Appendix M HAZID Workshop Report and Minutes with Treated Risk

URS

QUEENSLAND COKE & ENERGY

STANWELL CORPORATION LIMITED

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HAZID Workshop Report

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URS Australia Pty Ltd

Queensland Coke and Power Plant Project

HAZID Workshop Report

October 2005

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Appendices

1. Executive Summary

Queensland Coke and Energy Pty Ltd (QCE) and Stanwell Corporation Limited (SCL) are proposing to construct and operate a combined coke and power plant that will employ modern heat recovery coke making technology to produce a superior quality blast furnace coke for the export market. The technology uses heat generated from the combustion of gases contained within the coal to convert coal into coke. Surplus heat will be captured and used for the generation of electricity. Queensland Coke & Energy Pty Ltd is responsible for the coke making operations and SCL will likely be responsible for the generation of electricity.

The HAZID study achieved its aim of identifying the nature and scale of hazards that might occur during the operation of the proposed Queensland Coke and Power Plant. The HAZID team comprised of a core group of knowledgeable personnel, well versed in the proposed technology and mode of operation of the plant.

A total of 46 items were considered / recorded during the workshop, resulting in the identification of 18 recommendations / additional controls for consideration. None of the hazards were assessed as being extreme risks, with 5 high risks, 16 medium risks and 21 low risks. None of the identified risks were considered to have the potential for significant offsite effects. Thus, they would have no serious impact on the surrounding population and would not present a risk offsite. As a result, no further modelling is considered necessary for these operations.

The study was conducted during a one day workshop held at the URS offices in Brisbane. Due to the early stage of the project, details of the design and operation of proposed safety systems were not available. The workshop assumed that the plant would meet all relevant Australian Standards and would meet current best practice for similar operations around the world. Construction hazards were also excluded from consideration in this study, and should be the subject of a specific construction HAZID following appointment of a construction contractor.

This study was the first in a series of risk assessments planned for the Queensland Coke and Power Plant project. It is planned to conduct more extensive risk assessments as the project develops through detailed design.

2. Introduction

2.1 Purpose and Scope

The purpose of this HAZID study was to identify the nature and scale of hazards that might occur during the operation of the proposed Queensland Coke and Power Plant. This included the potential for release of gaseous or particulate pollutants or any other hazardous materials used, produced or stored on site. Also included in the scope of the study were the effects of natural events such as cyclones, earthquakes, bushfires or local flooding. Following the identification of these hazards, the potential for their having significant offsite effects was also evaluated to determine the possible impacts on the surrounding population.

The HAZID study focussed primarily on operational hazards related to the proposed Queensland Coke and Power Plant Project. As a result, it did not consider construction specific hazards. These should be covered closer to the time of construction, and should utilise the expert knowledge of the proposed construction contractors. It was not considered appropriate to include construction hazards in this HAZID study, as insufficient detail regarding construction methods and requirements were available to allow the development of meaningful findings.

This HAZID study was conducted consistent with the requirements of the Australian / New Zealand Standard for Risk Management 4360:2004.

The study included the entire Queensland Coke and Power Plant, and was divided up into the following broad areas for consideration;

- Coal Handling – Unloading / Stockpile / Blending / Crushing
- Coke Ovens
- Coke Quenching / Screening (inc Coke Wharf)
- Loading Operations (handling / transfer issues are the same as experienced at site)
- Utilities
- Heat Recovery Boiler / Fan / Vent Stack / Emergency Vent
- Steam Turbine / Generator / Cooling Tower
- Overview (Entire Site)

As the project was at a relatively early stage when the study was conducted, no detailed plans of the Queensland Coke and Power Plant were available for review. The study therefore relied on the expert knowledge and past experience of the workshop participants.

2.2 HAZID Workshop and Team Members

The HAZID study was conducted on Tuesday 26th July 2005 at the URS offices in Brisbane. The team present in the workshop is listed in the table below:

Name	Company	Position
James MacDermott	URS	Principal Engineer
David Cork	Corky's Carbon and Combustion	Coke Operations
Sharon O'Rourke	Hatch	Coke Operations
Fiona McKenzie	Barlow Jonker	Senior Consultant
Ross Grainger	Connell Wagner PPI	Associate
Samantha McKenzie	HAZID Facilitator	GHD
Peter Herrmann	HAZID Scribe	EMQ

2.3 Project Background

Queensland Coke & Energy Pty Ltd (QCE) and Stanwell Corporation Limited (SCL) are proposing to construct and operate a combined coke and power plant within the Stanwell Energy Park (SEP), located 25 km southwest of Rockhampton in Central Queensland. The SEP is situated on Power Station Road, immediately south of the township of Stanwell.

Queensland Coke & Energy Pty Ltd will be responsible for the coke plant, which will employ modern heat recovery coke making technology to produce a superior quality blast furnace coke for the export market. The technology uses heat generated from the combustion of gases contained within the coal to convert coal into coke.

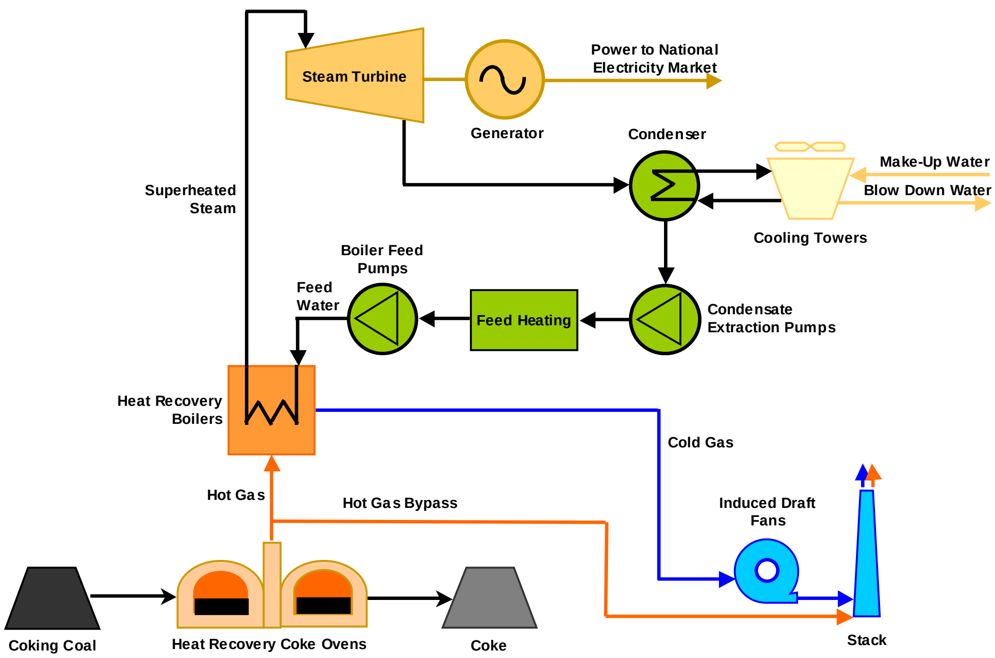
A power plant is proposed to be built on a site adjacent to the proposed QCE coke plant and the existing Stanwell Power Station (SPS) to generate electricity using steam produced from waste heat from the coke plant. The coke plant is proposed to be constructed primarily on land within the SEP that was significantly cleared for the former Australian Magnesium Corporation project

At the time of the HAZID workshop, the concept was to construct a coke plant with an initial (1st stage) production capacity of 1.6 Million tonnes per annum (Mtpa) of coke, allowing for expansion (2nd stage) to 3.2Mtpa. At the 3.2Mtpa level the project would consume approximately 5.0Mtpa of Bowen Basin coking coal. Following this 2nd stage, the plant would comprise 8 coke oven batteries, each with up to 60 ovens (approx 640 ovens in total). Heat generated from combusted coal gases in the coke making process would be sufficient to generate up to 370MW of electricity (for the 3.2Mtpa scenario).

Coke will be transported by rail to an export facility at the Fisherman's Landing port site in Gladstone in standard Blackwater train consists. Once at Gladstone the coke would be discharged from trains via a rail unloader then conveyed to a new wharf and ship loader. Panamax size vessels would then ship the coke product to markets in Asia, Europe and the Americas.

The proposed coke making technology is based on modern heat recovery processes used in the United States of America and elsewhere. The expected emission levels from this type of technology comply with the most stringent international standards and are significantly lower than conventional by-product coke oven technology, the latter most commonly associated with integrated steel mills. This is due to the nature of the coking process in which gaseous products are combusted in a negative pressure environment. Surplus heat generated by the combusted coal gases is converted to steam. Electricity will be produced by modern steam turbines.

The figure below is a simple flowchart showing an overview of the project. It shows the key inputs to, and outputs from, the process.



3. Methodology

A HAZID is a workshop based study carried out by a multi-disciplinary team of personnel. The procedure aims to systematically generate questions about the hazards of the particular system under review. Although it is a comprehensive hazard identification tool, it cannot provide assurance that all hazards (both major and minor) will be identified.

The study aims to search a design or procedure systematically section by section to identify every conceivable deviation from normal operation. The HAZID uses a set of guidewords that are carefully chosen to promote creative thought about all possible hazards.

For each guideword, the team considers whether there are realistic causes for that guideword and whether the consequences are significant. The team then considers whether the existing safeguards are adequate and may make recommendations for corrective action or further study as appropriate.

The composition of the team is important. Where possible, the team should comprise representatives from both the design and operating groups for the plant and any other specialists as required. The team members should be knowledgeable and experienced in the field they represent. A team leader (experienced in the HAZID technique and able to assist the team in identifying deviations and potential hazards) guides the HAZID process.

The best method for dealing with hazards is not always obvious. In this study, a simple risk analysis and hazard ranking exercise is used to highlight the level of attention each hazard requires. Each hazard is assigned a frequency of occurrence and a consequence severity. Using these frequency and severity rankings, the risk is determined on a simple matrix, and a risk level of Low, Medium, High or Extreme is assigned.

A HAZID conducted during the early stages of a project minimises risk by early identification of critical hazards, allowing the design to effectively eliminate or mitigate them. By considering all requirements in the very early stages of design, any changes can be made before procurement and construction commitments are made. This reduces the cost of any modifications, which will only increase the later in the project that they are made. The study also helps by highlighting key safety and operations aspects to the design team.

A HAZID can also assist in the construction and commissioning phases of a project, by being able to foresee major problems and then allow time to adequately plan how to handle the problems. This leads to trouble free construction and commissioning.

The guidewords that were used in the HAZID study are listed below. The “category” in the below table was used as the hazard under consideration, and the “guidewords” were used as examples to prompt the workshop group into considering the possible causes of each hazard.

Category	**Guideword**	**Category**	**Guideword**
Fire and Explosion Hazards	Stored flammables Sources of ignition Equipment layout Fire protection and response Operator Protection	Natural and Environmental Hazards	Climate Extremes Lightning Earthquakes Erosion Subsidence
Process Hazards	Inventory Release of Inventory Over pressure Over / under temperature Excess / zero level Wrong composition/ phase	Effect of the Surroundings on the Facility	Geographical – Infrastructure Proximity to Population Adjacent Land Use Proximity to Transport Corridors Environmental Issues Social Issues
Utility Systems	Firewater Fuel Gas Heating Medium Diesel Fuel Power Supply, Lighting Steam Drains Inert Gas/Instrument Air Waste Storage/Treatment Chemical / Fuel Storage Potable Water Sewerage	Environmental Damage	Continuous Plant Discharges to Air Continuous Plant Discharges to Water Continuous Plant Discharges to Soil Emergency / Upset Discharges Facility Impact Waste Disposal Options Timing of Construction
Maintenance Hazards	Access Requirements Commonality of Equipment Heavy Lifting Requirements Transport	Created (man made) Hazards	Security Hazards Terrorist Activity

The Matrix used to rank each of the hazards, and the definitions of each frequency and severity increment are shown below.

		Severity				
		1	2	3	4	5
Frequency		Insignificant	Minor	Moderate	Major	Catastrophic
A	Almost Certain	H	H	E	E	E
B	Likely	M	H	H	E	E
C	Possible	L	M	H	E	E
D	Unlikely	L	L	M	H	E
E	Rare	L	L	M	H	H

Measure of Severity		
1	Insignificant	No injuries, low financial loss
2	Minor	First aid treatment, on-site release immediately contained, medium financial loss
3	Moderate	Serious injuries, on-site release contained with outside assistance, high financial loss
4	Major	Extensive injuries, single fatality, loss of production capability, off-site release with no detrimental effects, major financial loss
5	Catastrophic	Multiple fatalities, toxic release off-site with detrimental effect, huge financial loss

Measure of Frequency			
A	Almost certain	10 times per year	Is expected to occur in most circumstances
B	Likely	once per year	Will probably occur in most circumstances
C	Possible	once every 10 years	Might occur at some time
D	Unlikely	once every 100 years	Could occur at some time
E	Rare	once every 1000 years	May only occur in exceptional circumstances

Although all of the guidewords were considered during the course of the workshop, it is an accepted practice to record “by exception” and only record the discussions where:

1. The consequences of a hazard are significant and the existing controls are noted to ensure recognition of the causes and the controls inherent in the process;
2. The existing controls are found to be inadequate and recommendations are made for additional / changes to these controls or for further study of the issue; or
3. The workshop team wishes to record that the issue was discussed and that the existing controls are considered acceptable

The benefit of this approach over the “full recording” approach is a considerable reduction in the duration of the study and the quantity of minutes generated.

4. Findings

The HAZID study identified a number of potential project improvements or areas for further study / investigation. The full HAZID minutes are shown in Appendix A at the end of this report. A total of 46 items were considered / recorded during the workshop, resulting in the identification of 18 recommendations / additional controls for consideration.

Matrix risk assessment of the 46 hazards resulted in 5 high risks, 16 medium risks, 21 low risks and 4 risks that did not require rating. The risks that did not require rating were either operational issues (i.e. not hazardous events) that the workshop participants wanted to capture, or hazards that were eliminated by the control that will be in place. None of the risks identified were anticipated to result in offsite consequences, negating the need for further / more detailed modelling of their consequences.

The recommendations / additional controls are shown in the table below. The item number corresponds to the item for which the recommendation / additional control was generated (see the minutes in Appendix A). Responsibilities should be assigned to each of these items and a sign-off should take place to ensure that they are actioned appropriately.

Item No.	Recommendations / Additional Controls	Area of Plant
2	Utilise a coal dryer to reduce wetness of coal to approx 8% to minimise handling issues and refractory damage.	Coal Handling - Unloading / Stockpile / Blending / Crushing
3	Determine best compromise between coal wetness (poor handling characteristics, refractory damage) and dryness (dust generation, spontaneous combustion risk). Confirm with coke oven technology provider (for design of crushing system). [1]	Coal Handling - Unloading / Stockpile / Blending / Crushing
4	Confirm controls with coal handling and coke oven designers (to minimise risk of fire and explosion).	Coal Handling - Unloading / Stockpile / Blending / Crushing
6	Incorporate protection from build up of static electricity on fines transport conveyors. Reduce transport distance (minimise potential for build up of explosive atmosphere).	Coal Handling - Unloading / Stockpile / Blending / Crushing
8	Confirm location of diesel storage (that it is appropriate - no / minimal escalation risk).	Coal Handling - Unloading / Stockpile / Blending / Crushing

Item No.	Recommendations / Additional Controls	Area of Plant
12	Monitoring of off gas temperatures for the "dip" once coking is completed. Consider including the ability to easily retrofit thermocouples / gas composition monitors (for oven monitoring) in initial design.	Coke Ovens
13	Consider some form of pusher emission control / fume extraction (hooded pusher machine) on ovens. Installation of a coal dryer would minimise the risk of emissions during charging.	Coke Ovens
17	Confirm the pressure of the natural gas delivery pipeline, and the application pressure during use on site.	Coke Ovens
18	Confirm use of quench water odour control additive at other sites (what is it, will it be useful at this site).	Coke Ovens
20	Temperature feed back loop from coke on conveyor to quenching tower to control cooling / temperature of coke (to minimise risk of spontaneous combustion following quenching of coke).	Coke Quenching / Screening (inc coke wharf)
24	Consider implementation of thermal desalination unit (utilising waste heat from process for unit) for quench water.	Coke Quenching / Screening (inc coke wharf)
25	Consider blending coke breeze back into feed coal to reduce dust generation.	Coke Quenching / Screening (inc coke wharf)
26	Consider eliminating screening at Gladstone (depending on attrition during transport and handling) - if possible whilst still meeting client specifications.	Loading Operations (handling / transfer issues are the same as experienced at site)
27	Provide compressed air throughout coke plant area.	Utilities
28	Devise a method of separating "clean" and "contaminated" stormwater runoff from site (and of storing them separately) such that excess "clean" stormwater can be disposed of with minimal / no treatment.	Utilities
34	Investigate whether a tube leak in the waste recovery boiler can result in a hazard to health and safety.	Heat Recovery Boiler / Fan / Vent Stack / Emergency Vent
35	Ensure that the design allows for easy retrofitting of particulate removal equipment (should they be deemed necessary in future operation).	Heat Recovery Boiler / Fan / Vent Stack / Emergency Vent
36	Investigate what alternate materials are available for cooling tower construction (and which is most appropriate to this site).	Steam Turbine / Generator / Cooling Tower

Note:

1. This hazard was determined to be low risk; this is supported by subsequent studies that indicate that this particular coal is not particularly prone to self-combustion (ref 2).

5. Conclusions

The HAZID study achieved its aim of identifying the nature and scale of hazards that might occur during the operation of the proposed Queensland Coke and Power Plant. The HAZID team comprised of a core group of knowledgeable personnel, well versed in the proposed technology and mode of operation of the plant. A total of 47 items were considered / recorded during the workshop, resulting in the identification of 18 recommendations / additional controls for consideration. None of the hazards were assessed as being extreme risks, with 6 high risks, 18 medium risks and 19 low risks. None of the identified risks were considered to have the potential for significant offsite effects. Thus, they would have no impact on the surrounding population and would not present a risk offsite. As a result, no further modelling is considered necessary for these operations.

The HAZID study was conducted at a preliminary stage of the Queensland Coke and Power Plant Project. As a result, there was some information that was not available for inclusion / consideration in the study. Noteworthy examples of this are:

- Details of the design and operation of the proposed safety systems, including fire prevention and protection, leak detection and minimisation, and emergency shutdown systems and procedures were not available. The workshop assumed that the plant would meet all relevant Australian Standards and would meet current best practice for similar operations around the world.
- The construction phase of the project was not considered in the HAZID, as no detailed information regarding the construction methods / requirements was available. A separate construction HAZID should be conducted when a construction contractor has been engaged to consider the specific hazards related to the construction phase of the project.

If any major changes are made to the project design, the findings of this HAZID study may be affected. As a result, any such changes should also be subjected to a HAZID style review.

It is important to note that the HAZID is the start of the process, not the end. A successful outcome depends on methodical close out of the recommendations / additional controls identified in the workshop.

6. References

1. “Initial Advice Statement – Coke Plant & Power Station Project”, Stanwell Energy Park & Gladstone Export Port, December 2004, Queensland Coke & Energy Pty Ltd and Stanwell Corporation Limited
2. “Spontaneous Combustion Assessment of Coals Mined by BMA Billiton in Queensland Open Cut Mines”, SkillPro, October 2004

Appendix A

Hazard Register

(10 pages)

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1	P Herrmann	S McKenzie		S McKenzie		28/11/05
2	P Herrmann	S McKenzie		S McKenzie		12/12/05

Appendix M.2
HAZID Minutes with Treated Risk

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URS
Queensland Coke and Power Plant Project Hazid

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
Coal Handling - Unloading / Stockpile / Blending / Crushing									
1	Fire & Explosion	Poor stockpile management	Spontaneous combustion of coal in stockpile	Stockpile management procedures to regulate coal quality and preventative handling measures. Post meeting note: severity reduced to reflect SkillPro Spontaneous Combustion Assessment Report findings (included in Hazid Report reference section).	2	D	L		
2	Temperature	High coal moisture (approx 15%)	Coal does not flow Higher emissions during charging process Damage to refractory materials		2	A	H	Utilise a coal dryer to reduce wetness of coal to approx 8% to minimise handling issues and refractory damage	
3	Fire & Explosion	Low coal moisture (<10%)	Spontaneous combustion of coal during handling	Coal handling and blending operations are conducted with a focus on reducing risk of spontaneous combustion and dust generation	2	E	L	Determine best compromise between coal wetness (poor handling characteristics, refractory damage) and dryness (dust generation, spontaneous combustion risk). Confirm with coke oven technology provider (for design of crushing system).	
4	Fire & Explosion	Low coal moisture (<10%)	Coal dust is easily generated during handling / crushing / blending operations (potential for fire / explosion etc)	All electrical equipment will be appropriately rated for area (taking into account dust levels) Stockpile / handling area utilises water sprays and dust extraction to minimise dust levels	2	D	L	Confirm controls with coal handling and coke oven designers.	

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
5	Fire & Explosion	Fine coal storage	Potential for explosion of coal fines / dust	Explosion relief is designed into fine coal storage bins / hoppers All electrical equipment will be appropriately rated for area (taking into account dust levels)	3	C	H		
6	Fire & Explosion	Covered conveyors for the transport of coal fines	Potential for explosive atmosphere (in an enclosed space)	Fire protection on conveyors (water deluge) Conveyor dust management procedures Electrical equipment will be rated for the environment in which it is operating. Post meeting note: Conveyors are now not to be covered, therefore there is no confined space. West standpipe water deluge will be provided for fire protection. Severity has been reduced accordingly and the risk re-ranked.	2	D	L	Incorporate protection from build-up of static electricity on fines transport conveyors Reduce transport distance (minimise potential for build-up of explosive atmosphere)	
7	Utilities	Use of compressed air around coal / coal fines	Potential for static build-up (and possible ignition of coal fines)	Compressed air will not be permanently supplied to the coal handling area (a portable compressor would be used where necessary) - reduces potential for static build-up	2	E	L		
8	Fire & Explosion	Diesel vehicles on site (approx 10,000L storage tank on site)	Potential for failure / ignition of fuel in storage area	Standard fire prevention / control measures for on-site fuel storage	2	D	L	Confirm location of diesel storage (that it is appropriate - no / minimal escalation risk)	

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
	Coke Ovens								
9	Pressure	Failure of pressure control	Coke ovens "Puffing" (not combusting uniformly / smoothly) leading to; - refractory damage (generation of hot spots), - release of combustion products to atmosphere - lower coke yield (coal will burn) Exposure of operators to charging emissions	Maintenance of equipment & operating procedures to control / optimise operation of coke ovens Training of operators	2	B	H		
10	Pressure	Process upset emission (from vent stack)	Venting of unburned flue gasses from vent stack (potential toxics released into atmosphere)	Stack has pilot flame (?) to ignite unburned gasses prior to their being vented from vent stack	2	D	L		
11	Failure	Poor condition of oven (oven deterioration)	Release of combustion products to atmosphere Lower coke yield (coal will burn) Exposure of operators to charging emissions	Maintenance of equipment & operating procedures to control / optimise operation of coke ovens Monitoring of coal dust emissions Monitoring of stack / emissions to detect oven conditions (refractory damage etc)	3	D	M		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
12	Temperature	Poor temperature management in oven	Insufficient temperature in oven Release of combustion products into atmosphere Production of "green" (under-cooked) coke	Interlocks on opening oven before push cart is present or before oven is ready	2	B	H	Monitoring of off gas temperatures for the "dip" once coking is completed Consider including the ability to easily retro-fit thermocouples / gas composition monitors (for oven monitoring) in initial design	
13	Unburned gasses	Charging of ovens	Emission of uncombusted gasses on oven charging	Charging process is designed to contain emissions (capture / control releases) during oven charging. Includes partially opening door instead of full door.	2	B	H	Consider some form of pusher emission control / fume extraction (hooded pusher machine?) on ovens Installation of a coal dryer would minimise the risk of emissions during charging	
14	Operations	Poor charging schedule	Process interruptions Poor coke quality ("green" coke) Unstable operation of coking ovens	Development of block pushing patterns to enable delays to be recovered (minimise knock on effects on process) - to account for maintenance, shift change, and unexpected breakdowns	2	C	M		
15	Toxic Releases	Releases of toxic gas during coking oven operations	Exposure of operators to toxic gasses (from ovens)	Appropriate PPE for operators Personnel monitoring will be conducted on a regular basis to monitor exposure of operators to toxic releases from ovens (personnel will be removed from task if they exceed a pre-set limit)	1	C	L		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
16	Maintenance Hazard	Exposure of maintenance personnel to crystalline dust (from insulation material in used insulating suits - following coking oven access / work)	Long term health effects resulting from exposure to crystalline dust	There will be an appropriate disposal procedure developed for the safe disposal of used insulation suits	3	E	M		
17	Fire & Explosion	Use of natural gas for initial commissioning of coking ovens	Potential for fire and explosion following failure of gas supply / use facilities	Low pressure applications for heating coking ovens on site Compliance with relevant gas codes / standards during commissioning process	1	D	L	Confirm the pressure of the natural gas delivery pipeline, and the application pressure during use on site	
	Coke Quenching / Screening (inc coke wharf)								
18	Odour	Products of combustion vented into atmosphere from quenching operations	Nuisance odour issues in surrounding areas	Odour unit monitoring / modelling based on expected products of combustion Compliance with relevant standards / guidelines	1	B	M	Confirm use of quench water odour control additive at other sites (what is it, will it be useful at this site)	
19	Fire & Explosion	Hot spots on coke conveyors at wharf Insufficient quenching of coke	Spontaneous combustion of coke on conveyor	Management of quenching operation to minimise risk of spontaneous combustion Stockpile of coke is kept as small as possible to prevent build up of excessive heat	2	D	L		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
20	Fire & Explosion	Heat build-up in rail wagon (due to confined space / insulated area) Possibly due to not keeping any coke stockpile (loading directly from quenching area into rail wagon), meaning that coke has no time to cool in the open prior to being loaded into rail wagon	Potential for spontaneous combustion of coke in rail wagon (due to short time for cooling of coke)	Stockpile of coke is kept as small as possible to prevent build up of excessive heat (if a stockpile is kept) Sufficient distance between quenching area and rail wagon loading area to allow coke to cool sufficiently (to minimise potential for spontaneous combustion in rail wagon)	2	D	L	Temperature feed back loop from coke on conveyor to quenching tower to control cooling / temperature of coke (to minimise risk of spontaneous combustion following quenching of coke)	
21	Fire & Explosion	Attempting to put out fire in coke stockpile with water	Potential for a secondary explosion (heat from coke liberates hydrogen from water, resulting in a secondary hydrogen explosion)	Development of specific procedures governing the response to a coke stockpile fire	1	B	M		
22	Emissions	Coal grit and some toxics in quenching steam emissions	Visual impact of quenching steam release Grit and toxics in steam released from quench area leading to "dirty" rain and public concern over corrosion etc	Location of quench towers in relation to sensitive areas (eg car parks, residential areas) Quench tower design will include appropriate design features to minimise grit and toxics emissions	1	B	M		
23	Temperature	High temperature of quench water	Potential for operators to sustain burns / injury	Appropriate guarding and training for operators / on site personnel	3	D	M		
24	Composition (product quality)	High salinity of quench water	Catalyses the breakdown of the coke in end use (blast furnace)	Analysis of coke to ensure that excessive sodium levels are not excessive (that coke meets required customer specification)	3	D	M	Consider implementation of thermal desalination unit (utilising waste heat from process for unit) for quench water	

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
25	Emissions	Generation of coke dust from screening / transfer points	OHS issues for onsite personnel Potential for the coke dust to be carried off site	PPE requirements for onsite personnel Dust control on all transfer points etc (control / containment)	2	C	M	Consider blending coke breeze back into feed coal to reduce dust generation	
	Loading Operations (handling / transfer issues are the same as experienced at site)								
26	See Note				No rating required			Consider eliminating screening at Gladstone (depending on attrition during transport and handling) - if possible whilst still meeting client specifications	
	Utilities								
27	Utilities	Compressed air required on site for maintenance			No rating required			Provide compressed air throughout coke plant area	
28	Utilities	Using stormwater catchment for process water	Potential for gathering more than plant can use (associated issues regarding disposing of excess "contaminated" stormwater)		2	D	L	Devise a method of separating "clean" and "contaminated" stormwater runoff from site (and of storing them separately) such that excess "clean" stormwater can be disposed of with minimal / no treatment	
	Heat Recovery Boiler / Fan / Vent Stack / Emergency Vent								
29	Emissions	Sulphur dioxide emissions from the main stack	Potential exposure of local community to sulphur dioxide	Emissions modelling is being conducted and the stack is designed to minimise emissions	1	B	M		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
30	Fire & Explosion	Flammable composition of gasses in exhaust / heat recovery boiler / main stack	Explosive atmosphere (unburned flue gasses) in main stack	An early warning / symptom indicating that unburned gasses were exiting the process would be a dirty stack This would alert operators to any problems far before it became a safety issue An opacity-meter (??) may be used to measure unburned gasses exiting the main stack	1	E	L		
31	Pressure	Failure / mal-function of exhaust fan used to draw exhaust fumes through heat recovery boilers	Potential for under-pressure of flue piping (fume emission from oxygen injection ports)	Exhaust fan will have pressure control to ensure that design pressure / vacuum of flue piping is not exceeded	2	D	L		
32	Process Hazards	Build-up of particulates in heat recovery boilers (from oven combustion by-products)	Potential fouling / blockage of boiler piping Build-up of corrosive materials on heat recovery boiler internals	Regular cleaning regime Selection of appropriate materials of construction	1	B	M		
33	Temperature	Corrosion / erosion / failure of heat recovery boiler tubing	Breakthrough of steam into flue gas	Hot flue gas is automatically vented through emergency vent stack and turbines are shut down (on low level cut-out on steam circuit water) to prevent damage to downstream equipment	2	D	L		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
34	Temperature	Failure of water supply to heat recovery boiler	Potential for over-heating cold flue gas flue	Hot flue gas is automatically vented (on high temperature / low water level in system) through emergency vent stacks to prevent damage to equipment downstream of heat recovery boiler	1	D	L	Investigate whether a tube leak in the waste recovery boiler can result in a hazard to health and safety	
35	Emissions	Particulates from flue gas	Potential emission / pollution issue	Particulate emissions are not expected to be an issue with the anticipated coal blend	2	C	M	Ensure that the design allows for easy retro-fitting of particulate removal equipment (should they be deemed necessary in future operation)	
	Steam Turbine / Generator / Cooling Tower								
36	Fire & Explosion	Cooling tower is left unused for a length of time	Potential for a cooling tower fire as the cooling tower dries out	Fire fighting equipment available to control / extinguish fires. Timber cooling towers will be fitted with wetting down systems.	3	D	M	Investigate what alternate materials are available for cooling tower construction (and which is most appropriate to this site)	
37	Operations	Use of cooling tower on site (in power generation plant)	Potential for diseases linked to cooling tower operation	Standard tests will be done for known cooling tower disease risks (eg legionnaires)	2	D	L		
38	Fire & Explosion	Hydrogen used for cooling turbines	Potential explosive atmosphere of hydrogen (and resulting explosion / fire)	Equipment is designed to minimise the possibility of hydrogen leakage. Hydrogen use is monitored to ensure that losses are within tolerances. Gas detection systems, fire detection and suppression systems in turbine enclosure. Selection of appropriately rated and certified electrical equipment.	3	E	M		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
39	Fire & Explosion	Oil used on site for lubrication and in transformers on site	Potential for oil fire / explosion (eg transformer failure)	Bunding to contain oil spills and potential spread of fire. Monitoring of oil pressures with alarming and protection as appropriate. Fire rated and explosion barrier walls installed or plant separated to prevent escalation. Appropriate fire detection and suppression systems will be provided on site	3	E	M		
40	Electrical	HV power connection from turbine to grid	Potential electrocution of site personnel	Appropriate clearances, barriers, procedures and standards will be adhered to in the site layout, design, operating and maintenance practices.	3	E	M		
	Overview (Entire Site)								
41	Temperature	Use of caustic in scrubber process	Potential for freezing of caustic solution in cold weather (unable to use in scrubber process)	Any design for systems on site utilising caustic solutions should take the lowest local ambient temperature into account (this will ensure that this risk will not occur)	No rating required				
42	Temperature	Equipment may not have been designed to operate in high ambient temperature conditions	Potential overheating of equipment on site in hot weather	Ensure that the design of all equipment on site takes the highest local ambient temperature into account (this will ensure that this risk will not occur)	No rating required				
43	Lightning	High structures on site (flue stacks etc)	Potential for direct lightning hits on site equipment	All vulnerable structures will be lightning protected	2	E	L		
44	High Wind	High wind / adverse environmental conditions	Potential for over-loading / damage to site structures	All structures on site will be wind rated for maximum expected local conditions	2	D	L		

Item No.	Guideword	Causes	Consequences	Existing Controls	Initial Risk			Additional Controls	Completed?
					Sev.	Freq.	Risk		
45	Extreme Weather	High rainfall conditions	Flooding of raw coal storage stockpile area (from site storage / holding ponds or nearby streams)	On site storage / holding ponds are designed to withstand a one in 10 year storm. Local area has no record of flooding. Streams are at a lower elevation than the stockpiles / site (approx. 4m lower).	2	E	L		
46	Emissions	Sludge formation in quench pond	Waste emissions from site	Sludge from quench ponds is to be recycled and used in the coke ovens (reduction of site waste generation)	1	C	L		

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Appendix M.3
SCL Hazard Memo and Hazard Register

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Amd Date
02/05/02

STANWELL
CORPORATION LIMITED

MEMO

ACN 078 848 674

Brisbane Office

TO James MacDermott

CC : Megan McCollum

FROM : Bob Saunders

DATE : 10 November 2005

FILE : 840/120/1

Power Plant Hazard Assessment Workshop Findings for Incorporation in EIS

James

On review of the draft Health and Safety Section of the EIS and supporting draft HAZID Workshop Report, we identified the need to undertake further work to better identify and assess the risks associated with the Power Plant. To address this need, a second workshop was conducted by SCL staff and contractors on the 2nd of November. A copy of the risk register developed during this workshop, which supersedes hazard items 36 to 40 from the earlier HAZID Workshop of 26 July 2005, is attached for inclusion in the EIS.

Workshop Team

The workshop team comprised:

- Graham Dawson – Stanwell Power Station Production Business Manager (Operations and Maintenance, SCL)
- Ross Grainger – Power Plant Design Manager, Associate (Connell Wagner PPI)
- Tasman Graham – Environmental Manager – Projects (Business Services, SCL)
- Ralph Willson – OH&S Consultant (Business Services, SCL)
- Bob Saunders - Project Manager (Business Expansion, SCL)

The team included representatives from both the design and operating groups of SCL.

Methods

The risk identification and assessment methodology we applied followed that used in the earlier HAZID Workshop and was in general accordance with the *AS/NZS 4360:2004 Risk Management* and *HB:203:2004 Environmental Risk Management: Principles and Process.*

Yours truly,

R W (Bob) Saunders
Project Manager

Attachments: Power Plant Risk Register Spreadsheet

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STANWELL CORPORATION LIMITED
QUEENSLAND COKE AND POWER PROJECT

REGISTER OF POWER PLANT HAZARDS (RELEVANT TO EIS) IDENTIFIED DURING WORKSHOP ON 2 NOVEMBER 2005
Attendees: Graham Dawson, Ross Grainger, Tasman Graham, Bob Saunders (P/T), Ralph Willson

Item No.	Plant Area	Guideword	Hazard	Causes	Consequences	Planned Controls	Initial Risk			Additional Controls	Completed?
							Sev	Freq	Risk		
1	Steam turbine	Emergency / Upset Discharges	Chemical and oil (all dangerous goods) storage	Inadvertent release of substances due to: - mechanical failures - inadequate design - control system maloperation - operator error	Release of chemicals to air, soil or stormwater drainage systems, injury to operations personnel or visitors	- Limit quantities of chemicals on site - Design to consider possibility of control system failures and operator error - Quality Assurance for design, fabrication and erection processes - Develop and implement operations and maintenance manuals - Implement safe working practices for operations personnel - Implement emergency and spill response procedures	3	D	M		
2	Steam turbine	Facility Impact	Noise	Unexpected, excessive noise during construction, commissioning and operation	Short term hearing loss or long term hearing damage for construction, commissioning, operations and maintenance personnel Off-site noise levels exceeding EPA guidelines	- Undertake noise studies during design and specify appropriate noise limits for all equipment procured - Verify noise levels during commissioning - Implement corrective measures for non-compliant plant and equipment - Appropriate hearing protection management system for construction workers and operations personnel - Periodically monitor hearing of operations personnel - Community communication process (notification and complaints handling)	3	D	M		

3	Steam turbine	Security Hazards / Terrorist Activity	Terrorism	Breaches of site security, either inadvertently or due to acts of terrorism	Injury to the intruder(s) or to people on site, business interruption	- Implement site security and access control systems and procedures - Implement emergency response procedures - Training of personnel - Periodic exercises	3	E	M		
4	Steam turbine	Water Storage / Treatment	Water Contamination	Contamination of water eg Legionella, due to inadequate treatment or incorrect storage	Injury to construction works or operations personnel or visitors, Legionella infection	- Regular maintenance of water treatment, storage and handling systems - Regularly test water quality - Corrective action if quality limits not met	3	D	M		
5	Steam turbine	Earthquakes	Earthquakes	Earthquake or tremor	Failure of plant, equipment or structures, leading to injury to construction or operations personnel or visitors	- Design structures considering earthquake loadings specified in the relevant standards and codes - Contractor design review - Cerification of building structures in accordance with BCA and DA requirements - Review of structural integrity as appropriate following an earthquake or tremor	3	D	M		

6	Steam turbine	Construction Hazards	Construction Phase - On Site Risks	Unsafe working practices or conditions leading to an incident occuring on site	Injury or death to people on site, business interruption	Develop and implement: - contractor selection process including review of past performance - clear delineation of construction site - control site access - site accountabilities and responsibilities (including Principal Contractor appointment) - on site safety plan by contractor - ongoing monitoring and auditing of safety plan - competent and certified construction workforce - fit for purpose construction equipment - training and induction programs (personnel competency) - site incident and emergency management plan - plant designed and constructed to relevant safe standards and specifications	3	D	M		

7	Steam turbine	Operations personnel	Operation Phase - On Site Risks	Unsafe design, working conditions or work practices leading to an incident occuring on site	Injury or death to people on site, business interruption	Develop and implement: - contractual obligations for safe design - detailed design review prior to construction - quality assurance during construction - Operations & Maintenance Manuals - on site safety plan by operator - ongoing monitoring and auditing of safety plan - training and induction programs (personnel competency) - site incident and emergency management plan - fit for purpose plant and equipment - control site access	3	D	M		
8	Steam turbine	Transport	Traffic	Increased traffic flow due to construction and operation of facility	Road accidents, potential environmental impacts such as release of hydrocarbons to waterways, potential road congestion	- Conduct traffic impact study for project - Consider alternative transportation strategies, eg buses for construction workers, timing of construction deliveries etc, if impacts are found to be significant	3	D	M		
9	Steam turbine	Fire protection and response	Fire and smoke	Bushfire, lightning and deliberate or accidental fires	Damage to plant and equipment, traffic hazards, impact on on site personnel, infrastructure and the local community	Comply with Bushfire Management Plan for Stanwell Energy Park and implement site specific Fire Management Plan, including: - vegetation assessments - fire breaks - controlled burn-offs (excluding areas of significant vegetation) - emergency response procedures - induction and training (personnel competency)	3	D	M		

10	Steam turbine	Climate Extremes	Flooding	Extreme rainfall event	Local flooding, business interruption	- Implement Stormwater Management Plan - Design of water catchment and storage - Design storage facilities for oil, chemicals and dangerous goods to avoid releases to waterways	3	D	M		
11	Steam turbine	Transport	Accident involving vehicles transporting oils, chemicals or dangerous goods to site or removal of waste from site	Road accident	Substance spill	- Transport to comply with Australian Dangerous Goods Code and applicable laws - Selection of reputable and safety compliant transport contractors	3	D	M		