ENVIROPACIFIC SERVICES

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25th January 2013

Wagga Wagga City Council
c/- Coffey Projects
Level 10, BT Tower
1 Market Street
Sydney NSW 2000

Attn: Andy Findlay
Email: Andy_Findlay@coffey.com.au

Re: Tarcutta Street Former Gasworks Remediation Project – WTP Discharge Response to Agencies Comments

Dear Andy,

EnviroPacific Services Pty Ltd (EPS) has been engaged by Wagga Wagga City Council (WWCC) to undertake the remediation for the former gasworks site located at the corner of Cross Street and Tarcutta Street, Wagga Wagga (the Site). As part of the remediation, EPS is proposing to amend the Part 3A Approval (10_0040).

The proposed modifications were dated 4th December 2012 (rev 3) and 21st December 2012 (Rev 4).

This letter is in response to comments made by agencies received by EPS on the 10th January 2013 and 17th December 2012, regarding the Part 3A Approval 10_0040 Amendment, and accompanies the Part 3A Approval 10_0040 Amendment (rev 5) (attached).

The letter details the modifications made to the water treatment plant in order to meet the revised discharge criteria along with additional bench scale test results verifying the revised criteria can be achieved.

We have also undertaken detailed review of historical groundwater results for the site in order to better understand the concentrations that are likely to be encountered during the bulk excavation works.

The comments from agencies and EPS's response are detailed in the attached table. These responses have been incorporated into the Part 3A Approval 10_0040 Amendment (EPS 21/12/12).

We summarise the modification to water treatment plant as follows and provide further detail in the body of this letter:

- Additional bench scale trials were undertaken in January 2013. As a result of these trials EPS has incorporated an additional treatment step (Stage 3 Zeolite Filtration) to achieve the required discharge concentrations.

- As a contingency, EPS has sourced a Reverse Osmosis (RO) unit. The RO unit can be mobilised to site and commissioned within 5 days. In the event that elevated levels of ammonia and conductivity concentrations are encountered the RO unit will be mobilised to site and added to the water treatment plant after the stage 3 zeolite in order to achieve the required discharge concentrations

Review of Historical Data

Due to the highly variable groundwater results obtained for the bench scale trails, EPS has undertaken a detailed review of Historical groundwater data for the Site, specifically for Ammonia and Conductivity. The following reports were review during this process:

- Source Location at the former Tarcutta Street Gasworks, Wagga Wagga NSW. Environmental & Earth Sciences, 1996;
- Limited Groundwater Investigation of the Former Tarcutta Street Gasworks Site, Wagga Wagga NSW. Environmental & Earth Sciences, 2006;
- March 2007 Groundwater Monitoring at the former Tarcutta Street gasworks Site, Wagga Wagga NSW. Environmental & Earth Sciences, 2007;
- Further Soil, Gas and Groundwater Investigation at the former Tarcutta Street Gasworks Site, on the corner of Tarcutta and Cross Streets in Wagga Wagga. Environmental & Earth Sciences, 2009; and
- Pre-remediation risk monitoring at the former Tarcutta Street Gasworks Site, Wagga Wagga. Environmental & Earth Sciences, 2011.

The review considered groundwater sampling results that were collected from monitoring wells located in the excavation area. The samples are considered representative of source water that will be encountered during the remediation.

Ammonia

A total of 49 individual ammonia samples were reviewed. Concentrations of Ammonia ranged from 3.8 mg/L in BH18 (EES 1996) to 950mg/L in BH13 EES 1996. The average ammonia concentration from monitoring wells in the source area is 127.8 mg/L. A summary table of the Historical data is included in Table 2 (attached).

The historic average ammonia concentration includes many more data points than the EPS treatment trial samples, covering a larger area than the EPS pre-treatment. The average of

127.8 mg/L is therefore considered to be a more representative concentration of groundwater that will be encountered during bulk excavation.

The historical average ammonia concentrations are significantly lower than the concentrations used in bench scale trials to date. The bench scale trails have been undertaken date has used composite samples with concentrations of 540, 360, 660 and 1,000 mg/L Ammonia.

Conductivity

A total of XX individual conductivity samples were reviewed. Conductivity ranged from 194 (BH19, EES 2011) to 5,610 µs/cm (BH6, EES 1996). The historical average conductivity is 1,593 µs/cm.

The average historical conductivity is also considered to be more representative of untreated water at the Site. The historical average conductivity is well below the adopted ANZECC discharge criteria (2,200 µs/cm).

EPS has used composite samples in treatment trial that had much higher conductivities. Untreated trial samples had conductivities of 4,700 and 4,800 µs/cm.

Based on the review of historical data, specific treatment for conductivity may not be required. EPS does however have contingency for conductivity treatment in the form of the RO plant, if required.

Additional Bench Scale Trials

Additional bench scale trials were undertaken by EPS on the XXXX. The table below provides the ammonia results (mg/L) after each step for all bench scale testing completed.

Table 1: Bench Scale Trial Results

	Raw	Coag/Floc	Aeration	S1 Zeolite	GAC	S2 Zeolite	S3 Zeolite	S4 Zeolite
Trial 1	540	390	230	120	**82**	NT	NT	NT
Trial 2	360	NT	NT	94	88	28	NT	NT
Trial 3	560	NT	240	140	96	44	8.8*	2.4

NT – Not Tested
*Sample Damaged – Result based on photometric analysis

Based on the above test results conservative removal efficiencies for Ammonia at each step of the water treatment plant have been estimated. These are presented below.

Table 2: Removal Efficiencies

Raw	Coag/Floc	Aeration	S1 Zeolite	GAC	S2 Zeolite	S3 Zeolite	S4 Zeolite
-	25%	50%	40%	25%	50%	50%	50%

These removal efficiencies were used to project the maximum influent concentrations of Ammonia that could be treated by the plant in order to achieve the required discharge criteria.

Table 2: Projected Influent Ammonia Concentrations WTP

Raw	Coag/Floc	Aeration	S1 Zeolite	GAC	S2 Zeolite	S3 Zeolite	S4 Zeolite
	25%	50%	40%	25%	50%	50%	50%
83.0	62.2	37.3	28	14	7	3.5	-
165.9	124.4	74.7	56	28	14	7	3.5

Modifications to Water Treatment Plant

Based on the above projections EPS have included an additional zeolite filtration capability in the Water Treatment Plant. This will consist of a skid with two zeolite filtration beds, stages 3 and 4.

During commissioning and operation of the plant the raw water will be analysed for ammonia and conductivity and depending on the concentrations the following additional treatment components will be employed.sag

Table 3: Additional Treatment

Raw Water Concentration	Additional Treatment Equipment Employed
Ammonia <83mg/L and Conductivity <2200 µs/cm	Stage 3 Zeolite Filtration
Ammonia >83mg/L < 165mg/L and and Conductivity <2200 µs/cm	Stage 3 and 4 Zeolite Filtration
Ammonia >165mg/L or Conductivity >2200 µs/cm	Reverse Osmosis

The Stage 3 and 4 zeolite filtration capacity will be incorporated in the plant during initial construction and commissioning. The Reverse Osmosis unit has been included as a contingency and will remain on standby for the duration of the project. Should Ammonia concentrations in excess of 250mg/L be identified in the influent water this unit will be mobilised to site and operational within 1 week.

The reverse osmosis unit will be an independently controlled unit. This will be added to the water treatment plant downstream of the 100 kL storage tank. Water will be treated

through the RO unit and discharged into an adjacent 100 kL storage tank for testing prior to discharge.

Reverse Osmosis Specifications

The primary components of the RO unit are detailed below:

- Feed pump
- Antiscalent dosing with storage tank and low level alarms (flow paced and controlled)
- Feed Acid OR SMBS dosing with bunded storage tank and level alarms
- Feed pH, ORP and conductivity monitoring
- Feed Cartridge filters containing 7 x 40" standard 2.5" cartridge filters (5 micron)
- Cartridge filter feed and outlet pressure transmitters
- High Pressure pump with variable speed drive. VSD controlled via permeate flow setpoint
- Membrane feed pressure transmitter
- Pressure Vessels – 6 x 4 element, 300PSI FRP
- Membrane concentrate pressure transmitter
- Permeate flow transmitter
- Concentrate flow transmitter
- Recycle flow transmitter
- Concentrate and Recycle control valves
- CIP tank with automatic permeate fill
- Compressed air system
- Permeate conductivity and pH monitoring
- Permeate Chlorine OR Caustic dosing with bunded storage tank and level alarms
- PLC Control panel with Koyo 205 PLC and 10" colour touch screen

Please refer to the attached GA drawings for further detail.

Anticipated treated water quality following reverse osmosis treatment is provided in Table 4 below.

Table 4: Projected Influent Ammonia Concentrations - RO

	Ammonia mg/L	**Conductivity µs/cm**
Post WTP	82	5626
RO	3.98	80.43
Removal Effiency	95%	98%

Brine Disposal

Brine generated by the RO unit. Brine will typically comprise 25% of the input volume. The peak brine output will be 1.44 L/s. Brine will stored on site and assessed for potential disposal options including Trade Waste, offsite transport, on site dust suppression or recirculation.

Please do not hesitate to contact me should you require any further information.

Regards

Rhys Blackburn
Project Manager
Attachments:

1. Figures
2. Laboratory Summary Table
3. Laboratory Certificates
4. GA Drawings for RO Plant

Table 5: Agencies Comments and Response

Agency	EPS Response
NSW EPA Comment	
The Ammonia Concentration of 50,000 µg/L which they anticipate achieving after treatment is not acceptable	EPS have adopted a discharge criteria of 4mg/L. EPS can to achieve this by: - Additional zeolite filtration beds - Provisions for Reverse Osmosis (RO) treatment, if required Refer to letter for further detail
The modeling based on dilution to "the River" is neither practicable or an acceptable approach	Noted, EPS has removed this approach from the modification, including the Murrumbidgee flow data.
There is inconsistency in the report regarding the monitoring of Volatile Organic Compounds (VOCs) and ammonia in Air. In Section 2.3.2 it is stated that real time monitoring of VOCs and Ammonia will occur time however Table 6 only proposes weekly sampling of the discharge stream	Daily air monitoring will be undertaken for Ammonia, VOCs and odour from the air stripper. Table 6 has been revised to include this monitoring.
There is inconsistency in the report regarding the air strippers and the removal of ammonia. Section 2.3.2 states that there will be ammonia in the air stripper stream. Section 3.1 says there will be negligible amount of ammonia being stripped.	Based on trial results we estimate 50% of the ammonia will be removed via the air stripper, however this may decrease at lower concentrations. Report updated to reflect this.
The estimate of VOCs in air adds the C6-C9 and the BTEX concentrations together which is incorrect as the BTEX concentration is part of the C6-C9 concentration. This is likely to over estimate the VOC concentration so this may just make the modeling more conservative	Concentration revised and recalculated.
There is no commissioning proposed for the air emissions and there is no level that they are proposing to meet with respect to VOC emmisions	Emission criteria at the Air Stripper is VOC's = 10 ppm Based on STEL from Safe Work Australia
Whilst based on the volumes alone, an EPL is not required, however the licensing system is based on capacity to treat and therefore an EPL would be required for contaminated groundwater treatment	EPS will apply for an EPL. WWCC as the holder of the Part 3A approval may need to apply for an EPL on behalf of EPS, if required
Discharge Limits are to be those listed in the Water Quality Guidelines, ANZECC, 2000 Table 3.4.1. Trigger values fro toxicants at alternative levels of protection for the protection of 95% of Freshwater Species. With the exception of Ammonia which is to have a maximum concentration of 4mg/L	EPS have adopted this discharge criteria. We have undertaken: - Review of historic groundwater data; - Included additional treatment trials; and - Included contingency tertiary treatment (RO)
Concentrations in discharge water are to be monitored at a minimum frequency of weekly with the analysis to be conducted at a NATA accredited laboratory. With the exception of ammonia which will be monitored on site daily and analysis undertaken weekly at a NATA accredited laboratory	EPS have adopted these minimum sampling requirements.
NSW Office of Water	

The proposal states that discharge criteria for ammonia and electrical conductivity (EC) will not be at the ANZECC 95% freshwater ecology levels based on several assumptions, including a single grab sample in the Murrumbidgee River and limited groundwater samples. The criteria proposed for ammonia (50 mg/L) and EC (5, 000 S/cm) are not considered justified for the proposal.	Noted and amended
the Office of Water does not object to the proposal, however requests that ANZECC guidelines for protection of 95% freshwater ecology be adopted for all water quality parameters and the Water Management Plan be updated for the site including requirements for monitoring according to Environment Protection Authority requirements.	EPS have adopted the Water Quality Guidelines, ANZECC, 2000 Table 3.4.1. Trigger values for toxicants at alternative levels of protection for the protection of 95% of Freshwater Species, With the exception of Ammonia which is to have a maximum concentration of 4mg/L –as approved by NSW EPA
NSW Fisheries	
Fisheries NSW seeks assurance that advice on this application will be sought from the Office of Environment & Heritage on whether the proposed discharges to the Murrumbidgee River from the water treatment plant are acceptable under the Protection of the Environment Operations Act 1997.	The WTP will be licensed under the POEO. The license will be held by either EPS or WWCC

PROXIMAL TO EXCAVATION

SETTLING TANK WITH OIL SKIMMER

INLET

OIL

WATER

BREAK TANK 10kL

TRANSFER PUMP

SLUDGE REMOVAL TO EXCAVATION

FLOCCULATING TANK

COAGULANT

NaOH

FLOCCULANT

VSD

M

FLOCCULATOR

O/F

CONTAINER MOUNTED SYSTEM

CLEAN AIR VENT

GRANULATED ACTIVATED CARBON BED

2 SETTLING TANKS

O/F

O/F

BREAK TANK 22kL

AIR STRIPPER FEED PUMP PP 03

AIR

AIR STRIPPER

AIR STRIPPER SUMP PUMP PP 04

FAN

SLUDGE REMOVAL to DECANTER

ZEOLITE & CARBON BACKWASH

SLUDGE REMOVAL

FEED WATER TANK 100kL

DUTY/STANDBY FEED PUMPS PP 01/02 10L/S

from SETTLING TANKS

from ZEOLITE FILTERS

from GAC FLUSH

DECANTER 30kL

OFF SPEC RECIRCULATION

SLUDGE REMOVAL

MONITORING STATION:
pH, Cond, Temp,
Turbidity, Flowrate

DUTY/STANDBY DISCHARGE PUMPS PP 11/12

STORMWATER DISCHARGE
to Murrumbidgee River

TREATED WATER TANK 100kL

pH

ACID DOSING SYSTEM

DP7

STAGE 2 ZEOLITE

ZEOLITE FILTER (16/30) STAGE 2

F03

DUTY/STANDBY/BW STAGE 2 ZEOLITE FEED PUMPS PP 07/08

B/W

BACKWASH TO DECANTER

BREAK TANK 10kL

CONTAINER MOUNTED

GAC FILTERS

F05

F04

DUTY/STANDBY FEED PUMPS PP 09/10

FLUSH TO DECANTER

BREAK TANK 10kL

STAGE 1 ZEOLITE

ZEOLITE FILTERS (16/30) STAGE 1

F01

F02

B/W

DUTY/STANDBY/BW STAGE 1 ZEOLITE FEED PUMPS PP 05/06

BACKWASH TO DECANTER

MIXER MX03

MIXING TANK 10kL

STRIPPED WATER

DP6

CAUSTIC DOSING SYSTEM

DP5

ACID DOSING SYSTEM

LEGEND

MT	MIXING TANK		VALVE
ST	SETTLING TANK		PUMP
BT	BUFFER TANK		DOSING PUMP
VSD	VARIABLE SPEED DRIVE		SUBMERSIBLE PUMP

ENVIROPACIFIC SERVICES

WAGGA WAGGA WTP
WATER TREATMENT PLANT - PFD

TARCUTTA ST & CROSS ST

WAGGA WAGGA

NEW SOUTH WALES

Drawn: N.R.	Document: 2–Process diag			
Checked: P.A.	Rev: 19 December 2012	Ref:		
Scale: NTS	DRG No. N0520.dwg	I.D. No.: EYR3008–120	FIG. 2	

Wagga Wagga - Gasworks site

Table 6: Anticipated Water Quality compared with ANZECC 2000 for Freshwater Ecosystem (95%)

LEGEND:
Uncertainty if < ANZECC
Higher than ANZECC

Analyte / Date sampled / Lab Batch No.	Units (unless otherwise specified)	UNTREATED AVERAGE [all data]	UNTREATED [RAW WATER] Treatment Trial #1 1/11/2012 81075	TREATED [Coag/Floc] Treatment Trial #1 1/11/2012 81075	TREATED [High pH/aerated] Treatment Trial #1 1/11/2012 81075	TREATED [Post Zeolite] Treatment Trial #1 (5 min contact time) 1/11/2012 81075	TREATED [Post GAC] Treatment Trial #1 1/11/2012 81075	Treatment Trial #2 [Raw Water] 20/11/2012 81853	Treatment Trial #2 [1st Pass Zeolite] 20/11/2012 81853	Treatment Trial #2 [Post GAC] 20/11/2012 81853	Treatment Trial #2 [2nd Pass Zeolite] 20/11/2012 81853	Untreated - low flow [BH33] 19/12/2012 83909	Untreated - low flow [BH35] 19/12/2012 83909	Raw Water 16/01/2013 84473	Treated - After aeration 16/01/2013 84473	Treated - After Stage 1 Zeolite 16/01/2013 84473	Treated - After GAC 18/01/2013 84473	Treated - After Stage 2 Zeolite 18/01/2013 84473	Treated - After Stage 3 Zeolite 18/01/2013	Treated - After Stage 4 Zeolite 22/01/2013 84556-A	Anticipated treated water concentration	ANZECC 2000 Freshwater Ecosystem Protection (95%)
pH	pH units	7.0	7.1	7.3	9.5	7.8	8.1							7.1				7.8		7.8	7.8	6.5 - 8.0
Conductivity	µS/cm	4,800	4,700	4,100	4,700	5,400	4,100							6,400				12,000		14,000	**14,000**	125 - 2200
Ammonia (as N)	µg/L	221,929	540,000	390,000	230,000	120,000	**82,000**	360,000	94,000	88,000	28,000	1,000,000	660,000	560,000	240,000	140,000	96,000	44,000	8,800	2,400	**<4,000**	900
Turbidity	NTU	1,890	790	100	17	14	14							430	3			2		5	<6	6 - 50
Aluminium	µg/L	2,220	1,100				350					450	2,200	2,100	<10			460		85	~85	55
Arsenic (III/V)	µg/L	8	21				32	78	10	83	79	13	120	55	16			72		75	~75	24/13 µg/L
Benzene	µg/L	6800	4,400		3		<1							3,800						<5	<0.03	950
Boron	µg/L	2,000	1,000				30					1,300	1,600	1,700	1,300			380		350	<370	370
Cadmium	µg/L		<0.1				<0.1	0.9	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1		<0.1	<0.1	0.2
Total Chlorine	µg/L																				<1	3
Chromium (VI)	µg/L	<100	<100	<100	<100		<5					<5	<5	<25	<25			<5		<5	<5	1 µg/L
Cyanide (un-ionised CN)	µg/L	1176	<1	<1	<1		<1					11	<4	10						<10	<10	7 µg/L
Copper	µg/L	8	19				11	95	120	1	25	6	13	14	3			69		65	~65	1.4 µg/L
Lead	µg/L	1.33	6	2	<1		<1	150	<1	<1	<1	5	8	7	<1			3		<5	<5	3.4 µg/L
Manganese	mg/L	2453	4.5				0.044					5,600	6,300	6,200	12			81		100	1	1.9
Mercury	µg/L	<0.05	<0.05				<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05			<0.05		<0.25	<0.25	0.6 µg/L
Naphthalene	µg/L	4200	1,800				<0.1							430		<1				<5	<5	16
Nickel	µg/L	55	94				6	240	21	8	5	170	49	89	22			47		10	~10	11 µg/L
Nitrate	mg/L	<0.025	0				0.083														<0.25	0.7
Phenol	µg/L	91000	68,000				<10							690,000		680,000				100	~100	320
2 Chlorophenol	µg/L	<100	<100				<10														<100	490
2,4 - Dichlorophenol	µg/L	<100	<100				<10														<100	160
2,4,6 - Trichlorophenol	µg/L	<100	<100				<10														<20	20
2,3,4,6 - Tetrachlorophenol	µg/L	<100	<100				<10														<20	20
Pentachlorophenol	µg/L	<1000	<1000				<100														<10	10
Selenium (Total)	µg/L	2	1	1	1	1	1					3	5	3	3			1		1	~1	11 µg/L
Silver	µg/L	<0.02	<1	<1	<1	<1	<1					<1	<1	<1	<1			<1		<1	<1	0.05 µg/L
o – xylene	µg/L	353	260		2		<1													<5	<0.1	350
p – xylene	µg/L																				<0.1	200
Zinc	µg/L		93	68	17		12	1,100	24	1	2	26	23	120	16			100		50	~50	8

ALERT - analysis not conducted at low enough LOR to get resolution
ALERT - process may not be capable of achieving required level

1. GHD Geotechnical, Hydrogeological and Environmental Investigation February 2012. Whole report available by request
2. Samples collected by EPS 19th September 2012 for treatability trials - Laboratory certificates attached
3. Samples collected by EPS 20th October 2012 for treatability trials - Laboratory certificates attached

Envirolab Services Pty Ltd
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ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 84473-A

Client:
Enviropacific Services (Chatswood) Pty Ltd
1/28 Barcoo St
Chatswood
NSW 2067

Attention: Rhys Blackburn

Sample log in details:

Your Reference:	**EYR3008/120, Wagga Gasworks**
No. of samples:	5 Waters
Date samples received / completed instructions received	22/01/13 / 22/01/13

This report contains results previously reported in 84473.

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	26/01/13 / 25/01/13
Date of Preliminary Report:	22/01/2013

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Nick Sarlamis
Inorganics Supervisor

Miscellaneous Inorganics						
Our Reference:	UNITS	84473-A-1	84473-A-2	84473-A-3	84473-A-4	84473-A-5
Your Reference	----------	Raw Water	After Aeration	Stage 1 Zeolite	GAC	Stage 2 zeolite/ Treated water
Date Sampled	----------	16/01/2013	16/01/2013	18/01/2013	18/01/2013	21/01/2013
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	22/01/2013	22/01/2013	22/01/2013	22/01/2013	22/01/2013
Date analysed	-	22/01/2013	22/01/2013	22/01/2013	22/01/2013	22/01/2013
Ammonia as N in water	mg/L	560	240	140	96	44

Method ID	Methodology Summary
Inorg-057	Ammonia - determined colourimetrically based on EPA350.1 and APHA 22nd ED 4500-NH3 F, Soils are analysed following a KCl extraction.

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			22/01/2013	[NT]	[NT]	LCS-W1	22/01/2013
Date analysed	-			22/01/2013	[NT]	[NT]	LCS-W1	22/01/2013
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	LCS-W1	109%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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12 Ashley St Chatswood NSW 2067
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enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 84556-A

Client:
Enviropacific Services (Chatswood) Pty Ltd
1/28 Barcoo St
Chatswood
NSW 2067

Attention: Rhys Blackburn

Sample log in details:

Your Reference:	**EYR3008/120, Wagga Gasworks**
No. of samples:	1 Water
Date samples received / completed instructions received	23/01/2013 / 23/01/2013

This report contains results previously reported in 84556.

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	26/01/13 / 25/01/13
Date of Preliminary Report:	Not issued

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Results Approved By:

Nick Sarlamis
Inorganics Supervisor

Miscellaneous Inorganics		
Our Reference:	UNITS	84556-A-1
Your Reference	----------	Stage 4 / Treated Water
Date Sampled	----------	16/01/2013
Type of sample		Water
Date prepared	-	23/01/2013
Date analysed	-	23/01/2013
Ammonia as N in water	mg/L	2.4

Method ID	Methodology Summary
Inorg-057	Ammonia - determined colourimetrically based on EPA350.1 and APHA 22nd ED 4500-NH3 F, Soils are analysed following a KCl extraction.

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			23/01/2013	[NT]	[NT]	LCS-W1	23/01/2013
Date analysed	-			23/01/2013	[NT]	[NT]	LCS-W1	23/01/2013
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	LCS-W1	105%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

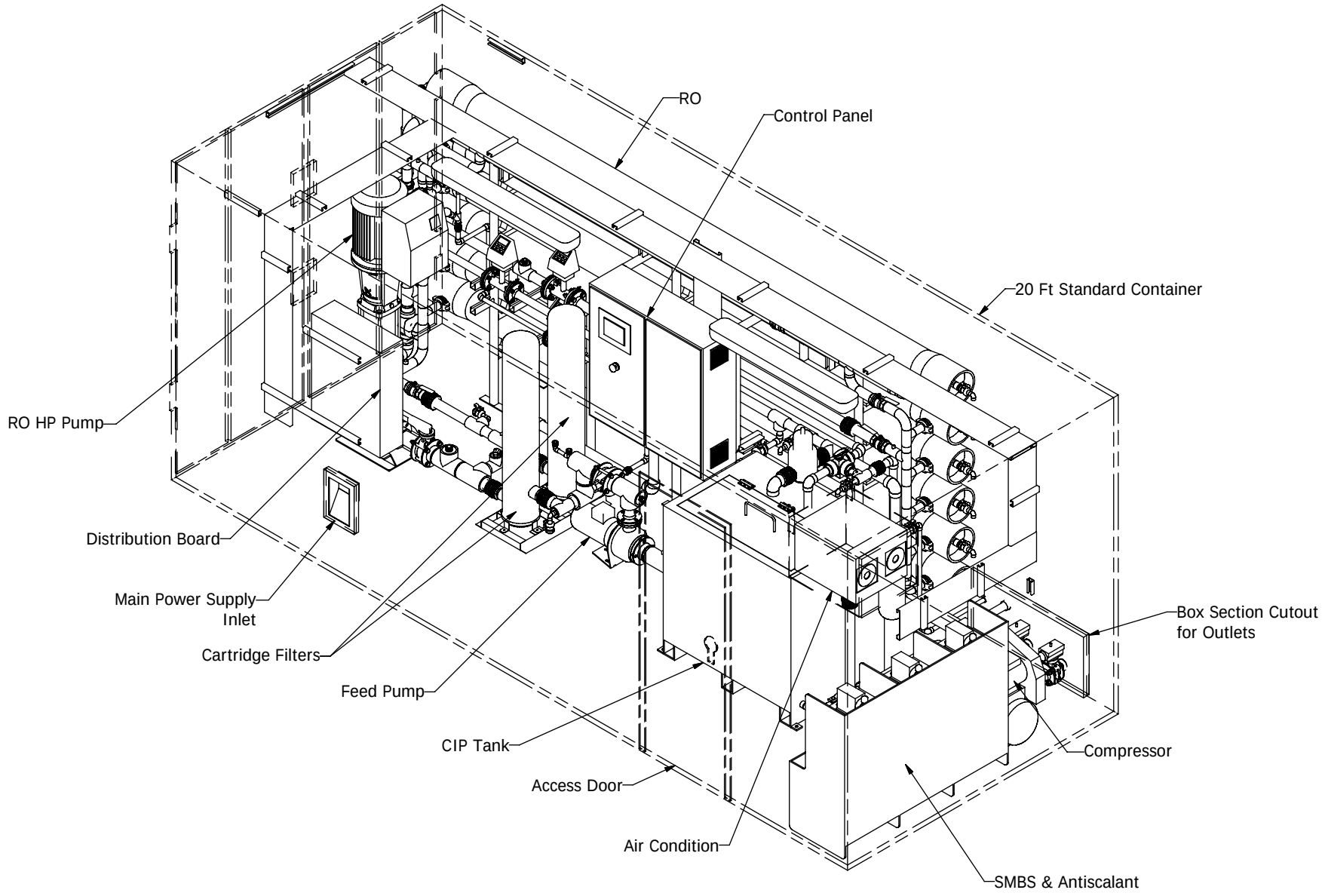
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.



REVISIONS	REV	BY	DATE	A.R.N	DESCRIPTION
	A	G.M.	23/10/08		Preliminary
	B	G.M.	11/11/08		Change 3 Chemical Bunds, Change A/C Size, Del MT Hole
	C	G.M.	12/11/08		Add 1/2" Sample Point x2 places
	D				
	E				

CRS INDUSTRIAL WATER TREATMENT SYSTEMS

DRAWN TO AS 1100	SCALE (A3)	N.T.S.
DRAWN		P.S.
CHECKED		G.M.
APPROVED		G.M.
DESIGN ENG.		

CLIENT / PROJECT: CRS Rental RO 500

TITLE: Plant Layout

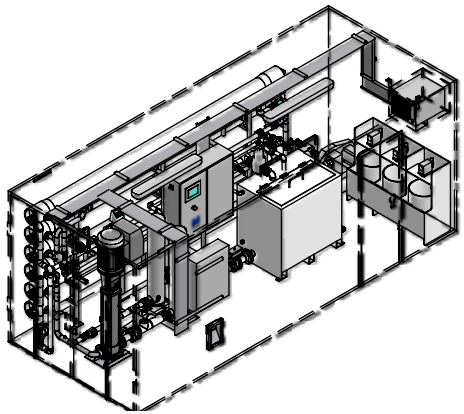
DRAWING No.: 413-L-01 (1 of 2)

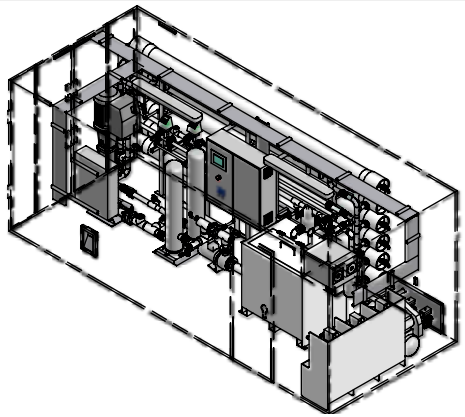
REV: C

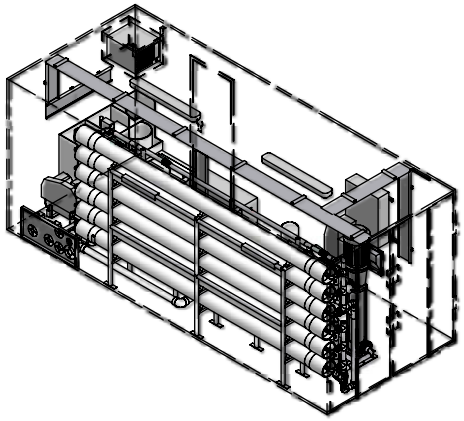
SIZE: A3

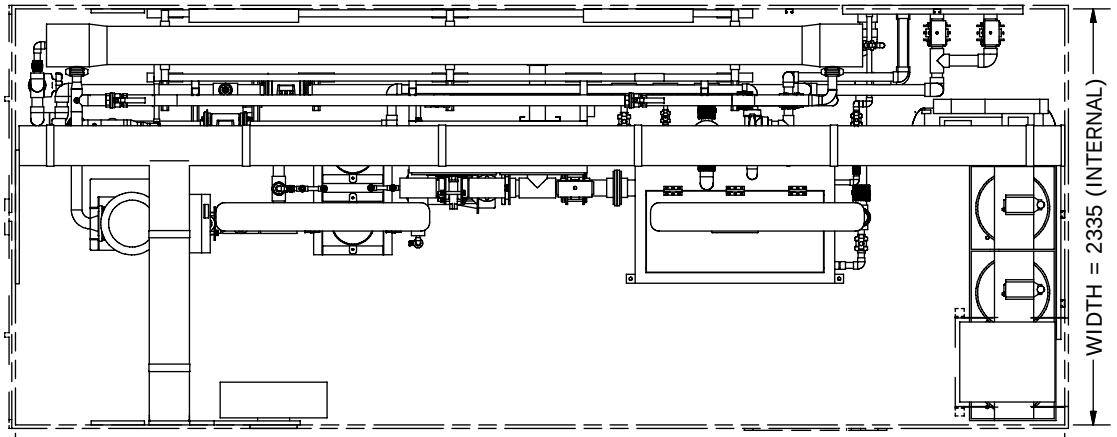
FSCM No.: -

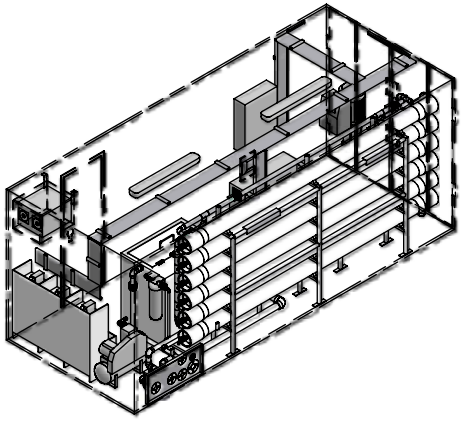
AutoCAD FILENAME: 413-L-01C Plant Layout

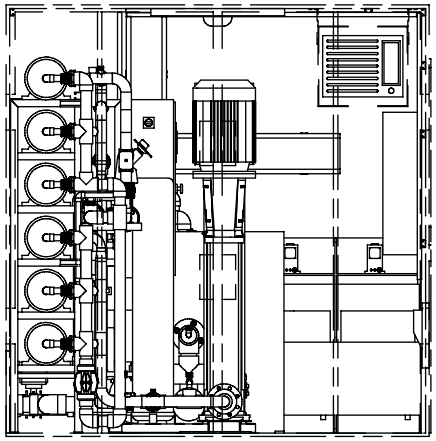


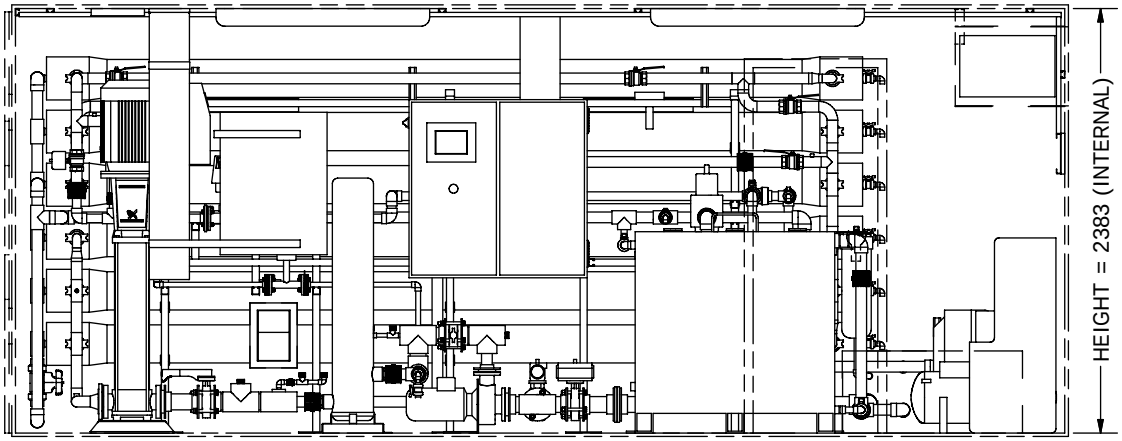


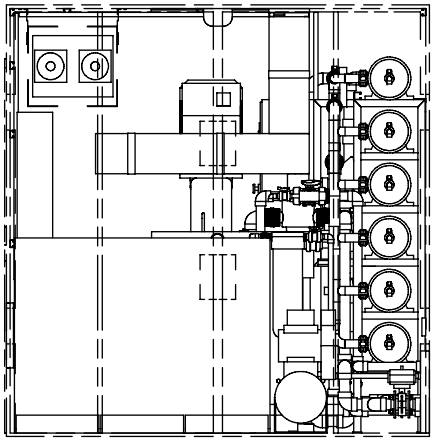












REVISIONS

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SCALE (A3)	N.T.S. ------
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CHECKED	G.M.
APPROVED	G.M.
DESIGN ENG.	

CLIENT / PROJECT
CRS Rental RO 500

TITLE
Plant Layout

DRAWING No. 413-L-01 (2 of 2)
REV C
SIZE -
FSCM No. -
A3
AutoCAD FILENAME
413-L-01C Plant Layout