.19			
7/12/2012 7:03	8.25	7.80			
8/12/2012 9:17	6.23	8.09	38		
9/12/2012 10:21			35		
9/12/2012 10:21	5.68	7.88			
10/12/2012 16:00	9.64	7.84			
10/12/2012 16:00			35		
11/12/2012 13:07			36		
11/12/2012 13:07	10.79	7.34			
12/12/2012 8:05	7.06	7.81	39		

Appendix 7: Dissolved Metals (mg/L) Data for Nauti in 2012

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
5/01/2012 8:10	<0.0001	0.0072	<0.0001	0.0007	<0.0001	0.0025	0.025	<0.0001	0.2870	<0.0003	0.0003	<0.0001	0.022
5/01/2012 8:50	<0.0001	0.0063	<0.0001	0.0007	<0.0001	0.011	0.036	<0.0001	0.2600	<0.0003	0.0006	<0.0001	0.011
5/01/2012 9:10	<0.0001	0.0063	<0.0001	0.0008	<0.0001	0.0066	0.039	<0.0001	0.2590	0.0008	0.0003	<0.0001	0.011
5/01/2012 10:10	<0.0001	0.0058	<0.0001	0.0008	<0.0001	0.0052	0.040	<0.0001	0.2550	0.0005	0.0004	<0.0001	0.007
5/01/2012 10:15	<0.0001	0.0057	<0.0001	0.0008	<0.0001	0.0049	0.044	<0.0001	0.2610	<0.0003	0.0005	<0.0001	0.010
5/01/2012 11:10	<0.0001	0.0057	<0.0001	0.0008	<0.0001	0.0048	0.038	<0.0001	0.2460	<0.0003	0.0003	<0.0001	0.007
5/01/2012 12:10	<0.0001	0.0056	<0.0001	0.0008	<0.0001	0.0101	0.042	<0.0001	0.2460	<0.0003	0.001	<0.0001	0.012
5/01/2012 13:10	<0.0001	0.0055	<0.0001	0.0003	<0.0001	0.0036	0.046	<0.0001	0.2230	<0.0003	0.0006	<0.0001	0.007
5/01/2012 13:15	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0010	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	0.003
8/01/2012 12:00	<0.0001	0.0045	<0.0001	0.0005	<0.0001	0.0017	0.050	<0.0001	0.3320	0.0006	0.0003	<0.0001	0.004
8/01/2012 13:00	<0.0001	0.0049	<0.0001	0.0007	<0.0001	0.0034	0.084	<0.0001	0.3370	<0.0003	0.0006	<0.0001	0.006
8/01/2012 14:00	<0.0001	0.0048	<0.0001	0.0005	<0.0001	0.0039	0.048	<0.0001	0.3150	0.0006	0.0007	<0.0001	0.005
8/01/2012 15:00	<0.0001	0.0050	<0.0001	0.0006	<0.0001	0.0014	0.041	<0.0001	0.3420	<0.0003	0.0002	<0.0001	0.003
9/01/2012 13:00	<0.0001	0.0042	<0.0001	0.0008	<0.0001	0.0021	0.038	<0.0001	0.3390	<0.0003	0.0004	<0.0001	0.004
9/01/2012 14:00	<0.0001	0.0043	<0.0001	0.0009	<0.0001	0.0029	0.036	<0.0001	0.3420	<0.0003	0.0003	<0.0001	0.004
9/01/2012 15:00	<0.0001	0.0042	<0.0001	0.0009	<0.0001	0.0041	0.072	<0.0001	0.3460	0.0006	0.0013	<0.0001	0.008
9/01/2012 16:00	<0.0001	0.0041	<0.0001	0.0008	<0.0001	0.0017	0.031	<0.0001	0.3260	<0.0003	0.0002	<0.0001	0.007
10/01/2012 10:00	<0.0001	0.0038	0.0001	0.0011	<0.0001	0.0031	0.036	<0.0001	0.3740	0.0014	0.0018	<0.0001	0.008
10/01/2012 11:00	<0.0001	0.0043	0.0001	0.0009	<0.0001	0.0032	0.018	<0.0001	0.4170	0.0006	0.0013	<0.0001	0.003
10/01/2012 12:00	<0.0001	0.0040	<0.0001	0.0011	<0.0001	0.0035	0.038	<0.0001	0.3510	0.0041	0.0012	<0.0001	0.006
10/01/2012 13:00	<0.0001	0.0040	0.0001	0.0011	<0.0001	0.0043	0.040	<0.0001	0.3520	0.001	0.0004	<0.0001	0.004
10/01/2012 14:00	<0.0001	0.0045	<0.0001	0.0010	<0.0001	0.0028	0.032	<0.0001	0.2850	<0.0003	0.0003	<0.0001	0.004
10/01/2012 15:00	<0.0001	0.0044	<0.0001	0.0010	<0.0001	0.0023	0.032	<0.0001	0.2950	0.0005	0.0003	<0.0001	0.005

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
11/01/2012 10:00	<0.0001	0.0042	0.0001	0.0011	<0.0001	0.0018	0.035	<0.0001	0.3500	<0.0003	0.0002	<0.0001	0.002
11/01/2012 11:00	<0.0001	0.0044	0.0001	0.0010	<0.0001	0.0018	0.028	<0.0001	0.3560	<0.0003	0.0003	<0.0001	0.003
11/01/2012 12:00	<0.0001	0.0043	0.0001	0.0012	<0.0001	0.0019	0.040	<0.0001	0.3470	<0.0003	0.0003	<0.0001	0.003
11/01/2012 13:00	<0.0001	0.0049	0.0001	0.0009	<0.0001	0.0018	0.032	<0.0001	0.2770	<0.0003	0.0004	<0.0001	0.003
11/01/2012 14:00	<0.0001	0.0043	0.0001	0.0011	<0.0001	0.0017	0.037	<0.0001	0.3290	<0.0003	0.0003	<0.0001	0.003
11/01/2012 15:00	<0.0001	0.0045	0.0001	0.0010	<0.0001	0.0018	0.041	<0.0001	0.3150	<0.0003	0.0003	<0.0001	0.020
12/01/2012 15:30	0.0001			0.0010		0.0042			0.3380	0.0007			
14/01/2012 13:00	<0.0001			0.0013		0.0088			0.3060	0.0006			
18/01/2012 11:50	<0.0001	0.0045	<0.0001	0.0015	<0.0001	0.0063	0.030	<0.0001	0.3470	0.0008	0.0026	<0.0001	0.019
18/01/2012 12:50	<0.0001	0.0052	0.0001	0.0023	0.000	0.0188	0.128	<0.0001	0.4260	0.0044	0.0232	<0.0001	0.119
18/01/2012 13:50	<0.0001	0.0045	<0.0001	0.0016	<0.0001	0.0025	0.022	<0.0001	0.3260	0.0008	0.0016	<0.0001	0.012
18/01/2012 14:50	<0.0001	0.0048	0.0001	0.0020	0.000	0.0103	0.058	<0.0001	0.3500	0.0026	0.014	<0.0001	0.068
18/01/2012 15:50	<0.0001	0.0047	0.0001	0.0020	0.000	0.0109	0.051	<0.0001	0.3510	0.0025	0.013	<0.0001	0.065
19/01/2012 9:50	<0.0001	0.0039	<0.0001	0.0010	<0.0001	0.0028	0.032	<0.0001	0.2530	0.0008	0.0012	<0.0001	0.010
19/01/2012 10:00	0.0001	0.0048	<0.0001	0.0003	0.000	0.0037	0.023	<0.0001	0.1360	0.001	0.0035	<0.0001	0.041
19/01/2012 10:50	<0.0001	0.0043	0.0001	0.0019	0.001	0.0192	0.117	<0.0001	0.3650	0.0051	0.0246	<0.0001	0.132
19/01/2012 11:00	<0.0001	0.0051	<0.0001	0.0003	0.000	0.0031	0.019	<0.0001	0.1340	0.001	0.0032	<0.0001	0.024
19/01/2012 11:50	<0.0001	0.0040	<0.0001	0.0012	<0.0001	0.0036	0.021	<0.0001	0.2730	0.0005	0.0007	<0.0001	0.009
19/01/2012 12:00	<0.0001	0.0056	0.0001	0.0006	0.001	0.0141	0.069	<0.0001	0.1940	0.004	0.0199	<0.0001	0.105
19/01/2012 12:50	<0.0001	0.0044	0.0001	0.0014	0.000	0.0125	0.065	<0.0001	0.2840	0.0031	0.0159	<0.0001	0.078
19/01/2012 13:50	<0.0001	0.0044	<0.0001	0.0013	<0.0001	0.0051	0.032	<0.0001	0.2520	0.0009	0.0028	<0.0001	0.015
19/01/2012 14:50	<0.0001	0.0046	<0.0001	0.0014	<0.0001	0.0045	0.032	<0.0001	0.2490	<0.0003	0.0001	<0.0001	0.008
20/01/2012 8:25	0.0002	0.0040	<0.0001	0.0003	<0.0001	0.0047	0.016	<0.0001	0.2690	0.001	0.0023	<0.0001	0.022
20/01/2012 9:25	<0.0001	0.0040	0.0001	0.0006	0.001	0.0054	0.068	<0.0001	0.3300	0.0019	0.0053	<0.0001	0.041
20/01/2012 10:25	0.0003	0.0040	<0.0001	0.0002	<0.0001	0.0014	0.014	<0.0001	0.2590	<0.0003	0.0004	<0.0001	0.008

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
20/01/2012 11:25	0.0001	0.0040	<0.0001	0.0002	0.001	0.0021	0.028	<0.0001	0.2520	<0.0003	0.0008	<0.0001	0.018
20/01/2012 12:25	<0.0001	0.0041	<0.0001	0.0008	0.000	0.0032	0.022	<0.0001	0.2720	0.0005	0.0009	<0.0001	0.015
20/01/2012 13:25	<0.0001	0.0042	<0.0001	0.0013	0.001	0.0036	0.018	<0.0001	0.2740	0.0006	0.0009	<0.0001	0.017
20/01/2012 14:25	<0.0001	0.0042	<0.0001	0.0013	<0.0001	0.004	0.014	<0.0001	0.2670	<0.0003	0.001	<0.0001	0.020
21/01/2012 10:20	<0.0001	0.0047	<0.0001	0.0002	<0.0001	0.0042	0.126	<0.0001	0.1800	<0.0003	0.0004	<0.0001	0.010
22/01/2012 12:24	<0.0001	0.0039	<0.0001	<0.0001	<0.0001	0.004	0.015	<0.0001	0.0845	<0.0003	0.0001	<0.0001	0.008
23/01/2012 11:00	<0.0001	0.0038	<0.0001	<0.0001	0.000	0.004	0.041	<0.0001	0.1420	<0.0003	0.0002	<0.0001	0.009
23/01/2012 12:00	<0.0001	0.0039	<0.0001	<0.0001	<0.0001	0.0047	0.031	<0.0001	0.1480	<0.0003	0.0002	<0.0001	0.011
23/01/2012 13:00	0.0002	0.0040	<0.0001	<0.0001	<0.0001	0.0037	0.018	<0.0001	0.1420	<0.0003	<0.0001	<0.0001	0.008
23/01/2012 14:00	<0.0001	0.0039	<0.0001	0.0002	<0.0001	0.0046	0.019	<0.0001	0.1450	<0.0003	0.0002	<0.0001	0.008
24/01/2012 10:00	<0.0001	0.0049	<0.0001	0.0001	<0.0001	0.0011	0.163	<0.0001	0.1300	<0.0003	0.0005	<0.0001	0.002
24/01/2012 11:00	<0.0001	0.0054	<0.0001	0.0001	<0.0001	0.0009	0.126	<0.0001	0.1560	<0.0003	0.0003	<0.0001	0.002
24/01/2012 12:00	<0.0001	0.0058	<0.0001	0.0001	<0.0001	0.001		<0.0001	0.1560		0.0003	<0.0001	
24/01/2012 13:00	<0.0001	0.0064	<0.0001	0.0005	<0.0001	0.0014	0.146	<0.0001	0.2020	<0.0003	0.0003	<0.0001	0.002
26/01/2012 9:08	<0.0001	0.0049	<0.0001	<0.0001	<0.0001	0.0038	0.093	<0.0001	0.0798	<0.0003	0.0002	<0.0001	0.018
27/01/2012 11:00	<0.0001	0.0050	<0.0001	0.0012	<0.0001	0.0023	0.054	<0.0001	0.2300	<0.0003	0.0002	<0.0001	0.010
27/01/2012 12:00	<0.0001	0.0051	<0.0001	0.0012	<0.0001	0.0024	0.050	<0.0001	0.2260	<0.0003	0.0001	<0.0001	0.004
27/01/2012 13:00	0.0002	0.0056	<0.0001	0.0012	0.001	0.0034	0.087	<0.0001	0.2220	0.0011	0.0005	0.0002	0.007
27/01/2012 14:00	<0.0001	0.0055	<0.0001	0.0012	0.001	0.0021	0.059	<0.0001	0.2400	0.001	0.0005	<0.0001	0.004
27/01/2012 15:00	0.0003	0.0058	<0.0001	0.0011	0.001	0.0019	0.044	<0.0001	0.2370	0.0011	0.0005	0.0003	0.006
28/01/2012 10:00	0.0002	0.0059	<0.0001	0.0016	0.001	0.0032	0.056	<0.0001	0.2650	0.001	0.0006	0.0002	0.006
28/01/2012 11:00	0.0001	0.0060	<0.0001	0.0015	0.001	0.0025	0.054	<0.0001	0.2570	0.002	0.0005	<0.0001	0.005
28/01/2012 12:00	0.0001	0.0060	<0.0001	0.0017	0.001	0.0025	0.043	<0.0001	0.2690	0.001	0.0004	<0.0001	0.005
28/01/2012 13:00	0.0001	0.0052	<0.0001	0.0018	0.001	0.0034	0.049	<0.0001	0.2810	0.0012	0.0006	<0.0001	0.011
28/01/2012 14:00	0.0002	0.0059	<0.0001	0.0018	0.001	0.0058	0.038	<0.0001	0.2650	0.0011	0.0004	<0.0001	0.109

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
28/01/2012 15:00	<0.0001	0.0060	<0.0001	0.0018	0.001	0.0028	0.046	<0.0001	0.2640	0.001	0.0004	<0.0001	0.006
29/01/2012 11:00	<0.0001	0.0059	<0.0001	0.0016	0.001	0.0064	0.045	<0.0001	0.2810	0.0013	0.0006	<0.0001	0.052
29/01/2012 12:00	0.0001	0.0057	<0.0001	0.0016	0.001	0.0066	0.109	<0.0001	0.2920	0.0011	0.0006	<0.0001	0.039
29/01/2012 13:00	<0.0001	0.0058	<0.0001	0.0017	0.001	0.0061	0.122	<0.0001	0.2950	0.0011	0.0005	<0.0001	0.016
29/01/2012 14:00	<0.0001	0.0056	<0.0001	0.0016	0.001	0.0049	0.052	<0.0001	0.2980	0.001	0.0005	<0.0001	0.022
29/01/2012 15:00	<0.0001	0.0057	<0.0001	0.0017	0.001	0.0053	0.060	<0.0001	0.2920	0.0011	0.0005	<0.0001	0.022
30/01/2012 12:00	<0.0001	0.0080	<0.0001	0.0015	0.001	0.0058	0.042	<0.0001	0.2290	0.0012	0.0004	<0.0001	0.017
30/01/2012 13:00	<0.0001	0.0063	<0.0001	0.0015	0.001	0.0079	0.081	<0.0001	0.2590	0.0012	0.0006	<0.0001	0.024
30/01/2012 14:00	0.0001	0.0062	<0.0001	0.0014	0.001	0.0078	0.101	<0.0001	0.2600	0.0011	0.0006	<0.0001	0.079
31/01/2012 13:00	0.0001	0.0060	<0.0001	0.0010	0.001	0.0089	0.083	<0.0001	0.2100	0.001	0.0008	<0.0001	0.010
31/01/2012 14:00	<0.0001			0.0009		0.0207			0.2210	<0.0003			
1/02/2012 16:12	0.0001		0.0004	0.0023		0.0199			0.3470	<0.0003			
2/02/2012 16:00	0.0002			0.0031		0.0206			0.3320	<0.0003			
3/02/2012 12:00	0.0002	0.0054	<0.0001	0.0015	0.001	0.0228	0.118	<0.0001	0.2610	0.001	0.0005	<0.0001	0.008
3/02/2012 13:00	0.0001	0.0050	<0.0001	0.0014	0.001	0.023	0.101	<0.0001	0.2510	0.0011	0.0005	<0.0001	0.009
3/02/2012 14:00	0.0002	0.0040	<0.0001	0.0011	<0.0001	0.0157	0.102	<0.0001	0.2250	<0.0003	0.0002	<0.0001	0.006
3/02/2012 15:00	0.0001	0.0042	<0.0001	0.0012	<0.0001	0.015	0.119	<0.0001	0.2540	<0.0003	0.0002	<0.0001	0.004
4/02/2012 13:00	0.0002	0.0039	<0.0001	0.0012	<0.0001	0.0204	0.077	<0.0001	0.2730	<0.0003	0.0002	<0.0001	0.006
4/02/2012 14:00	0.0002	0.0039	<0.0001	0.0012	<0.0001	0.0229	0.066	<0.0001	0.2760	<0.0003	0.0001	<0.0001	0.005
4/02/2012 15:00	0.0002	0.0038	<0.0001	0.0014	<0.0001	0.0244	0.090	<0.0001	0.2870	<0.0003	0.0002	<0.0001	0.007
4/02/2012 16:00	0.0002	0.0035	<0.0001	0.0014	<0.0001	0.0307	0.095	<0.0001	0.2860	<0.0003	0.0002	<0.0001	0.164
5/02/2012 13:00	0.0002	0.0032	<0.0001	0.0014	<0.0001	0.0334	0.085	<0.0001	0.2730	<0.0003	0.0002	<0.0001	0.007
5/02/2012 14:00	0.0002	0.0031	<0.0001	0.0017	<0.0001	0.0348	0.071	<0.0001	0.2840	<0.0003	0.0004	<0.0001	0.220
5/02/2012 15:00	0.0002	0.0040	<0.0001	0.0017	<0.0001	0.0368	0.084	<0.0001	0.3320	<0.0003	0.0003	<0.0001	0.034
5/02/2012 16:00	0.0002	0.0031	<0.0001	0.0016	<0.0001	0.0497	0.083	<0.0001	0.2940	<0.0003	0.0001	<0.0001	0.006

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
6/02/2012 13:00	0.0001	0.0035	<0.0001	0.0018	0.000	0.0485	0.064	<0.0001	0.3790	<0.0003	0.0001	<0.0001	0.012
6/02/2012 14:00	0.0002	0.0033	<0.0001	0.0018	<0.0001	0.0446	0.067	<0.0001	0.3640	<0.0003	0.0002	<0.0001	0.011
6/02/2012 15:00	0.0002	0.0048	<0.0001	0.0020	<0.0001	0.0388	0.055	<0.0001	0.3730	<0.0003	0.0002	<0.0001	0.007
6/02/2012 16:00	0.0004	0.0039	<0.0001	0.0023	0.000	0.0639	0.062	<0.0001	0.3080	<0.0003	0.0009	<0.0001	0.070
7/02/2012 10:30	0.0002		0.0003	0.0026		0.0693			0.3450	0.0006			
9/02/2012 10:10	0.0002	0.0029	0.0001	0.0017	<0.0001	0.037	0.072	<0.0001	0.4160	0.0006	0.0001	<0.0001	0.113
11/02/2012 9:00	<0.0001	0.0038	<0.0001	0.0010	<0.0001	0.0095	0.070	<0.0001	0.3270	<0.0003	0.0004	<0.0001	0.038
11/02/2012 12:05	0.0001	0.0029	<0.0001	0.0018	<0.0001	0.0129	0.057	<0.0001	0.4340	0.0007	0.0005	<0.0001	0.030
11/02/2012 12:06	<0.0001	0.0026	<0.0001	0.0018	<0.0001	0.0323	0.042	<0.0001	0.3210	0.0006	0.0004	<0.0001	0.040
14/02/2012 8:30	0.0002	0.0038	<0.0001	0.0017	<0.0001	0.0082	0.051	<0.0001	0.3910	0.0006	0.0002	<0.0001	0.023
15/02/2012 12:10	0.0003	0.0044	<0.0001	0.0018	0.000	0.0133	0.065	<0.0001	0.2880	<0.0003	0.001	<0.0001	0.021
16/02/2012 9:10	<0.0001	0.0047	<0.0001	0.0022	<0.0001	0.0105	0.043	<0.0001	0.4020	0.0006	0.0003	<0.0001	0.023
17/02/2012 12:50	<0.0001	0.0041	0.0001	0.0034	<0.0001	0.0158	0.056	<0.0001	0.4170	0.0012	0.0002	<0.0001	0.010
18/02/2012 14:15	<0.0001	0.0048	0.0001	0.0015	<0.0001	0.0047	0.018	<0.0001	0.4260	0.0009	0.0002	<0.0001	0.020
19/02/2012 13:02	<0.0001	0.0048	0.0001	0.0034	<0.0001	0.0171	0.049	<0.0001	0.4380	0.0006	0.0004	<0.0001	0.024
20/02/2012 14:28	0.0001	0.0045	0.0001	0.0048	0.000	0.129	0.081		0.5440	0.0013	0.001	<0.0001	0.102
21/02/2012 9:43	0.0002	0.0032	<0.0001	0.0040	<0.0001	0.0265	0.044		0.4860	0.0006	0.0003	<0.0001	0.028
22/02/2012 11:00	<0.0001	0.0034	<0.0001	0.0030	<0.0001	0.0156	0.043	<0.0001	0.5290	0.0009	0.0001	<0.0001	0.069
23/02/2012 10:15	0.0002	0.0032	0.0001	0.0043	<0.0001	0.0358	0.056	<0.0001	0.5170	0.001	<0.0001	<0.0001	0.007
24/02/2012 10:35	0.0001	0.0029	0.0001	0.0048	<0.0001	0.044	0.018	<0.0001	0.5340	0.0009	<0.0001	<0.0001	0.007
25/02/2012 12:45	0.0004	0.0032	0.0001	0.0048	0.000	0.0308	0.049	<0.0001	0.4860	0.0008	<0.0001	<0.0001	0.006
26/02/2012 11:35	0.0003	0.0029	0.0001	0.0050	<0.0001	0.0326	0.041	<0.0001	0.5220	0.0009	<0.0001	<0.0001	0.007
27/02/2012 11:43	0.0002	0.0030	0.0001	0.0048	<0.0001	0.0193	0.020	<0.0001	0.5050	0.0006	<0.0001	<0.0001	0.006
1/03/2012 0:00	<0.0001	0.0048	<0.0001	0.0024	<0.0001	0.0049	0.050	<0.0001	0.1570	<0.0003	<0.0001	<0.0001	0.008
2/03/2012 0:00	0.0002	0.0041	<0.0001	0.0113	<0.0001	0.0246	0.038	<0.0001	0.1690	<0.0003	<0.0001	<0.0001	0.006

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
3/03/2012 0:00	<0.0001	0.0045	<0.0001	0.0046	<0.0001	0.0057	0.067	<0.0001	0.1520	<0.0003	<0.0001	<0.0001	0.007
4/03/2012 0:00	0.0001	0.0040	<0.0001	0.0104	<0.0001	0.0185	0.030	<0.0001	0.1740	<0.0003	<0.0001	<0.0001	0.006
5/03/2012 0:00	0.0003	0.0039	<0.0001	0.0114	<0.0001	0.0182	0.053	<0.0001	0.1870	<0.0003	<0.0001	<0.0001	0.007
5/03/2012 8:38	0.0001	0.0036		0.0001		0.0124	0.024		0.4310	0.0004		0.0001	0.003
6/03/2012 8:26	<0.001	0.0030	<0.0001	0.0060	<0.0005	0.027	0.150	<0.0001	0.3790	<0.001	0.003		0.025
7/03/2012 8:07	0.0005	0.0035	0.0001	0.0139	<0.0001	0.0236	0.151	<0.0001	0.1820	0.0007	<0.0001	<0.0001	0.007
8/03/2012 9:00	0.0006	0.0036	0.0001	0.0064	<0.0001	0.0386	0.080	<0.0001	0.4070	0.0007	0.0004	<0.0001	0.032
9/03/2012 13:15	0.0005	0.0034	0.0001	0.0064	<0.0001	0.0445	0.075	<0.0001	0.4140	0.0009	0.0004	<0.0001	0.035
10/03/2012 14:30	0.0003	0.0035	0.0001	0.0050	<0.0001	0.0341	0.063	<0.0001	0.3940	0.0008	0.0004	<0.0001	0.037
11/03/2012 13:39	0.0004	0.0034	0.0001	0.0065	<0.0001	0.0411	0.063	<0.0001	0.4490	0.0009	0.0004	<0.0001	0.042
12/03/2012 11:30	0.0004	0.0036	0.0001	0.0055	<0.0001	0.0373	0.059	<0.0001	0.4440	0.0006	<0.0001	<0.0001	0.002
15/03/2012 7:30	0.0004	0.0033	0.0001	0.0053	<0.0001	0.0461	0.038	<0.0001	0.3880	0.0013	0.0004	<0.0001	0.008
16/03/2012 12:58	0.0003	0.0032	0.0001	0.0054	<0.0001	0.0524	0.044	<0.0001	0.3650	0.0007	0.0001	<0.0001	0.019
17/03/2012 11:28	0.0004	0.0035	<0.0001	0.0045	<0.0001	0.0796	0.071	<0.0001	0.3200	0.0006	0.0008	<0.0001	0.006
18/03/2012 14:00	0.0004	0.0030	<0.0001	0.0040	<0.0001	0.0623	0.067	<0.0001	0.2760	0.0007	0.0004	<0.0001	0.021
19/03/2012 14:04	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0010	<0.0001	<0.0003	<0.0003	<0.0001	<0.0001	<0.0005
20/03/2012 9:45	0.0001	0.0044	<0.0001	0.0009	<0.0001	0.0131	0.034	<0.0001	0.2900	0.0008	<0.0001	<0.0001	0.005
20/03/2012 15:58	<0.0001	0.0038	<0.0001	0.0017	<0.0001	0.0089	0.034	<0.0001	0.2900	<0.0003	<0.0001	<0.0001	0.008
22/03/2012 8:30	0.0003	0.0036	0.0001	0.0046	0.000	0.0541	0.040	<0.0001	0.3720	0.0008	0.0002	<0.0001	0.019
23/03/2012 12:00	0.0001	0.0034	<0.0001	0.0051	<0.0001	0.043	0.029	<0.0001	0.3350	0.0006	0.0002	<0.0001	0.008
24/03/2012 12:50	<0.0001	0.0037	<0.0001	0.0044	<0.0001	0.0438	0.029	<0.0001	0.2860	0.0006	0.0001	<0.0001	0.008
25/03/2012 11:39	0.0001	0.0032	0.0001	0.0048	<0.0001	0.0598	0.038	<0.0001	0.3160	0.0006	<0.0001	<0.0001	0.013
26/03/2012 13:00	0.0002	0.0033	0.0001	0.0045	<0.0001	0.0592	0.049	<0.0001	0.3170	0.0011	0.0002	<0.0001	0.016
27/03/2012 10:10	0.0002	0.0035	<0.0001	0.0044	<0.0001	0.0436	0.058	<0.0001	0.3510	<0.0003	0.0003	<0.0001	0.033
28/03/2012 10:45	0.0002	0.0033	0.0001	0.0048	<0.0001	0.0621	0.047	<0.0001	0.3740	0.0007	0.0001	<0.0001	0.003

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
29/03/2012 10:00	0.0003	0.0036	0.0002	0.0033	<0.0002	0.0601	0.065	<0.0001	0.3440	<0.0005	0.0002	<0.0002	0.003
30/03/2012 13:05	0.0002	0.0032	0.0002	0.0035	<0.0002	0.08	0.078	<0.0001	0.3160	0.0007	0.0002	<0.0002	0.003
31/03/2012 11:43	0.0002	0.0032	0.0002	0.0036	<0.0002	0.0337	0.078	<0.0001	0.3230	0.0008	0.0002	<0.0002	0.005
1/04/2012 13:40	<0.0001	0.0030	0.0002	0.0035	<0.0002	0.0155	0.051	<0.0001	0.3380	0.0008	0.0002	<0.0002	0.033
2/04/2012 15:30	0.0002	0.0031	0.0002	0.0035	<0.0002	0.0189	0.077	<0.0001	0.3380	0.0006	0.0002	<0.0002	0.003
3/04/2012 8:30	0.0002	0.0030	<0.00005	0.0022	<0.0002	0.0327	0.112	<0.0001	0.2430	<0.0005	0.0003	<0.0002	0.002
4/04/2012 15:50	0.0003	0.0030	0.0002	0.0035	<0.0002	0.0203	0.086	<0.0001	0.3390	0.0006	0.0002	<0.0002	0.008
5/04/2012 12:45	0.0002	0.0028	0.0001	0.0039	<0.0002	0.0147	0.038		0.3840	0.0007	<0.0001		0.002
6/04/2012 15:00	0.0004	0.0028	0.0001	0.0043	<0.0002	0.0367	0.065	<0.0001	0.3500	0.0007	0.0003	<0.0002	0.024
8/04/2012 14:25	<0.0001	0.0038	0.0004	0.0008	<0.0002	0.027	0.100	<0.0001	0.3200	0.0006	0.0015	<0.0002	0.040
10/04/2012 9:10	<0.0001			0.0004	0.000		0.060	0.0	0.3150			<0.0002	
10/04/2012 9:10		0.0034	<0.0001	0.0004	0.000	0.0069		0.0	0.3150		0.0003		0.072
11/04/2012 9:10	<0.0001	0.0036	<0.0001	0.0003	<0.0002	0.0036	0.047	<0.0001	0.3240	<0.0005	0.0001	<0.0002	0.002
26/04/2012 0:00	<0.0001	0.0048	0.0001	0.0025	<0.0001	0.0184	0.043	<0.0001	0.4470	<0.0003	0.0003	<0.0001	0.017
27/04/2012 0:00	<0.0001	0.0045	<0.0001	0.0029	<0.0001	0.0156	0.049	<0.0001	0.4120	0.0005	0.0003	<0.0001	0.008
28/04/2012 0:00	0.0001	0.0041	<0.0001	0.0032	<0.0001	0.0233	0.051	<0.0001	0.4290	0.0007	0.0001	<0.0001	0.005
29/04/2012 0:00	<0.0001	0.0041	<0.0001	0.0033	<0.0001	0.0213	0.037	<0.0001	0.4330	<0.0003	0.0001	<0.0001	0.002
1/05/2012 10:20	<0.0001	0.0048	0.0032	0.0003	<0.0002	0.0052	0.043	<0.0001	0.3040	0.0006	0.0001	<0.0002	0.007
2/05/2012 13:40	<0.0001	0.0042	0.0012	0.0022	<0.0002	0.0128	0.034	<0.0001	0.5270	0.001	0.0008	<0.0002	0.026
3/05/2012 13:45	<0.0001	0.0045	0.0007	0.0017	<0.0002	0.0101	0.042	<0.0001	0.4420	0.0005	0.0003	<0.0002	0.014
4/05/2012 12:45	<0.0001	0.0045	0.0006	0.0024	<0.0002	0.0198	0.025	<0.0001	0.4960	<0.0005	0.0009	<0.0002	0.006
5/05/2012 13:35	<0.0001	0.0045	0.0008	0.0016	<0.0002	0.0121	0.076	<0.0001	0.3540	<0.0005	0.0002	<0.0002	0.006
6/05/2012 14:15	<0.0001	0.0045	0.0005	0.0011	<0.0002	0.0118	0.087	<0.0001	0.3180	<0.0005	0.0003	<0.0002	0.009
7/05/2012 16:00	<0.0001	0.0046	0.0018	0.0011	<0.0002	0.0064	0.030	<0.0001	0.3090	<0.0005	0.0001	<0.0002	0.009
8/05/2012 8:30	0.0001	0.0040	0.0013	0.0012	<0.0002	0.0058	0.029	<0.0001	0.3740	<0.0005	0.0001	<0.0002	0.007

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
9/05/2012 11:40	<0.0001	0.0061	0.0014	0.0007	0.000	0.0037	0.309	<0.0001	0.4470	0.0006	0.0025	<0.0002	0.053
10/05/2012 9:42	<0.0001	0.0041	0.0010	0.001	<0.0002	0.0042	0.032	<0.0001	0.3990	<0.0005	<0.0001	<0.0002	0.005
11/05/2012 13:02	<0.0001	0.0045	0.0004	0.0014	<0.0002	0.0075	0.033	<0.0001	0.4380	<0.0005	<0.0001	<0.0002	0.133
12/05/2012 15:35	<0.0001	0.0041	0.0006	0.0016	<0.0002	0.0112	0.026	<0.0001	0.4290	<0.0005	<0.0001	<0.0002	0.008
13/05/2012 12:20	<0.0001	0.0047	0.0007	0.0002	<0.0002	0.0013	0.015	<0.0001	0.3120	<0.0005	<0.0001	<0.0002	0.003
14/05/2012 10:32	<0.0001	0.0041	0.0015	0.0002	<0.0002	0.0018	0.015	<0.0001	0.2520	<0.0005	<0.0001	<0.0002	0.014
15/05/2012 8:10	<0.0001	0.0042	0.0002	0.0010	0.000	0.0094	0.029	<0.0001	0.3830	0.0009	0.0006	<0.0002	0.026
16/05/2012 12:59	<0.0001	0.0044	0.0009	0.0010	<0.0002	0.0057	0.030	<0.0001	0.3440	<0.0005	<0.0001	<0.0002	0.002
17/05/2012 10:00	<0.0001	0.0038	0.0014	0.0008	<0.0002	0.0048	0.070	<0.0001	0.3470	0.0007	0.0009	<0.0002	0.021
20/05/2012 15:00	<0.0001	0.0051	0.0002	0.0008	<0.0002	0.005	0.056	<0.0001	0.3690	<0.0005	<0.0001	<0.0002	0.004
21/05/2012 16:54	0.0001	0.0054	0.0007	0.0010	<0.0002	0.0203	0.033	<0.0001	0.3970	0.0005	0.0002	<0.0002	0.008
22/05/2012 7:30	<0.0001	0.0046	0.0005	0.0011	<0.0002	0.0158	0.047	<0.0001	0.4520	0.0008	0.0001	<0.0002	0.006
23/05/2012 13:00	<0.0001	0.0044	0.0007	0.0012	<0.0002	0.0189	0.046	<0.0001	0.4450	0.0005	0.0001	<0.0002	0.006
24/05/2012 10:05	0.0002	0.0039	0.0001	0.0011	<0.0002	0.0136	0.056	<0.0001	0.4900	0.0005	0.0001	<0.0002	0.003
25/05/2012 14:04	<0.0001	0.0044	<0.00005	0.0002	<0.0002	0.0018	0.042	<0.0001	0.3640	<0.0005	<0.0001	<0.0002	0.002
26/05/2012 16:15	0.0001	0.0042	0.0001	0.0013	<0.0002	0.0138	0.025	<0.0001	0.4770	<0.0005	0.0003	<0.0002	0.005
27/05/2012 11:34	0.0002	0.0037	<0.00005	0.0012	0.000	0.0089	0.045	<0.0001	0.4350	0.0005	0.0002	<0.0002	0.019
28/05/2012 16:00	0.0003	0.0047	<0.00005	0.0009	<0.0002	0.0066	0.049	<0.0001	0.4330	<0.0005	0.0002	<0.0002	0.027
29/05/2012 15:12	<0.0001	0.0040	0.0001	0.0006	<0.0002	0.0032	0.044	<0.0001	0.3900	0.001	0.0006	<0.0002	0.026
30/05/2012 9:10	0.0002	0.0038	<0.00005	0.0002	<0.0002	0.003	0.089	<0.0001	0.3100	0.0005	0.0003	<0.0002	0.040
2/06/2012 14:15	0.0002	0.0035	0.0005	0.0015	<0.0002	0.0219	0.034	<0.0001	0.3700	<0.0005	0.0002	<0.0002	0.003
4/06/2012 17:25	0.0002	0.0038	0.0008	0.0008	0.000	0.0132	0.010	<0.0001	0.2640	<0.0005	<0.0001	<0.0002	0.002
5/06/2012 9:43	<0.0001	0.0044	0.0005	0.0007	<0.0002	0.0035	0.018	<0.0001	0.4290	<0.0005	<0.0001	<0.0002	<0.001
6/06/2012 9:25	<0.0001	0.0052	0.0006	0.0008	<0.0002	0.0015	0.026	<0.0001	0.4230	<0.0005	<0.0001	<0.0002	0.004
7/06/2012 7:55	<0.0001	0.0045	0.0010	0.0005	<0.0002	0.0173	0.015	<0.0001	0.3720	<0.0005	<0.0001	<0.0002	0.001

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
8/06/2012 13:20	<0.0001	0.0053	0.0005	0.0008	<0.0002	0.0027	0.009	<0.0001	0.4920	<0.0005	<0.0001	<0.0002	<0.001
9/06/2012 15:20	<0.0001	0.0042	0.0008	0.0004	<0.0002	0.0012	0.018	<0.0001	0.2770	<0.0005	<0.0001	<0.0002	0.015
10/06/2012 15:19	<0.0001	0.0046	0.0005	0.0009	<0.0002	0.0062	0.012	<0.0001	0.4010	<0.0005	<0.0001	<0.0002	0.001
12/06/2012 9:40	<0.0001	0.0047	0.0011	0.0006	<0.0002	0.0016	0.016	<0.0001	0.4260	<0.0005	<0.0001	<0.0002	0.002
13/06/2012 12:15	<0.0001	0.0042	0.0006	0.0008	<0.0002	0.0043	0.027	<0.0001	0.4580	<0.0005	0.0002	<0.0002	0.005
14/06/2012 15:40	<0.0001	0.0048	0.0008	0.0008	<0.0002	0.0033	0.020	<0.0001	0.4630	<0.0005	<0.0001	<0.0002	0.003
15/06/2012 13:47	<0.0001	0.0054	0.0007	0.0009	<0.0002	0.0035	0.019	<0.0001	0.4730	<0.0005	0.0001	<0.0002	0.004
18/06/2012 13:17	0.0003	0.0040	0.0006	0.0015	<0.0002	0.0304	0.039	<0.0001	0.4880	<0.0005	0.0004	<0.0002	0.028
19/06/2012 8:50	0.0004	0.0035	0.0006	0.0017	<0.0002	0.0163	0.036	<0.0001	0.5170	0.0008	0.0002	<0.0002	0.003
28/06/2012 10:00	<0.0001	0.0042	<0.00005	0.0011	<0.0002	0.0102	0.053	<0.0001	0.3760	0.0079	0.0009	<0.0002	0.017
29/06/2012 13:20	<0.0001	0.0042	<0.00005	0.0017	<0.0002	0.0318	0.037	<0.0001	0.3540	0.0005	<0.0001	<0.0002	<0.001
30/06/2012 14:50	<0.0001	0.0041	0.0001	0.0025	<0.0002	0.0231	0.040	<0.0001	0.4060	0.0005	0.0002	<0.0002	0.002
1/07/2012 14:55	<0.0001	0.0037	0.0001	0.0031	<0.0002	0.0186	0.052	<0.0001	0.4020	<0.0005	0.0001	<0.0002	<0.001
2/07/2012 17:24	<0.0001	0.0039	0.0004	0.0031	<0.0002	0.0444	0.042	<0.0001	0.4890	0.0006	<0.0001	<0.0002	0.001
3/07/2012 17:21	<0.0001	0.0041	<0.00005	0.0028	<0.0002	0.0056	0.051	<0.0001	0.3640	<0.0005	0.0002	<0.0002	0.001
5/07/2012 14:50	<0.0001	0.0037	<0.00005	0.0011	0.000	0.0664	0.052	<0.0001	0.3340	0.0006	0.0002	<0.0002	0.001
6/07/2012 9:05	<0.0001	0.0036	<0.00005	0.0009	<0.0002	0.0134	0.054	<0.0001	0.3900	0.0006	0.0001	<0.0002	<0.001
10/07/2012 16:18	<0.0001	0.0035	<0.00005	0.0027	0.000	0.0272	0.022	<0.0001	0.4000	<0.0005	<0.0001	<0.0002	0.002
11/07/2012 17:00	<0.0001	0.0034	0.0001	0.0035	<0.0002	0.0075	0.028	<0.0001	0.3980	<0.0005	<0.0001	<0.0002	0.002
12/07/2012 9:35	<0.0001	0.0032	<0.00005	0.0004	<0.0002	0.0447	0.078	<0.0001	0.3310	0.0007	0.0002	<0.0002	0.002
13/07/2012 10:55	<0.0001	0.0031	0.0002	0.0028	0.000	0.013	0.074	<0.0001	0.4810	0.0011	0.0015	<0.0002	0.017
20/07/2012 14:53	<0.0001	0.0017	0.0002	0.0013	<0.0002	0.0062	0.043	<0.0001	0.3470	0.0026	0.0008	<0.0002	0.013
21/07/2012 16:51	0.0001	0.0029	0.0004	0.0015	<0.0002	0.0126	0.036	<0.0001	0.3660	0.0015	0.0006	<0.0002	0.014
22/07/2012 18:00	<0.0001	0.0028	0.0004	0.0024	0.000	0.0112	0.054	<0.0001	0.3800	0.0027	0.0007	<0.0002	0.022
23/07/2012 17:16	<0.0001	0.0032	0.0003	0.0022	0.000	0.0043	0.043	<0.0001	0.3270	0.0008	0.0003	<0.0002	0.011

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
24/07/2012 17:04	<0.0001	0.0038	0.0004	0.0026	0.000	0.011	0.076	<0.0001	0.3480	0.0031	0.001	<0.0002	0.019
25/07/2012 9:42	<0.0001	0.0047	0.0005	0.0028	<0.0002	0.0037	0.028	<0.0001	0.4460	0.0006	0.0002	<0.0002	0.004
28/07/2012 10:00	<0.0001	0.0047	<0.00005	0.0011	<0.0002	0.0127	0.037	<0.0001	0.3720	<0.0005	0.0001	<0.0002	<0.001
29/07/2012 13:55	<0.0001	0.0036	0.0002	0.0017	<0.0002	0.0241	0.033	<0.0001	0.3660	<0.0005	0.0002	<0.0002	0.003
30/07/2012 14:34	<0.0001	0.0032	0.0002	0.0017	<0.0002	0.0036	0.023	<0.0001	0.3900	<0.0005	0.0001	<0.0002	0.002
3/08/2012 10:25	<0.001	0.0050	<0.0001	<0.001	<0.001	0.006	0.070	<0.0001	0.3840	<0.001	<0.001	<0.01	<0.005
4/08/2012 12:00	<0.001	0.0050	<0.0001	<0.001	<0.001	0.004	<0.05	<0.0001	0.3630	<0.001	<0.001	<0.01	<0.005
5/08/2012 9:36	<0.001	0.0060	<0.0001	<0.001	<0.001	0.004	0.080	<0.0001	0.0360	<0.001	<0.001	<0.01	<0.005
6/08/2012 10:20	<0.0001	0.0040	<0.00005	0.0007	<0.0002	0.0066	0.030	<0.0001	0.3460	<0.0005	0.0001	<0.0002	0.002
7/08/2012 11:00	<0.0001	0.0041	<0.00005	0.0012	<0.0002	0.0048	0.027	<0.0001	0.4360	<0.0005	0.0001	<0.0002	0.002
8/08/2012 7:35	<0.0001	0.0050	<0.00005	0.0009	<0.0002	0.0032	0.050	<0.0001	0.4860	<0.0005	0.0001	<0.0002	0.003
9/08/2012 11:30	<0.0001	0.0046	<0.00005	0.0012	<0.0002	0.0407	0.029	<0.0001	0.4860	0.0005	<0.0001	<0.0002	0.002
10/08/2012 11:00	<0.0001	0.0045	0.0001	0.0017	0.000	0.0186	0.024	<0.0001	0.4900	0.0011	0.0008	<0.0002	0.026
11/08/2012 11:05	<0.0001	0.0039	<0.00005	0.0012	0.000	0.015	0.039	<0.0001	0.5170	0.0012	0.0003	<0.0002	0.013
12/08/2012 11:10	<0.0001	0.0042	0.0001	0.0013	<0.0002	0.0047	0.026	<0.0001	0.5510	0.0008	0.0018	<0.0002	0.012
13/08/2012 13:00	<0.0001	0.0022	<0.00005	0.0010	<0.0002	0.0052	0.075	<0.0001	0.4020	0.0016	0.0007	<0.0002	0.043
14/08/2012 10:10	<0.0001	0.0039	0.0001	0.0015	<0.0002	0.0086	0.027	<0.0001	0.5090	0.0011	0.0007	<0.0002	0.025
16/08/2012 16:48	<0.0001	0.0041	0.0001	0.0012	<0.0002	0.0061	0.073	<0.0001	0.5020	0.0008	0.0002	<0.0002	0.026
19/08/2012 14:06	<0.0001			0.0007		0.0035			0.3690	0.0007			
20/08/2012 14:30	<0.0001	0.0046	0.0005	0.0012	0.001	0.0028	0.026	<0.0001	0.4230	0.0007	0.0012	<0.0002	0.009
21/08/2012 16:15	<0.0001			0.0012		0.0034			0.4260	0.0016			
22/08/2012 15:00	<0.0001			0.0011		0.0174			0.3690	0.0006			
23/08/2012 11:27	<0.0001			0.0016		0.0216			0.3640	<0.0005			
24/08/2012 7:40	<0.0001			0.0016		0.0084			0.4680	<0.0005			
25/08/2012 14:58	<0.0001			0.0018		0.0036			0.4340	<0.0005			

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
26/08/2012 13:24	<0.0001			0.0013		0.0027			0.4000	<0.0005			
27/08/2012 11:50	<0.0001			0.0015		0.0022			0.4200	<0.0005			
28/08/2012 8:36	<0.0001			0.0013		0.0042			0.4230	<0.0005			
29/08/2012 12:25	<0.0001	0.0031	<0.00005	0.0008	<0.0002	0.0032	0.031	<0.0001	0.3280	0.0013	<0.0001	<0.0002	0.003
31/08/2012 5:11	<0.001	0.0030	<0.0001	<0.001	<0.001	0.004	<0.05	<0.0001	0.3260	<0.001	<0.001	<0.01	0.008
5/09/2012 13:45	<0.0001	0.0052	<0.00005	0.0004	<0.0002	0.0016	0.082	<0.0001	0.3570	0.0006	0.0003	<0.0002	0.004
9/09/2012 13:46	<0.0001			0.0004		0.0013			0.0220	<0.0005			
11/09/2012 9:15	<0.001	0.0070	<0.0001	<0.001	<0.001	0.002	<0.05	<0.0001	0.1480	<0.001	<0.001	<0.01	0.005
17/09/2012 14:38	<0.0001			0.0003		0.0016			0.2290	0.0006			
20/09/2012 8:23	<0.0001	0.0048	0.0010	0.0012	<0.0002	0.0015	0.022	<0.0001	0.6580	0.0008	0.0002	<0.0002	0.009
21/09/2012 13:48	<0.0001			0.0012		0.0025			0.4530	0.0005			
30/09/2012 17:10	<0.0001	0.0040	0.0007	0.0004	<0.0002	0.0012	0.044	<0.0001	0.3960	0.0005	0.0001	<0.0002	0.002
6/10/2012 12:20	0.0001	0.0037	0.0009	0.0006	<0.0002	0.0095	0.043	<0.0001	0.3810	0.0008	0.0002	<0.0002	0.012
7/10/2012 11:05	<0.0001	0.0035	<0.00005	0.0003	<0.0002	0.0012	0.046	<0.0001	0.3160	0.0006	0.0001	<0.0002	0.004
8/10/2012 11:30	<0.0001	0.0046	0.0001	0.0007	<0.0002	0.0022	0.061	<0.0001	0.3200	0.0006	0.0003	<0.0002	0.005
9/10/2012 10:47	<0.0001	0.0040	<0.00005	0.0006	0.001	0.0034	0.056	0.0	0.3220	0.0008	0.0026	<0.0002	0.011
11/10/2012 16:56	<0.0001	0.0040	0.0001	0.0012	<0.0002	0.0043	0.034	<0.0001	0.3420	0.0006	0.0007	<0.0002	0.011
15/10/2012 11:42	<0.0001			0.0006		0.0066			0.2830	0.0009			
16/10/2012 8:08	0.0001			0.0015		0.0046			0.3630	0.0009			
17/10/2012 14:00	<0.0001	0.0039	<0.00005	0.0008	0.001	0.0018	0.030	<0.0001	0.3280	0.0013	0.0002	<0.0002	0.003
18/10/2012 8:32	<0.0001			0.0007		0.0016			0.3480	<0.0005			
19/10/2012 13:23	<0.0001			0.0009		0.0013			0.3790	0.0005			
21/10/2012 13:40	<0.0001			0.0010		0.0019			0.4250	0.0311			
4/11/2012 8:20	<0.0001	0.0045	0.0001	0.0009	0.000	0.0037	0.267	<0.0001	0.2790	0.0006	0.0009	<0.0002	0.028
8/11/2012 13:37	<0.0001			0.0008		0.0025			0.2650	<0.0005			

Date	Ag	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Zn
9/11/2012 14:36	<0.0001			0.0010		0.0025			0.3210	<0.0005			
10/11/2012 13:36	<0.0001			0.0006		0.0022			0.2770	<0.0005			
11/11/2012 12:42	<0.0001			0.0004		0.0014			0.3230	<0.0005			
12/11/2012 9:39	<0.0001	0.0046	<0.00005	0.0006	<0.0002	0.0025	0.094	<0.0001	0.3450	<0.0005	0.0003	<0.0002	<0.001
14/11/2012 12:37	<0.0001			0.0007		0.0018			0.3390	<0.0005			
15/11/2012 14:46	<0.0001			0.0006		0.0042			0.2680	<0.0005			
16/11/2012 7:57	<0.0001			0.0008		0.0015			0.3450	<0.0005			
17/11/2012 13:04	<0.0001			0.0006		0.0035			0.2310	0.001			
18/11/2012 14:18	<0.0001			0.0004		0.0027			0.1480	<0.0005			
25/11/2012 12:14	<0.0001	0.0036	<0.00005	0.0004	<0.0002	0.0011	0.066	<0.0001	0.3360	0.0007	0.0002	<0.0002	0.003
2/12/2012 14:56	<0.0001	0.0032	0.0001	0.0010	<0.0002	0.0098	0.039	<0.0001	0.3480	0.0019	0.0004	<0.0002	0.006
3/12/2012 14:33	<0.0001			0.0015		0.0096			0.4010	0.0024			
4/12/2012 10:15	<0.0001			0.0013		0.0025			0.3760	0.0012			
5/12/2012 11:10	<0.0001	0.0032	0.0001	0.0017	<0.0002	0.0079	0.049	<0.0001	0.3990	0.0012	0.0008	<0.0002	0.011
8/12/2012 9:17	<0.0001			0.0014		0.0026			0.5070	0.0047			
12/12/2012 8:05	<0.0001	0.0043	<0.00005	0.0006	<0.0002	0.0012	0.031	<0.0001	0.3440	<0.0005	0.0001	<0.0002	0.001