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Southern Cross Operations

2009/10 Annual Environmental Report



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DATE: 28 October 2010



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(except where indicated as Joint Ventures or “JV”)

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Executive Summary

This Annual Environmental Report (AER) summarises the operational and environmental activities at St Barbara Limited's (St Barbara) Southern Cross Operations (SXO) for the period 1 July 2009 to 30 June 2010. The report has been prepared to meet the annual reporting requirements for the Department of Mines and Petroleum (DMP) and Department of Environment and Conservation (DEC). It also serves as an information document for other key stakeholders.

In order to simplify reporting over SXO's 247 tenements, projects have been classified as 'active' or 'inactive'. Discussion in this report focuses on active projects. The projects listed in Table 1 are deemed to have been active for at least part of the reporting period.

Table 1: Projects and Activities Undertaken in 2009/2010

| Project | Activity Undertaken | Active Period |
|------------------------------|--|--------------------|
| Marvel Loch | Underground Mining, Processing, Dewatering, Tailings Storage, Exploration Rehabilitation | Entire 09/10 |
| Nevoria | Dewatering/Water Abstraction for Processing | Entire 09/10 |
| Transvaal | Open Pit Mining, Stockpile haulage, Infrastructure Decommissioning | July 09-January 10 |
| Jaccoletti/Panizza Borefield | Water Abstraction for Processing | Entire 09/10 |
| Edward's Find | Water Abstraction for Processing | Entire 09/10 |
| Yilgarn Star | Water storage (dewater) and Sampling of stockpiles | Entire 09/10 |
| Resurrection | Stockpile haulage, Rehabilitation | July 09-January 10 |
| Pakistani | Rehabilitation | March 10 |
| GVG | Infrastructure decommissioning, Rehabilitation, Sampling of stockpiles | Jul-Aug 09 |
| Treasury | Sampling of stockpiles | |
| Polaris South | Sampling of stockpiles | |
| Southern Star | Sampling of stockpiles | |
| Golden Pig | Sampling of stockpiles | |
| Triad | Sampling of stockpiles | |
| Harris Find | Sampling of stockpiles | |

Ore production occurred predominantly from the Marvel Loch Underground Mine during 2009/2010 due to suspension of open cut mining at the end of the 2008/2009 financial year. The Marvel Loch Underground produced 970 thousand tonnes of ore with an additional 23 thousand tonnes of ore produced by one week of open pit mining from Mercury which carried over into July 2009.



The Marvel Loch processing plant had a throughput of 1.28 million tonnes of ore, producing 121,870 ounces of gold. Tailings were deposited into the tailings storage facility (TSF) at Marvel Loch. During the review period, embankment raising works were undertaken on Cell TSF 1 from 1,037m RL to 1,039.5m RL.

Minor rehabilitation activities were undertaken during the year including minor capping work on the Resurrection/Bronco waste dump, removal of infrastructure associated with open pit operations at GVG/Hercules and Transvaal and legacy exploration rehabilitation.

Two reportable incidents (saline water releases) occurred during the reporting period. St Barbara notified DEC and DMP of these occurrences. There was no discernable environmental impact caused by either incident.

Highlights during the year included:

- Awarding of seed collection contract to Jims Weeds, Seeds and Trees for collection of provenance seed from the Southern Cross region. Approximately 800kg of seed was collected for the 2010-2011 rehabilitation program;
- Improved abrasive blasting management and hydrocarbon management.

No new disturbance undertaken during the reporting period. A disturbance and rehabilitation summary based on the previous reporting period has been included in Table 2.



Table 2: Disturbance and Rehabilitation Summary

| Disturbance Type | 2009/2010 Clearing (ha) | Cumulative Disturbance (ha) | Years Prior to this AER Period | | | | | | The Current AER Period | | | | | |
|--|----------------------------|--------------------------------|--------------------------------|---------------------------|------------|------------|------------|------------|------------------------|---------------------------|----------|----------|----------|----------|
| | | | Total Disturbance | Rehabilitation Stage (ha) | | | | | Total Disturbance | Rehabilitation Stage (ha) | | | | |
| | | | | 0 | 1 | 2 | 3 | 4 | | 0 | 1 | 2 | 3 | 4 |
| Open Pit, U/G Mines & Vent shafts and Abandonment Bunds | 0 | 544 | 544 | 544 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tailings Storage Facilities | 0 | 380 | 380 | 196 | 0 | 16 | 83 | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Heap/Vat Leach | 0 | 22 | 22 | 8 | 3 | 7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Evaporation Dams/Turkeys Nests | 0 | 11 | 11 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROM pads/Low Grade Stockpiles | 0 | 42 | 42 | 23 | 0 | 13 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Plant sites and mining infrastructure including workshops | 0 | 9 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hypersaline pipelines(>15,000 TDS) / Haul roads | 0 | 248 | 248 | 233 | 0 | 1 | 9 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fresh water pipeline corridors (<15,000 TDS) / Access tracks | 0 | 90 | 90 | 69 | 2 | 4 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hardstand areas | 0 | 372 | 372 | 125 | 8 | 91 | 52 | 125 | 0 | 0 | 0 | 0 | 0 | 0 |
| Borrow Pits | 0 | 39 | 39 | 18 | 1 | 6 | 5 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exploration clearing | 0 | 10 | 10 | 5 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Waste dumps | 0 | 1,044 | 1,044 | 70 | 87 | 220 | 165 | 516 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Disturbance | 0 | 2,811 | 2,811 | 1,307 | 103 | 353 | 327 | 703 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: Tracking and surveying of disturbance and rehabilitation areas since the 2006 Bond Review has been ad hoc and as such these figures may not be 100% accurate but reflect the best information available at this time. St Barbara intends to review all disturbance and rehabilitation information and formulate better tracking of activities to improve accuracy of reporting for future reporting periods.



1 Introduction

This Annual Environmental Report (AER) summarises the operational and environmental activities associated with St Barbara Limited's (St Barbara) Southern Cross Operations (SXO) for the period 1 July 2009 to 30 June 2010. The report has been prepared to meet the annual reporting requirements for both the Department of Mines and Petroleum (DMP) and Department of Environment and Conservation (DEC).

St Barbara currently has mining and exploration tenements covering approximately 1,000 km² in the Southern Cross region of Western Australia. The township of Southern Cross is located 375 km east of Perth and 235 km west of Kalgoorlie on the Great Eastern Highway. The administrative centre for SXO is located at Marvel Loch, some 32 km south of Southern Cross. SXO tenements are predominately located in the Shire of Westonia-Yilgarn, with several tenements overlapping into the Shires of Kondinin, Lake Grace and Kulin.

In the 2009/2010 reporting period, the primary ore source was the Marvel Loch underground mine, with one week of mining also occurring at the Mercury open pit and haulage of stockpiles from Mercury and Burbidge being undertaken in the first half of the year.

1.1 Brief History

The Southern Cross region has a long history of gold mining and exploration. Prospectors first discovered gold in the district in 1887 north of Bullfinch. The first significant mine was developed at Fraser's following its discovery in 1888. Gold was also discovered near Burbidge in the late 1890s, resulting in the development of mines at Grand National and Great Victoria (GVG) in 1906 and 1907 respectively. Discoveries at Nevoria, Marvel Loch, Bullfinch and Westonia occurred between 1905 and 1910. Mines were developed on a number of deposits in the following decades before declining in 1941 because of World War II.

After the war, Western Mining Corporation formed Great Western Consolidated to develop its leases in the area. This saw mining recommence at Copperhead (Bullfinch), Corinthia, Golden Pig, Frasers and Nevoria with ore processed at the Bullfinch mill. Great Western Consolidated produced over 650,000oz of gold in the period 1952 to 1966 before being wound up in 1970.

The increase in gold price and the advent of carbon in pulp/carbon in leach (CIP/CIL) processing led to increased gold mining and exploration activities in the belt by the early 1980's. A range of companies were involved in open pit mining at Marvel Loch, Transvaal, Nevoria, GVG, Frasers, Westonia and other deposits from the mid-1980's to early 1990's. Sons of Gwalia Ltd consolidated ownership of tenements in the Southern Cross region through the acquisition of the Marvel Loch and Southern Cross mines as well as companies such as Burmine, Orion Resources and 50% share of Gascoyne Gold Mines in the mid 1990's. Over subsequent years, processing facilities were rationalised from five facilities (Bullfinch, Southern Cross [Cornishman], Marvel Loch, the Star Mill [GVG] and Nevoria) to one plant located at Marvel Loch with a strategy of exploring and mining satellite deposits, to support the main operation at Marvel Loch. St Barbara acquired the Southern Cross Operations from Sons of Gwalia (Administrators Appointed) and have continued operations in the area.



1.2 Government Approvals

Mining and processing activities within SXO are required to comply with the provisions of the *Mining Act 1978* and *Environmental Protection Act 1986* (and associated regulations) in addition to other legislation. Changes to the current and future planned activities within the operation require environmental assessment through the Mining Proposal process, administered by DMP.

SXO operates under a single *Environmental Protection Act 1986* (EP Act) Licence 4597/12, which covers all prescribed activities. A summary of the EP Act Licence conditions and St Barbara's compliance with these conditions is provided in Appendix 8. Table 3 lists the current prescribed activities associated with the licence.

Table 3: EP Act Licence Activities and Associated Licence Limits

| Category Number | Category Name | Licence Limits |
|-----------------|------------------------------------|--------------------------|
| 5 | Processing and Beneficiation | 2,600,000 tonnes / annum |
| 6 | Mine Dewatering | 4,300,000 kL / annum |
| 64 | Class II and III Putrescible Waste | Less than 5,000 tonnes |

A summary of the recent approvals for SXO is provided in the following sections.

1.2.1 Environmental Approvals Granted

Mining Proposals

- A Mining Proposal for raising of the Marvel Loch Tailings Storage facility from 1040mRL to 1045mRL was submitted to the DMP on 1 August 2010 (outside of this reporting period).

Works Approval/Notifications

- A notification to raise the Marvel Loch Tailings Storage Facility Cell TSF1 by 2.5m, 1037.5 mRL to 1039.5 mRL (in accordance with Works Approval 3826) was approved by the DEC in July 2009.
- A Works Approval application for raising of the Marvel Loch Tailings Storage facility from 1040mRL to 1045mRL was submitted to the DEC on 1 August 2010 (outside of this reporting period).

Clearing Permits

- No clearing permit applications were lodged.

Exploration

- No approvals for exploration activity were sought during 2009/10.



1.2.2 Approvals Required During 2010/2011 Reporting Period

The following approvals will be required during the 2010/2011 reporting period.

Mining Proposals

- A Mining Proposal for raising of the Marvel Loch Tailings Storage facility from 1040mRL to 1045mRL was submitted to the Department of Mines and Petroleum on 1 August 2010 and is anticipated to be approved within the reporting period.

Works Approvals

- A Works Approval application for raising of the Marvel Loch Tailings Storage facility from 1040mRL to 1045mRL was submitted to the DEC on 1 August 2010. The Works Approval was granted on 26 September 2010 (expires on 26 September 2013).
- Notification to conduct subsequent raises of the Marvel Loch Tailings Storage Facility Cell 2 (1037.5mRL to 1040mRL) & Cell 2E (1035 mRL to 1037.5mRL) in accordance with Works Approval 3826.

Exploration

- Exploration activity will recommence in the Southern Cross region during the coming reporting period with a focus on testing potential underground targets. St Barbara anticipates the following Programmes of Work will be submitted during the coming reporting period.
 - o Copperhead/Bullfinch exploration on M77/480 (application submitted and approved October 2010)
 - o Frasers South exploration on M77/66 and M77/175 (application submitted)
 - o Corinthia exploration (M77/534)



2 Southern Cross Operations Tenement Summary

SXO is located almost entirely within the Yilgarn Mineral Field (77), although a small number of tenements are located in the Phillips River Mineral Field (74). Previous mining operations associated with SXO extend from Bullfinch in the north to Blue Haze in the south. Figure 1 illustrates the location of sites within SXO.

This AER is intended to fulfil the reporting requirements of the 247 tenements under the control of St Barbara SXO. Table 4 presents a summary of those tenements that require annual reporting or tenements where activities have occurred during the July 2009 to June 2010 reporting period.



Figure 1: Location of Southern Cross Operations sites



Table 4: Southern Cross Operations Tenement Summary

| Location | Tenement | Status during 2009/10 |
|--|--|---|
| Bullfinch/Copperhead Gold Mine | M77/46, M77/105, M77/299, M77/301, M77/356, M77/480, M77/572, M77/1026, G77/15, G77/25, G77/32, G77/33, G77/34, G77/36, G77/79, G77/80, G77/81, L77/57 | Closed. |
| Baladjie Borefield | L77/47, L77/52, L77/53, L77/54, L77/55, L77/56, L77/71, L77/72, L77/129, L77/132, L77/154, L77/155, L77/156, L77/157, L77/158, L77/159, L77/160 | Care and maintenance. |
| Corinthia Gold Mine | M77/534 | Closed. |
| Golden Pig & Fraser's Gold Mines | M77/66, M77/90, M77/109, M77/593, M77/1002 | Closed. Stockpile sampling. |
| Polaris South Gold Mine | M77/175, M77/497, | Closed. Stockpile sampling. |
| Ruapehu Gold Mine | M77/251 | Closed. |
| Greenmount & Transvaal Gold Mine | M77/225, M77/250, M77/734 | Operational (part of reporting period then care and maintenance). |
| Maori Lass Gold Mine | M77/217, M77/221, M77/225 | Closed. |
| Cornishman Gold Mine | M77/193, M77/197, M77/347, M77/352, M77/631, M77/811, M77/969 | Closed. |
| Axehandle, Leviathan & Achilles Gold Mines | M77/133, M77/159, M77/224, M77/722 | Closed. |
| Glendower Gold Mine | M77/424, M77/721 | Closed. |
| Triad Gold Mine | M77/86 | Closed. Stockpile sampling. |



| Location | Tenement | Status during 2009/10 |
|---|--|--|
| Lenneburg Gold Mine | M77/380 | Closed. |
| Mary Lena & Treasury Gold Mines | M77/555, M77/668 | Closed. Stockpile sampling. |
| Marvel Loch Gold Mine | M77/07, M77/08, M77/10, M77/26, M77/113, M77/114, M77/239, M77/525, M77/554, M77/638, M77/1036, G77/01, G77/02, G77/03, L77/7, L77/115 | Operational. |
| Jaccoletti, Panizza and Edwards Find Borefield | L77/19, L77/20, L77/21, L77/23, L77/41, L77/64, L77/65 | Operational. |
| Jaccoletti Gold Mine | M77/112, M77/525, M77/598, L77/65, L77/140 | Closed. Occasional use for storage of dewater from ML UG. |
| Edwards Find Gold Mine | M77/160, M77/376 | Closed. |
| Nevoria Gold Mine (including Kurrajong) | M77/31, G77/05, G77/06, G77/07, G77/08, G77/12, G77/13 | Care and maintenance and rehabilitation. |
| Burbidge Area (including GVG and Hercules Gold Mines) | M77/72, M77/138, M77/655, M77/745, M77/746, M77/747, M77/768, M77/775, M77/790, M77/1052, L77/112, L77/126 | Care and maintenance and rehabilitation. |
| Banker Gold Mine | M77/510 | Closed. |
| Yilgarn Star and Harris Find Gold Mine | M77/137, M77/431, M77/597, G77/74, G77/75 | Care and maintenance and storage of dewater. Stockpile sampling. |
| Southern Star Gold Mine | M77/198, M77/660, M77/702, L77/167 | Closed. Stockpile sampling. |
| Blue Haze Gold Mine | M77/812, L77/174 | Closed. |



| Location | Tenement | Status during 2009/10 |
|---|---|---|
| Teddy Bear Gold Mine | L77/175 | Closed. Tenement surrendered during reporting period.. |
| Cornishman to Marvel Loch Haul Road | M77/186, M77/554, L77/113, L77/114 | Care and maintenance. |
| Marvel Loch to Nevoria Haul Road | L77/162 | Operational. |
| Nevoria to Yilgarn Star Haul Road and Yilgarn Star to GVG Haul Road | M77/640, L77/06, L77/145, L77/173 | Operational. |
| Southern Star to GVG Corridor | L77/106, L77/167 | Care and maintenance. |
| Southern Star to Yilgarn Star Access Road | M77/432, L77/105, L77/168 | Care and maintenance. |
| Pilot Gold Mine | M77/1049 | Closed. |
| Forrestania Exploration | E74/396, E77/476, E77/478, E77/1433, E77/1434, E77/1435, E77/1437, L74/12 | No activities. All tenements (except L74/12) expired or surrendered during the reporting period.. |
| Mt Stewart Exploration | E77/998, E77/999 | No activities. Tenements expired or forfeited during reporting period.. |
| Yellowdine Exploration | E77/1344 | No activities. Tenement surrendered during reporting period. |

Detailed plans of project areas are provided in Appendix 1.



During the 2008-2009 reporting period St Barbara undertook an intensive review of SXO which resulted in consolidation of operations to the Marvel Loch underground. As a result there have been no surface mining activities undertaken during the 2009/10 reporting period and to date there are no activities planned for the 2010/11 reporting period.

A summary of the disturbance and rehabilitation for the SXO is provided in Table 2. The summary has been based on reporting in previous years. A complete breakdown of disturbance and rehabilitation is included in tenement data sheets in Appendix 2. The tenement data sheets were not updated with activities undertaken in 2008/09. They have now been updated with activities which occurred in the previous reporting period but no changes have been made for the 2009/10 reporting period due to no surface disturbance or rehabilitation occurring. A complete review of disturbance areas and rehabilitation status is proposed during 2010/11 to ensure tables are accurate and up to date.

Due to the large number of tenements included in this AER, it is necessary to simplify reporting by dividing projects and tenements into Active Sites and Inactive Sites. During the reporting year, the projects listed below were active on the basis of either mining, rehabilitation, dewatering or exploration activities. All other projects listed in Table 4 are considered inactive with no significant activities conducted in the past year. Projects that become active during the year will be reported in the next AER.

- Edwards Find
- Golden Pig
- GVG
- Jaccoletti/Panizza Borefield
- Kurrajong
- Marvel Loch
- Nevorla
- Pakistani
- Polaris South
- Resurrection
- Southern Star
- Transvaal
- Treasury
- Triad
- Yilgarn Star and Harris Find



3 Mining Activities

Mining activity during the reporting period was predominantly restricted to the Marvel Loch underground operation. One week of mining was conducted in the first week of July at the Mercury Open Pit (Transvaal) to complete the cutback operation which commenced in the previous reporting period (completion of the operation was delayed into July due to heavy wet weather conditions toward the end of June 2009). Haulage of stockpiles from Mercury and the Burbidge area was also carried out from July – August 2009 and again from October 2009 – January 2010. A summary of the mining production details from the Southern Cross Operations has been listed in Table 5.

The Marvel Loch Underground was the primary ore source for the year producing 969,519 tonnes of ore at an average grade of 4.00g/t. Ore was mined from the Undaunted, Sherwood, Contact, Exhibition, Sherwood, O’Brien, New, East and Mazza Lodes.

Table 5: Mine Production Summary July 2009 – June 2010

| Mine | Production Period | Ore (t) | Grade (g/t) | Contained Ounces (oz) | Waste (t) |
|---------------------------------------|---------------------------------------|----------------|-------------|-----------------------|----------------|
| Marvel Loch Underground | Continuous | 969,519 | 4.0 | 124,800 | 314,149 |
| Mercury | July 09 (1 week) | 23,413 | 5.7 | 4,317 | 21,600 |
| Total Mining | | 992,932 | 4.04 | 129,117 | 335,749 |
| <i>Haulage (Mercury and Burbidge)</i> | <i>Jul-Aug 09 & Oct 09-Jan 10</i> | <i>240,310</i> | <i>NA</i> | <i>NA</i> | <i>0</i> |

An aerial image of the entire Marvel Loch operation is included in Figure 2. A schematic of the Marvel Loch underground operation is included in Figure 3. The diagram illustrates previous development of the underground mine with decline development and stoping conducted in 2009/10 highlighted.



Figure 2: Aerial photograph of Marvel Loch Operation

Marvel Loch UG Stopping and Development 2009-2010

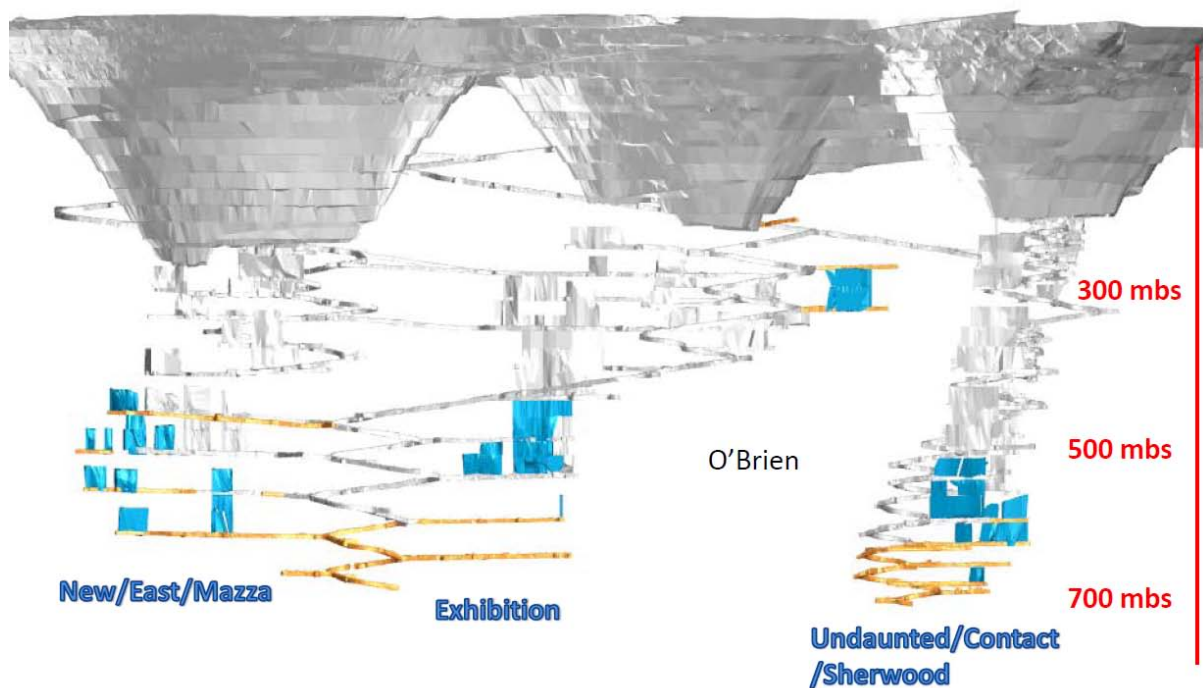


Figure 3: Schematic of the Marvel Loch Underground Mine with 2009/10 decline development and stopping



4 Exploration Activities

There was no physical surface exploration activity conducted during the reporting period. Underground exploration drilling continued in the Marvel Loch underground. Regional exploration focus was on compilation of historic data to assess exploration opportunities within the Southern Cross region. This work has focused primarily on the historic Copperhead, Fraser's South and Corinthian deposits. Investigation has also continued into the feasibility of developing the Nevorla deposit as a higher grade underground operation.

Rehabilitation of historic exploration on P77/3788 was completed in January 2010. The work included removal of degraded sample bags, plugging and burying of open drill holes, filling of open sumps and costeans, spreading of mounded soil stockpiles and ripping disturbed areas. Images of the rehabilitated area are included in Figure 4 and Figure 5.



Figure 4: Rehabilitated legacy exploration site on P77/3788



Figure 5: Rehabilitated legacy exploration site on P77/3788



5 Processing Activities

The Marvel Loch treatment plant is a 2.6 Mtpa conventional carbon in leach / pulp (CIL/CIP) plant. A process flow diagram and image of the processing plant are provided in Figure 6 and Figure 7. The process plant has been operating on a campaign basis (one week on, one week off) since August 2010 due to restricted ore availability as a result of the cessation of open pit mining.

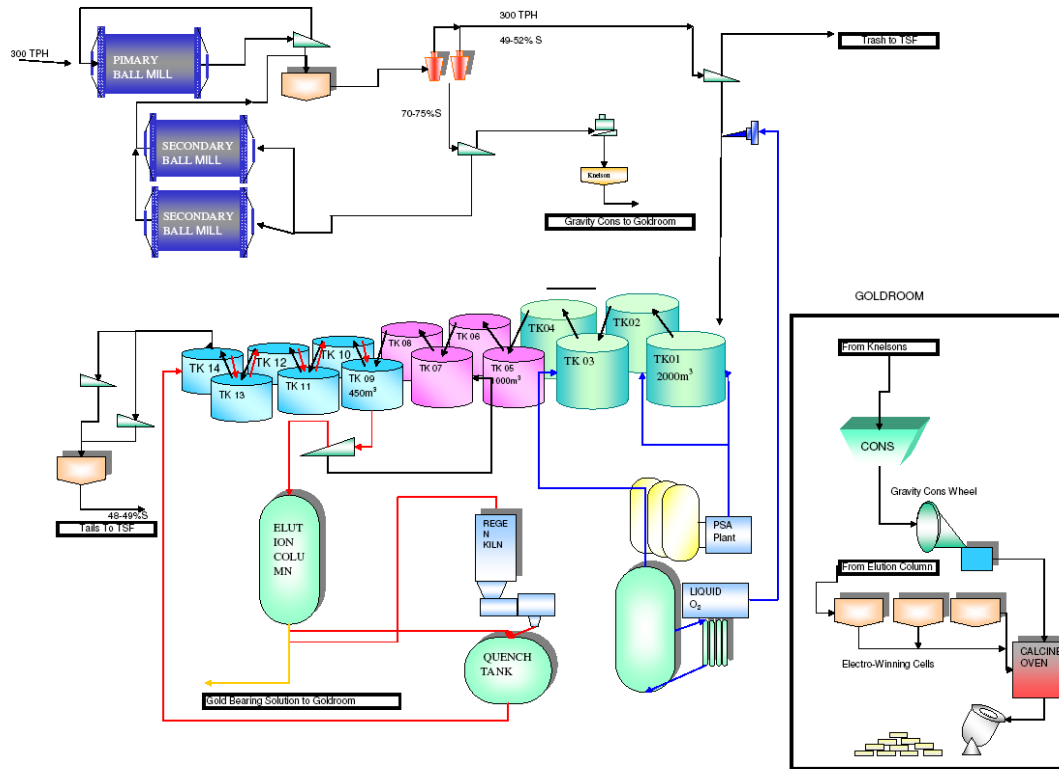


Figure 6: Marvel Loch Process Plant flow diagram



Figure 7: Aerial image of Marvel Loch Processing Plant



For the year ended 30 June 2010, a total of 1.28 Mt of ore was processed, yielding 121,870 ounces of gold (Au) with an average recovery rate of 86% (Table 6). The processing plant throughput was approximately half the nominal rated throughput of 2.6 Mtpa specified in EP Act Licence 4597/12 as a result of campaign milling.

The process plant has been undergoing significant changes over the reporting period to improve the safety, efficiency and environmental management of the plant. Refurbishment works have been undertaken throughout the year focussing on the leach and adsorption tanks, conveyors and the crushing circuit. One of the major improvement projects initiated as part of the project has been installation and commissioning of an Acacia Reactor in the gravity circuit. This change has increased typical gold recoveries from 84% to 93%.

The quantities of the processing consumables used during the year are included in Table 7.

Table 6: Processing Summary July 2009 – June 2010

| Ore Source | Units | Value |
|-----------------|--------|-----------|
| Mill throughput | tonnes | 1,279,751 |
| Grade | g/t | 3.56 |
| Ounces Au | Oz | 121,870 |
| Recovery | % | 85.9% |

Table 7: Processing Consumables July 2009 – June 2010

| Consumable | Unit | Total | Unit /tonne Milled |
|--------------------------|------|-----------|--------------------|
| Primary Grinding Media | kg | 272,369 | 0.21 |
| Secondary Grinding Media | kg | 511,221 | 0.4 |
| Cyanide | kg | 1,334,334 | 1.04 |
| Lime | kg | 6,678,930 | 5.22 |
| Carbon | kg | 35,200 | 0.03 |
| Oxygen | m3 | 597,472 | 0.47 |
| Lead Nitrate | L | 350,400 | 0.27 |
| Hydrochloric Acid | L | 398,293 | 0.31 |
| Sodium Hydroxide | kg | 296,080 | 0.23 |
| LPG | L | 323,474 | 0.25 |
| Hydrogen Peroxide | kg | 278,162 | 0.22 |

5.1 Tailings Management

During the reporting period the Marvel Loch processing plant produced 2.82 Mt of tailings at an average density of 45.6% solids. All tailings produced were deposited into the Marvel Loch Tailings Storage Facility (TSF) (all cells). Embankment raising works were undertaken on Cell TSF 1 to increase the embankment height from 1037 mRL to 1039.5 mRL. The embankment raise was constructed in



accordance with Notice of Intent 4307/Works Approval 3826 which were submitted in 2003 to extend the life of the TSF.

The construction work involved raising the perimeter embankments by 2.5 m utilising upstream construction techniques and dried tailings borrowed from within the storage cells. As part of construction works, decant access and decant structures were also raised by 2.5 m. Embankment raising is scheduled to be undertaken on TSF 2 Cell 1 and TSF 2 Cell Ext works during 2010/11.

The current design limit of the TSF (1040 mRL, corresponds to a design height of 23-37m) is insufficient for projected tailings production. To address this issue St Barbara (in association with Coffey Mining) completed investigation into the possibility of increasing the design limit of the TSF by five metres to 1045 mRL. The primary regulator concerns which needed to be addressed through this investigation were stability and seepage management.

Electrical Friction Cone Penetration Testing was conducted on the TSF to assist with seepage and stability analysis for the proposed increased design height. The results of this test work allowed assessment of the consolidation and drainage rates of in-situ tailings near the TSF perimeter embankments.

Stability analysis was undertaken using the computer program Slope/W. The results indicated that at the increased design height the TSF meets recommended minimum factors of safety for a series of different conditions. Seepage analysis was conducted using the computer program Seep/W. The seepage analysis examined the potential seepage increase resulting from raising the TSF to a maximum height of 1045 mRL. The analysis determined that seepage may increase by up to 1.8L/s at the maximum design height of 1045 mRL. To manage the predicted increase in seepage, additional seepage recovery systems have been designed which will be constructed adjacent to the Southern and Eastern TSF embankments in 2011.

In order to improve the monitoring of seepage St Barbara also installed 12 new monitoring bores at six locations around the TSF in January 2010. One deep (30m) and one shallow (10m) bore was installed at each location. These will be monitored for changes in water level and water quality. A diagram illustrating the location of the new bores is included in Figure 8.





Figure 8: New Marvel Loch TSF monitoring bores

5.1.1 Seepage Management

The Marvel Loch TSF currently has three active seepage recovery systems (Northern Seepage, Eastern Seepage and Southern Seepage). As mentioned in section 5.1 additional seepage recovery will be required to manage increased seepage anticipated as a result of increasing the embankment height above 1040 mRL.

The objectives of the seepage management system are to:

- reduce the risk of vegetation distress from seepage;
- recover near surface seepage (i.e. less than 4m) through seepage recovery trenches draining to pump sumps; and
- Monitor the effectiveness of seepage management controls through a network of monitoring bores.

Southern Seepage

The Southern Seepage is thought to be associated with a cut off trench under the embankment in association with an old natural drainage line. In the 2009 Annual TSF Audit it was noted that seepage flow into the southern collection sump appears to have reduced compared with previous audits. It is proposed to expand the existing Southern Seepage recovery system in 2011. Detailed schematics for the proposed alterations were submitted with the Works Approval and Mining Proposal Application for Raising the TSF Embankments to 1045 mRL.

Eastern Seepage

The Eastern Seepage is believed to be associated with water flow along the internal embankments between the TSF cells. The water is diverted by the cut off trench under the eastern embankment of Cell TSF2 through the abutment with Cell TSF1. St Barbara proposes to improve seepage management along the eastern embankment by constructing a new seepage recovery trench along a 250m section of the eastern embankment which will drain to a sump at the junction of Cell TSF1 and Cell TSF 2. The trench will be 2-3m deep, backfilled with clean select rock and a geotextile to act as a filter. These works have been outlined within the Works Approval and Mining Proposal application for raising the TSF Embankments to 1045 mRL.

Northern Seepage

The Northern Seepage recovery system is effectively controlling seepage along the northern face of the TSF. Additional seepage management is not required at this location and seepage will continue to be managed with the existing system.

5.1.2 Tailings Storage Audit

The Annual TSF Audit had not been completed at the time of writing this report due to the workload of the consultant engaged to conduct the audit. The audit is scheduled to be undertaken on 27 October 2010 by Coffey Mining. The report and a summary of findings will be submitted as an addendum to this report upon their completion.

An updated Tailings Storage Data Sheet for the Marvel Loch TSF can be located in Appendix 3.



6 Rehabilitation and Closure

Funds budgeted for major rehabilitation works at Southern Cross Operations were diverted to another St Barbara site due to higher priority tenement expenditure commitments at that operation (for details, please refer to the St Barbara Limited, Leonora Operations 2009/10 Annual Environmental Report). As a result only minor rehabilitation activities were undertaken during the reporting period, including removal of surface infrastructure, abandonment bund construction and legacy exploration works. The areas planned for rehabilitation in 2009/10 will now be completed within the 2010/11 reporting period.

6.1 Transvaal

Mining at Transvaal (Mercury open pit) was completed in early July 2010. Following completion of mining, surface infrastructure associated with the operation was removed. This included removal of temporary workshops, offices and a refuelling facility. Stockpiles remained on the ROM at Transvaal following mining however these were hauled to Marvel Loch for processing throughout the year. Bunding was also established on access roads to prevent public from accessing the open pit.

6.2 Burbidge Area

Mining was completed in the Burbidge area during the 2008/09 reporting period. The final operation in the area was the Resurrection open pit. Waste material from the pit was used to cap dispersive kaolin clays on the Bronco South waste dump. Sheeting of the slopes of this landform commenced in June and was completed in July 2009. The majority of the dump has now been sheeted with competent laterite material however a small section remains uncapped. The landform still requires final contouring, shallow ripping and seeding.

Abandonment bunding was established around the Pakistani open pit in the Burbidge area. The bund has been located outside the zone of instability however is not yet closed as a road traverses through the enclosed area. Two small sections require completion when rehabilitation is finished at sites accessed by the road which passes through the bunded area.

6.3 GVG

GVG was used as the main service area for surface operations in the Burbidge region. Following completion of mining in the area the facilities were no longer required. All mobile and servicing equipment and refuelling facilities were subsequently removed from the site. A workshop and storage shed have been left in place at this stage with a decision on their removal pending.

6.4 SXO Regional

6.4.1 Exploration Rehabilitation

As mentioned in section 4, a small amount of legacy exploration rehabilitation was conducted on P77/3788. This involved removal of degraded sample bags, plugging and burying of open drill holes, filling of open sumps and costeans, spreading of mounded soil stockpiles and ripping disturbed areas. St Barbara intend to develop a strategy for auditing legacy exploration rehabilitation in the 2010/11 reporting period which will assist in targeting areas which are still outstanding.

6.4.2 Seed Collection

Jim's Seeds, Weeds and Trees were engaged to conduct provenance seed collection in the Southern Cross area in preparation for future rehabilitation programs. Species selected for collection were determined based on their predominance in vegetation communities near operations at SXO and species performance in rehabilitation. Approximately 800kg of seed was collected which will be used in the 2010/11 rehabilitation program.



6.4.3 *Closure Planning*

St Barbara made significant progress with Closure Planning during the reporting period. A Southern Cross Operations Closure Plan was compiled and submitted to the DMP and DEC in October 2008. This closure plan outlines the current status of rehabilitation at sites within SXO and objectives and standard for closure domains. This plan did not include any cost estimates for the remaining closure works to be undertaken at Southern Cross and also doesn't include operations undertaken after completion of the plan. In early 2010 St Barbara engaged GHD to develop fully costed closure plans for current operations including SXO. GHD have been working with St Barbara throughout 2010 to develop the plan and it is expected to be complete before the end of 2010.



7 Environmental Management

An organisation structure review was conducted during the year for the entire St Barbara business which resulted in the restructure of the environmental department. The health, safety and environment functions have been incorporated into a single department managed by the Manager – Health, Safety and Environment. Staffing levels have been restricted to one position throughout the reporting period which has limited the capacity to conduct proactive environmental management however an Environmental Advisor position has been created which will be filled in November 2010. The reporting structure for the SXO Environmental personnel is illustrated in Figure 10.

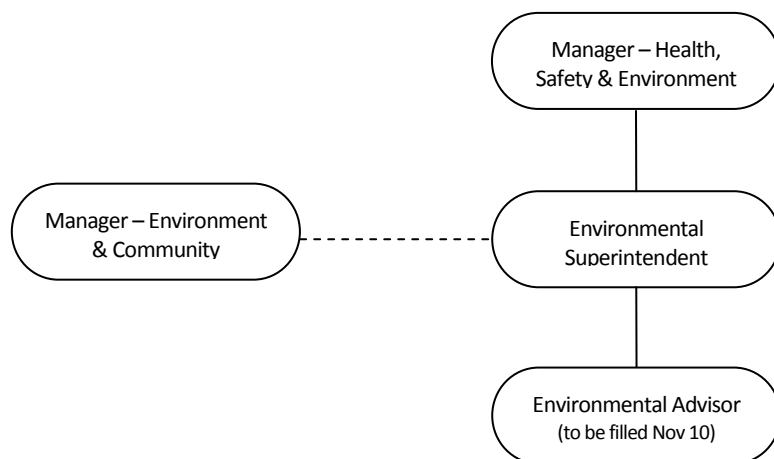


Figure 9: Structure of the environmental function at Southern Cross Operations

7.1 Environmental Incidents

There were 21 incidents during the reporting period. The most common incident type during 2009/10 was hydrocarbon releases (8 occurrences). Other notable incident types were saline and process water releases (3 and 4 occurrences respectively). All incidents were rectified once identified and clean up measures initiated where required. Preventative measures were put in place where possible to prevent recurrence of incidents. The breakdown of the types of environmental incidents occurring during the reporting period is included in Table 8 and Figure 10 and a summary of incident details is included in Table 9.



Table 8: Environmental Incidents by Type Between July 2009 and June 2010

| Incident Type | Number of Incidents | Percentage (%) |
|---|---------------------|----------------|
| Hydrocarbon Release | 8 | 38 |
| Saline Water Release | 3 | 14 |
| Tailings Release | 1 | 5 |
| Process Water Release (Saline, Cyanide and Chemical) | 4 | 19 |
| Chemical Release | 2 | 9.5 |
| Waste Management | 2 | 9.5 |
| Dust Management | 1 | 5 |
| Total | 21 | 100 |

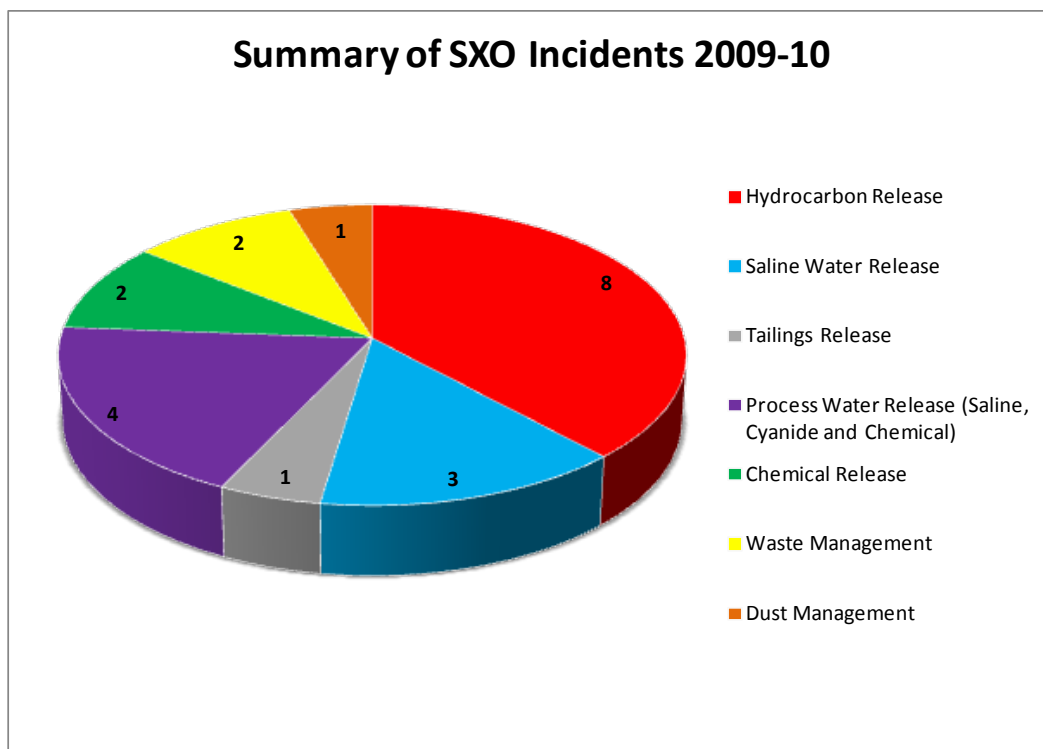


Figure 10: Breakdown of environmental incidents - July 2009 to June 2010



Table 9: SXO Environmental Incidents Between July 2009 and June 2010

| Date | Department | Description | Actions | Type |
|----------|------------|---|---|-----------------------|
| 20/7/09 | Processing | Decant Dam was over filled causing ~3000L Process Water to overflow into the secondary containment area. | Level indicator installed in dam to signal alarm and shut off when water reaches critical level. | Process Water Release |
| 9/8/09 | NA | Diesel pump nozzle was replaced in the pump housing in the locked position so when the next operator removed the diesel nozzle to fill vehicle it sprayed diesel over the bunded area, pump and operator. | Diesel was cleaned up with absorbent materials. Incident was discussed with crews and signage placed on the diesel pump notifying users to check the quick fill lock. | Hydrocarbon Release |
| 10/8/09 | Processing | Approximately 1000L of saline water was released from a Sniffer Valve connection on the Jaccoletti borefield pipeline (Frog Rock Road) due to failure of a rusty connection on relief valve. | Steel valves have been wrapped in Denzo tape to prevent rusting. Valves are check on an annual basis for wear. | Saline Water Release |
| 7/10/09 | Mining | Excessive dust generation was reported due to haulage on the Transvaal haul road. The dust generation occurred due to failure to implement dust suppression measures prior to recommencing haulage. | Undertook dust suppression with water cart and instructed contract haulage operator to ensure dust suppression measures are implemented before and during haulage operations. | Dust Management |
| 8/10/09 | Processing | Saline water was released from a decommissioned pipe at the base of the Nevoria Turkeys Nest due to corrosion of a valve housing. The saline water reported to an already salt affected area of rehabilitation. | Corroded fitting was replaced with a blank valve. | Saline Water Release |
| 16/10/09 | Processing | While moving a poly line within a bunded area approximately 5L of barren eluate solution was | Locked out the valve which the eluate was released from. Discussed the | Chemical Release |



| Date | Department | Description | Actions | Type |
|----------|------------|--|--|-----------------------|
| | | released when the valve handle on the line was turned to the on position. The operator moving the line was holding it by the valve handle which caused it to open. The spill reported to the bund. | incident at toolbox meetings to increase awareness of hazards associated with moving pipelines by valve handles. | |
| 24/10/09 | NA | Hydrocarbon contaminated rags were disposed into the site landfill instead of the allocated hydrocarbon waste bins by an unknown person/s. | Discussed the incident at toolbox meetings to remind personnel of site hydrocarbon management requirements. | Waste Management |
| 24/10/09 | Processing | Approximately 20L of hydrogen peroxide bubbled out of the hydrogen peroxide tank during filling by a delivery truck. The spill was contained in the bunded area below. | Tank and bunded area was hosed down. Level sensor was recalibrated. Delivery procedure modified to refill to a lower level. | Chemical Release |
| 28/10/09 | Processing | Minor (20L) hydrocarbon release from transformers while being loaded onto truck for transfer offsite. Transformers were not secured in an upright position causing leakage. | Released oil was cleaned up and soil taken to bioremediation area. Contractors were informed to take care when loading equipment and ensure transformers are upright and properly secured. | Hydrocarbon Release |
| 05/11/09 | Processing | Approximately 400L of elution wash water (3%HCl, 97% H ₂ O) was released from the bunded area when a valve on the elution column failed to close properly, filling the bund and causing it to overflow. | The valve was fixed and the incident discussed at toolbox meetings to increase awareness. | Process Water Release |
| 3/12/09 | Camp | Litter around the camp. An increase in with the number of glass bottles being incorrectly disposed around the camp (in the | Notice around site reminding personnel to use available bins for rubbish disposal. Also discussed at | Waste Management |



| Date | Department | Description | Actions | Type |
|----------|------------|---|---|------------------------|
| | | garden or barrier poles rather than bins) was identified. | toolbox meetings. | |
| 17/12/09 | NA | Approximately 75L of oil was spilt by a vehicle existing site onto the public access road. The spill was not reported nor cleaned up by those responsible. | The spill was cleaned up with absorbent materials. | Hydrocarbon Release |
| 21/12/09 | UG Mining | Diesel was observed pooling and overflowing from the UG fuel bay concrete pad due to ineffective drainage and design. | Installed a sludge pump for periodic removal of accumulated water and diesel. | Hydrocarbon Release |
| 23/01/10 | UG Mining | Oil spill from underground equipment onto the ramp out of the pit. | The spill was cleaned up and contaminated material taken to the bioremediation area. | Hydrocarbon Release |
| 27/01/10 | Processing | Approximately 500L of slurry sprayed out of the Scuttle Plate when changing slurry pumps. Approximately 50L was released outside of the secondary containment. | Spilt tailings was cleaned up. Skirting was added to bunding to prevent slurry from spraying out. Inspection of gland seals added to weekly inspection sheet. | Tailings Release |
| 16/02/10 | Processing | Process water was released when the process water tank overflowed. Caused by the cable which relays tank levels to Citect being disconnected by electricians conducting work in area. | Pumps turned off. Educated electricians about need to think about how actions affect operations and need to notify process personnel of changes. | Process Water Release |
| 31/03/10 | Processing | Hose got caught around a ball valve on a heat exchanger and opened the valve releasing oil into a bunded area. | Cleaned up released oil and contaminated solids. Valve was replaced with a plug to reduce risk of incident reoccurring while hosing down. | Hydrocarbon Release |
| 17/05/10 | Processing | Pipeline carrying process water from decant dam to plant disconnected at a join (connected with a hugger clamp) releasing | Section of pipe which disconnected replaced and hugger clamps have been replaced with poly | *Process Water Release |



| Date | Department | Description | Actions | Type |
|----------|------------|--|---|-----------------------|
| | | approximately 240kL of process water which drained back to the decant dam. | weld. | |
| 15/06/10 | Hamptons | Less than 50L of oil was release when a hydraulic hose failed on a loader on the ROM. Hose appears to have failed at a weak point. | The spill was contained and cleaned up. | Hydrocarbon Release |
| 26/06/10 | Hamptons | Approximately 200L of hydraulic oil was released when a hydraulic line burst on the ROM Loader. Operator did not immediately shut down as suspected flat tyre rather than blown hose as the issue. | The spill was contained and cleaned up. Counseled operator on Emergency shutdown procedures because failure to follow procedure resulted in a larger quantity of oil being spilt. | Hydrocarbon Release |
| 30/06/10 | Processing | Buried pipeline transferring water from 3 Mile Dam to Marvel Loch ruptured releasing ~20kL of saline water (EC ~90,000µS/cm). Only a small number of shrubs and two tress affected by the spill. | Pumping was shut down immediately and ruptured section of pipeline repaired. The area will be monitored for any subsequent vegetation stress. | *Saline Water Release |

**Reportable incident. Reported to DEC and DMP.*

NB: 48 minor hydrocarbon releases also occurred within the Marvel Loch underground. These have previously been recorded by means of quick spill reporting cards but not formally reported in the AER. Releases typically occur due to failure/rupture of hoses on underground equipment.

7.1.1 Reportable Incidents

Pursuant to the SXO EP Act Licence 4597/12, St Barbara reported two incidents during the reporting period. The incidents were releases of process and saline water. Summaries of the reported included in below.

Process Water Release 17 May 2010

Approximately 240kL of process water was released from a pipeline carrying water from the TSF decant dam to the process plant. The release occurred due to the failure of a hugger clamp which was connecting parts of the line. The spill did not affect any vegetation and drained back to the decant dam. The pumps were shut off upon discovery of the incident and the failed hugger clamp was replaced with a poly weld (other hugger clamps identified on the line were also replaced with poly welds). Telemetry did not detect the leak as it is only set up to report flow rates as the area is considered low risk to regular inspection, intermittent operation and no vegetation which can be impacted. No environmental impact occurred as a result of the incident as the area is already salt affected due to dust suppression on the roadways and previous tailings and saline water releases which have occurred in the area. There is also no vegetation in the vicinity as it is an operational area.

Saline Water Release 30 June 2010

Approximately 20kL of saline water (EC ~90,000µS/cm) was released from a buried pipeline transferring borefield water from the Three Mile Dam to Marvel Loch. Investigation found that two main factors contributed to the rupture. The pipeline is constructed from PVC and is at least 15 years old impacting on structural integrity of the line. Compounding this, the variable speed drive on the pipeline pump was not operating properly. It was causing rapid increases in pumping pressure which may have caused the rigid PVC line to crack. The spilled water was cleaned up and approximately 150m of pipe has been replaced with poly line. Additionally the variable speed drive error has been rectified. The spill impacted on a few small shrubs and two trees. This vegetation is being monitored for signs of stress following from the spill.

7.2 Audits and Inspections

7.2.1 External

There were no external audits conducted by DMP or DEC during the reporting period.

An audit conducted by DMP in June 2009 resulted in the return of \$852,000 of unconditional performance bonds for Nevoria (M77/31), Hercules (M77/138, 745 & 790), GVG (M77/746) and Kurrajong (M77/31) in September 2010.

7.2.2 Internal

Internal inspections of work areas within the Southern Cross Operations were conducted throughout the year. Inspections were focussed on areas of highest actual and potential impact and ensuring compliance with licence conditions. During the year, inspections were conducted over the following areas:

- workshops;
- accommodation facilities;
- refuelling facilities;

- washdown facilities
- laydown areas;
- stores yard;
- process plant;
- waste dumps & rehabilitation areas;
- landfill and waste management facilities; and
- Tailings Storage Facility.

7.3 Water Monitoring

St Barbara is required to monitor groundwater quality and standing water levels (SWLs) at the Marvel Loch TSF and groundwater discharge volumes and quality in accordance with conditions in EP Act Licence 4597/12. To identify success of compliance with monitoring requirements, each monitoring requirement has been deemed to be a monitoring event (e.g. SWLs, basic water quality (BWQ) & WAD cyanide and complete analysis are each considered to be a required monitoring event). This is subsequently used to record a percentage of achievement of monitoring requirements.

All water monitoring analyses were conducted by ALS. ALS is accredited by NATA. Water samples were collected and preserved according to Australian Standard 5667.1 – 1998.

7.3.1 Marvel Loch TSF

Under the EP Act Licence 4597/12, five TSF bores require quarterly monitoring for basic water quality analytes, WAD cyanide and SWLs during December, March, June and September. Complete quality analysis is also required in March and September. One of the bores (MB94B1) was dry for the duration of the reporting period, therefore samples could not be taken for this bore and it has been excluded from the assessment of compliance monitoring events. Therefore, for the TSF monitoring bores there were 16 quarterly SWL monitoring events, 16 quarterly BWQ & WADCN monitoring events and eight biannual complete analysis monitoring events required. In addition, a further nine piezometers require quarterly SWL monitoring (36 monitoring events). The location of monitoring points is illustrated in Figure 11.

All 16 quarterly monitoring bore SWLs monitoring events were undertaken however 9 out of 36 quarterly piezometer SWL monitoring events were missed due to staffing changes in the Process department. To prevent this reoccurring, the Health, Safety and Environment department has taken over the responsibility for undertaking all TSF SWL monitoring. All 16 quarterly BWQ and WAD cyanide monitoring events and eight complete analysis monitoring events were undertaken. Additional complete analysis monitoring was completed in December for all four monitoring bores. All water monitoring data is included in Appendix 5.

As mentioned in section 5.1, 12 new monitoring bores were installed near the TSF in January 2010. Quarterly monitoring of SWL and water quality has been undertaken for these bores since March 2010. Monitoring results for these bores are also included in Appendix 5.



TSF Monitoring Locations

Marvel Loch
(Attachment 1)

Date : 30 August 2010
 Drawn by : A Fisher
 Ref : M:\02.User_Projects\2.3.Regional\Western_Aust\Southern Cross\Environmental\Monitoring\100830_Marvel Loch TSF Bore Monitoring Locations.mxd

0 70 140 280 420 560
Meters

Projection : Map Grid of Australia Zone 50
 Datum : Geocentric Datum of Australia 1994 (GDA94)

St Barbara Limited

Figure 11: Marvel Loch TSF and monitoring bore locations.

Condition W11 of the EP Act Licence requires water samples drawn from designated monitoring bores (MB94-B1, TSF1-4, PZ99B1, PZ99D1, PZ99F1 and PZ99G1) to meet the water quality criteria of pH between 6 and 9 and WAD cyanide to not exceed 0.5 mg/L. However, TSF1-4, PZ99B1, PZ99D1, PZ99F1 and PZ99G1 are piezometers and are specified for only standing water level measurements (not water samples), and as previously described, MB94B1 is dry. Thus, sampling is either not required or not possible for any of these installations. Bores MB94D1 to MB94G1 are exempt from Condition W11, however below is a discussion of the bores compliance with this Condition.

Bores MB94D1 to MB94G1 all had WAD cyanide concentrations below 0.5 mg/L. The average WAD cyanide concentration was 0.1 mg/L with the highest concentration of 0.338 mg/L recorded at bore MB94D1 in September 2009 (the minimum concentration recorded was <0.04 mg/L in September 2009 at bore MB94F1).

The pH of water samples continued to be low with an average pH 3 persisting for existing bores. The new monitoring bores exhibit similar low pH with the samples collected to date averaging pH 3.7. The lowest pH recording was pH 2.82 which was recorded at new bore 10/A6 in June 2010 and the highest recording was pH 5.5 recorded at new bore 10/A3 in June 2010. Low pH has persisted for many years (and is exempt from compliance with the EP Act Licence). Soil and Rock Engineering Pty Ltd (2003; now Coffey Geosciences Pty Ltd), suggest that the reason for the lowering of the pH is probably due to ferrolysis. A decrease in pH coincides with groundwater rising into laterised/saprolitic clays, which are naturally acidic due to intense weathering. Interaction of saline groundwater with acidic soil materials (via aluminium displacement with sodium) results in a decline in groundwater pH.

Salinity (expressed as TDS) of the existing TSF bores ranged from 47,000 mg/L to 120,000 mg/L, with most results ranging between 50,000 mg/L and 100,000 mg/L. The newly installed TSF monitoring bores exhibited slightly lower salinity with values ranging from 38,000 mg/L to 91,000 mg/L, however most results were between 40,000 mg/L and 80,000 mg/L. A graph illustrating pH and TDS results is included in Figure 12.

Groundwater levels of monitoring bores and piezometers surrounding the Marvel Loch TSF have been relatively static over the past year. Bores MB94E1 and MB94G1 have shown a slightly increasing trend. Graphs illustrating the SWLs of monitoring bores and piezometers are included in Figure 13 and Figure 14 respectively. Some erroneous measurements were recorded in the June monitoring round. These are assumed to be incorrect because, due to low staffing levels, monitoring in June was undertaken by a contractor with limited bore monitoring experience. Results in the September monitoring round were similar with those taken prior to June indicating the June results are most likely incorrect.

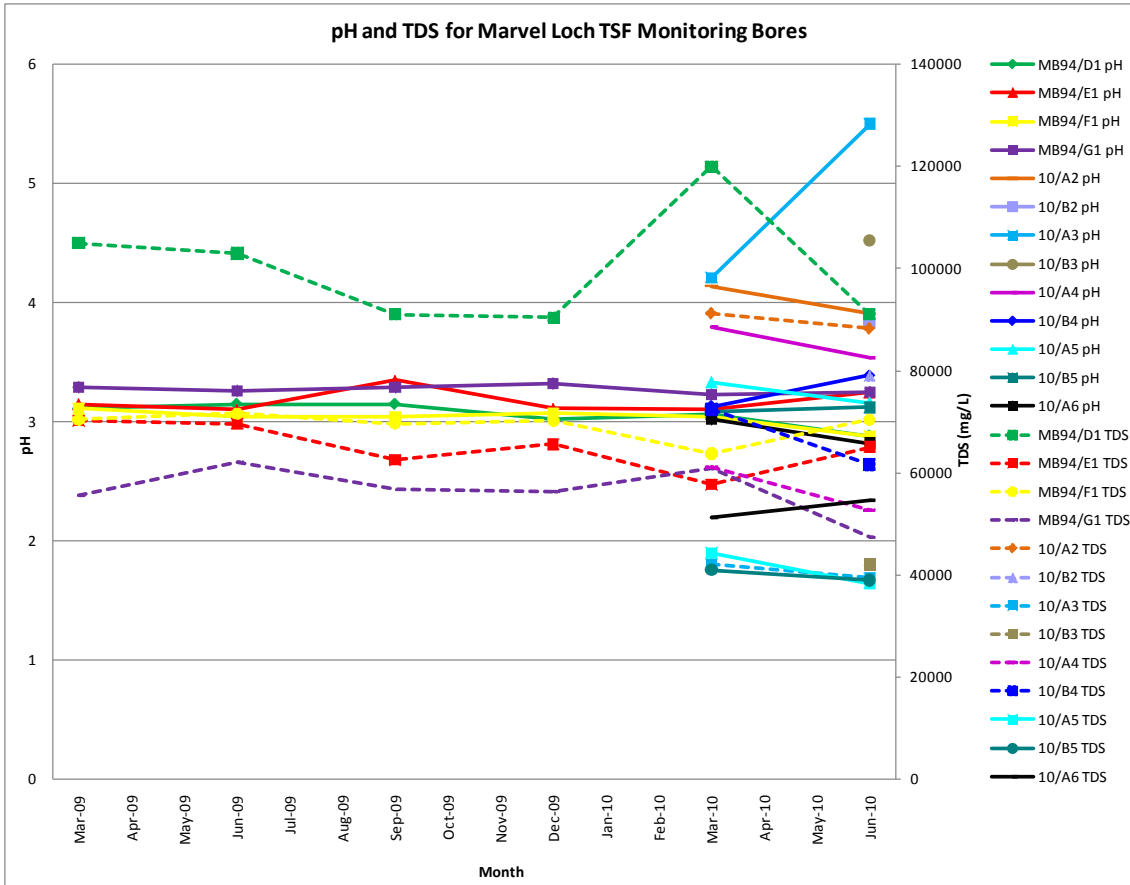


Figure 12: pH and TDS results for Marvel Loch TSF monitoring bores

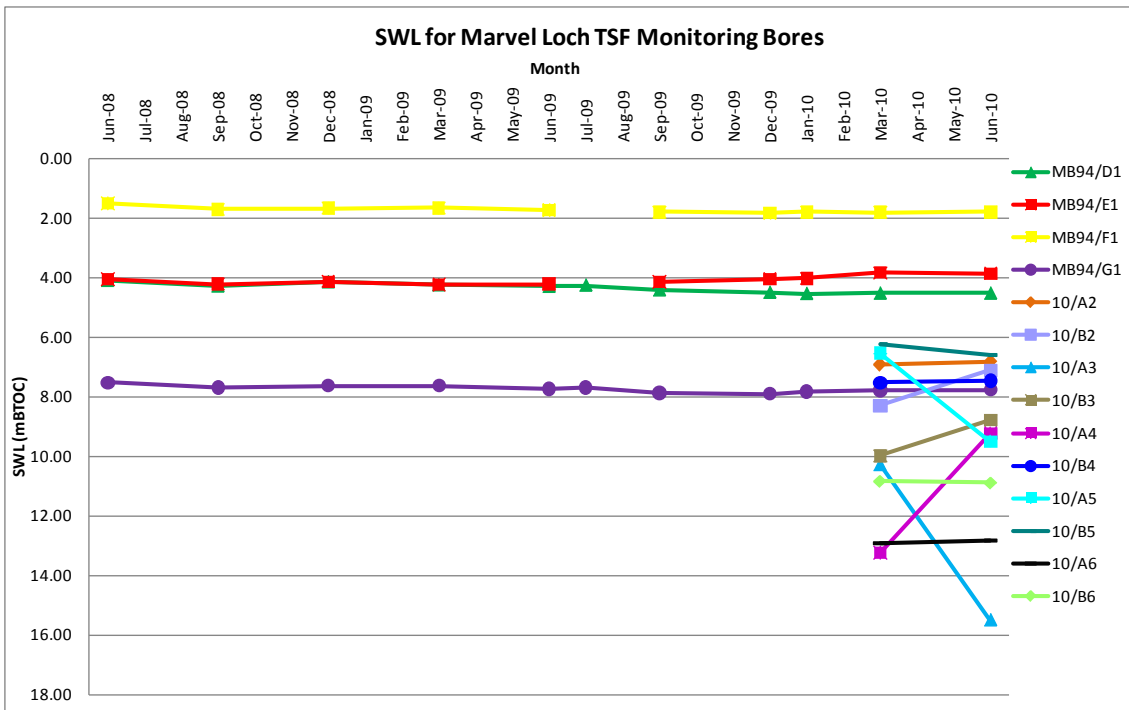


Figure 13: SWLs for Marvel Loch TSF monitoring bores

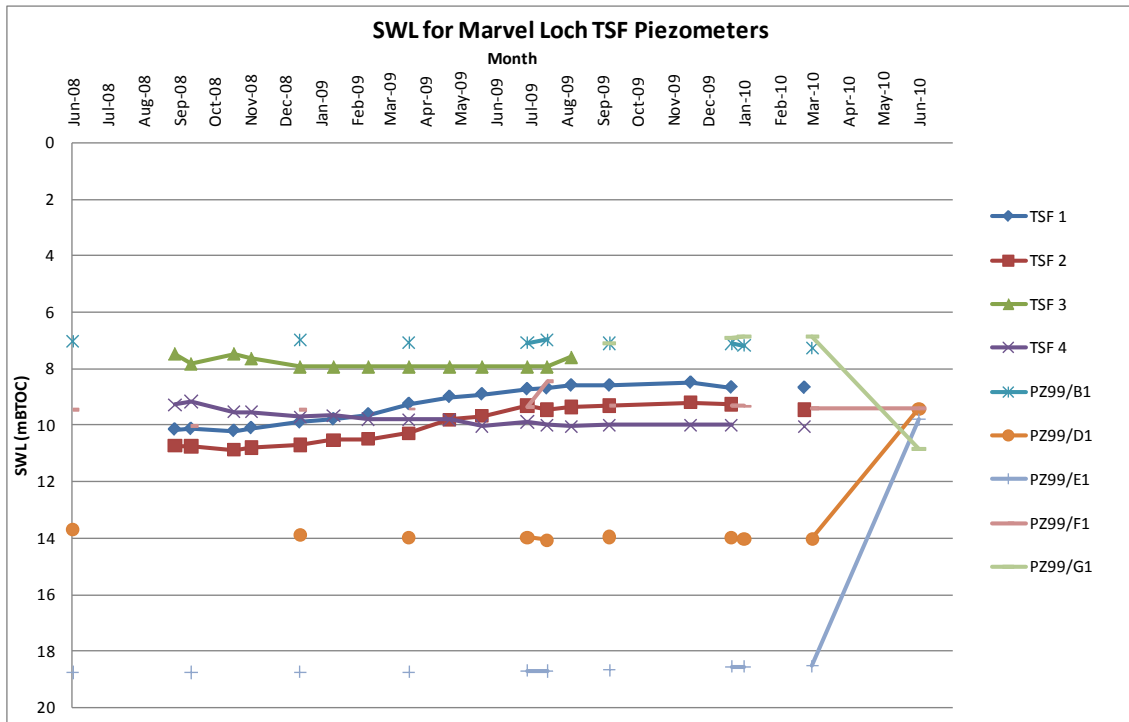


Figure 14: SWLs for Marvel Loch TSF piezometers

7.3.2 Dewatering Discharge

St Barbara is required to monitor the mine dewatering discharge in accordance with condition W10(a) of EP Act licence 4597/12. The condition requires that samples of dewatering discharge to pits are collected biannually (September and March) and analysed for pH, TDS and TSS (BWQ) and an annual complete analysis of 22 analytes is also undertaken. The EP Act licence also limits the quantity of water discharged to pits to < 4,300,000 kL

During the reporting period dewatering continued from the Marvel Loch Underground and Nevoria Open Pit. Dewater from the Marvel Loch underground is pumped to the site Process Water pond for use in the processing circuit and for dust suppression. On occasions when excess dewater is produced some water is discharged from the Process Water pond to the Jaccoletti Pit. This only occurred during August and November 2009. Dewater from the Nevoria open pit is predominantly pumped to Yilgarn Star pit for storage. A total volume of 1,214,662 kL of dewater was discharged to these pits during the reporting period which is significantly lower than the licence limit. A summary of dewatering discharge volumes is included in Table 10.

Samples of dewater are collected from the abstraction points rather than the discharge locations. Dewater from Nevoria is sampled from the Nevoria Turkey's nest and dewater from the Marvel Loch Underground is collected from one of the pumping stages in the pit. Samples were collected from the Nevoria Turkey's nest and a complete water analysis completed in October and December 2009 and March 2010. This meets the biannual and annual monitoring requirements however the October sample should have occurred within September (four days late). Only one sample of dewater discharged to the Jaccoletti pit was collected and analysed due to the infrequent discharge events. The sample was collected in December and a complete analysis was undertaken. This does not meet the biannual monitoring requirement however does satisfy the annual monitoring requirement. A graphical summary of the TDS and TSS measurements for the discharge locations is included in Figure 15.

Table 10: Dewatering Discharge Summary July 2009 to June 2010

| Month | Discharge from Nevoria to Yilgarn Star (kL) | Discharge from Marvel Loch to Jaccoletti Pit (kL) |
|---|---|---|
| Jul-09 | 136,475 | 0 |
| Aug-09 | 147,834 | 15,548 |
| Sep-09 | 115,095 | 0 |
| Oct-09 | 137,785 | 0 |
| Nov-09 | 114,327 | 7,056 |
| Dec-09 | 141,215 | 0 |
| Jan-10 | 120,521 | 0 |
| Feb-10 | 7,385 | 0 |
| Mar-10 | 0 | 0 |
| Apr-10 | 56,042 | 0 |
| May-10 | 120,324 | 0 |
| Jun-10 | 95,055 | 0 |
| FY 09-10 TOTAL | 1,192,058 | 22,604 |
| SUM OF ALL DEWATER DISCHARGES (kL) | | 1,214,662 |

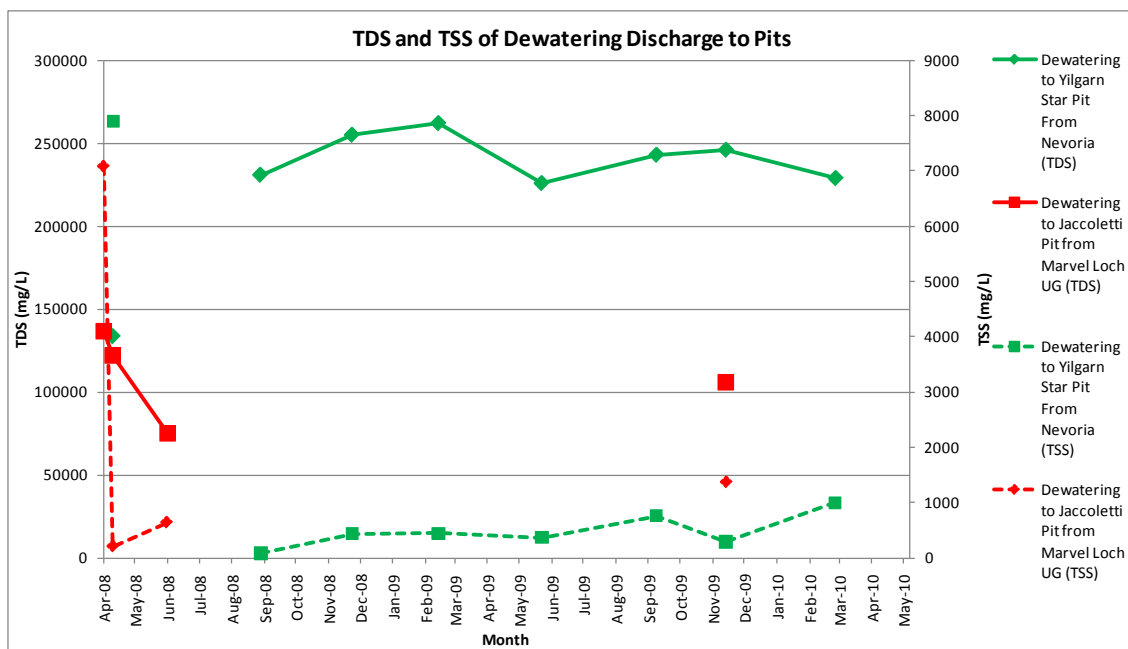


Figure 15: TDS and TSS measurements for dewatering discharge locations

7.3.3 Groundwater Abstraction Licences

During the year groundwater abstraction occurred at SXO under the terms of the three Licenses to Take Water. The Southern Cross Amalgamated GWL 59227(3) (Lake Baladjie to Yilgarn Star), Southern Star/Toomey Hills GWL104620(4) and Blue Haze/Kondinin-Ravensthorpe GWL 153325(3). A Triennial Aquifer Review was prepared for the period 1 July 2007 to 30 June 2010 and submitted to the Department of Water (DoW) in September 2010.

7.4 Surface Water (Salt Lake Discharge)

Whilst SXO no longer discharges saline water to Banker Lake, Lake Polaris or Southern Star Lake, it continues to conduct photo monitoring at Banker Lake in accordance with Condition W8 of EP Act Licence 4597/12. Monitoring photographs are required to be taken from ten monitoring points at six monthly intervals (summer and winter). The Banker Lake photographic monitoring is presented in Appendix 6. Photographic monitoring is beginning to indicate a slight and gradual recovery of the ecosystem. St Barbara has commissioned an Ecosystem Recovery Assessment in an attempt to quantify any improvements in Lake condition, define recovery indicators and milestones, and identify any management actions that may support further recovery. The assessment was undertaken in August 2009. The report is still outstanding and results will be discussed in the 2010/11 Annual Environmental report.

7.5 Hydrocarbon, Chemical and Waste Management

Hydrocarbon waste generated by St Barbara personnel and contractors at SXO is collected by or sent to Wren Oil for recycling or disposal. The quantities of hydrocarbon wastes removed from site are summarised in Table 11.

Table 11: Waste Hydrocarbon Disposal and Recycling Summary

| Item | Units | Quantity | Disposal Method |
|-------------------|----------------|----------|---------------------------------|
| Filters | m ³ | 10 | Removed offsite and recycled |
| Grease | L | 39,000 | Removed offsite and incinerated |
| Oily Water | L | 2,000 | Removed offsite and recycled |
| Waste Oil | L | 75,600 | Removed offsite and recycled |
| Hydrocarbon waste | m ³ | 41 | Removed offsite and incinerated |

Hydrocarbon management was improved during the reporting period through implementation of a number of initiatives. A new steel bund was constructed to contain drums of waste mill grease prior to transport offsite. This replaces an earthen bund which had previously been used as a storage area. The oil trap at the Hamptons workshop was identified during a DEC Audit in the previous reporting period as having the potential to overflow. Subsequently, modifications were made to the trap to transfer collected oil and water (through a double skinned buried pipe) to the collection

sump at the wash bay where it is then treated through an oil separation system so waste oil can be recycled. A similar initiative was also implemented at the Hamptons fuel bay bund to direct accumulated contaminated water to the wash bay collection sump.

Abrasive blasting activities were also identified as a concern during 2009 DEC Audit. To ensure compliance with the *Environmental Protection (Abrasive Blasting) Regulations 1998* St Barbara developed a containment structure which ad hoc abrasive blasting activities are now conducted within. The structure contains blasting residue for easy and quick clean up. Chemical management has also improved within the processing plant with a new concrete apron being constructed to contain any spillage which occurs during cyanide sparging.

The SXO recycling programme continued during the reporting period. Cardboard, paper and aluminium cans are collected from the site and sent to AMCOR for recycling. Improved management of the recycling despatch yard has resulted in an increase in the proportion of recycling undertaken. St Barbara also stockpile scrap metals for periodic collection by an external recycling contractor. A stockpile of scrap metal and poly pipe was also removed from the Yilgarn Star mine for recycling.

7.6 Air Quality (Noise and Dust)

During the 2009/2010 reporting period, no surface mining was undertaken so there was no blast monitoring conducted.

Dust from operational areas (Marvel Loch & Transvaal) was controlled using water carts as required. Dust generated at the process plant is controlled using specialised equipment such as water sprays and enclosures. Improvements were made to the crusher dust suppression system during the reporting period resulting in a reduction of dust emissions from this area.

One incident relating to dust management occurred during the reporting period when excessive dust emissions occurred during haulage operations from Transvaal (detail on the incident is included in Table 8). The issue was identified by a St Barbara employee so there was no community concern raised.

7.7 Flora and Fauna

Due to the cessation of surface mining and exploration activities in 2009 there was no clearing, or flora or fauna surveys conducted during the reporting period.

7.8 Aboriginal Heritage

Due to the cessation of surface mining and exploration activities there was no requirement to undertake ethnographic or archaeological surveys during the reporting period.

St Barbara continued liaison with representatives of the Central West Native Title Claimants Group (Central West NTC) following agreement to re-establish the Project Agreement Monitoring Committee in the preceding reporting period. Meetings are scheduled with the Central West NTC on a biannual basis with one occurring in Kalgoorlie and the other at the Southern Cross Operations which includes a tour of current active areas. The Kalgoorlie meeting was held in December 2009 with discussion centring on employment opportunities for young indigenous people in the Goldfields. There was also discussion on the members of the Central West NTC developing a Cultural Awareness training package which could be delivered at SXO however this is yet to be developed. The following meeting was scheduled for June 2010 however was postponed to September due to availability of attendees.

7.9 Workforce Education and Training

All company staff and contractors are required to participate in and pass a general site environmental management induction at the commencement of employment. The induction is reviewed throughout the year to ensure relevance to workforce and operational issues, particularly in relation to water conservation, energy efficiency and hydrocarbon management. Environmental issues are an agenda item at toolbox meetings, site safety meetings and management meetings and topical issues such as incidents, legislation changes and improvements are discussed at these as required.

The following training/education programmes were conducted during the year:

- Snake awareness training – Snakes Harmful and Harmless was engaged to provide snake handling training to site personnel;
- Waste management and recycling;
- Water conservation and management; and
- Energy efficiency.

7.10 Community Involvement

St Barbara's participation with the community and stakeholders during the year involved a number of groups and activities which are summarised below:

- Sponsorship of the Yilgarn Agricultural show and staff manned a stall at the show providing St Barbara show bags and native seedlings;
- Sponsorship of the *King of the Cross* motocross event held annually at Southern Cross;
- Sponsorship of a Book Prize for the Southern Cross District High School;
- Liaison with the Shire of Westonia-Yilgarn regarding mining activities and upgrade of the Southern Cross airstrip; and
- Liaison with local landowners to keep them informed of current activities and proposed activities which may impact on them or their properties.

An Environmental and Community risk assessment was undertaken as part of the GHD SXO closure planning project discussed in section 6.4.3. As part of the risk assessment discussions were held with relevant stakeholders to identify their perceived environmental and community risks. The stakeholders contacted included DEC and DMP officers, Shire of Westonia-Yilgarn CEO, Central West NTC and Gubrun NTC.

8 Reporting and Statutory Liaison

8.1 Statutory Reporting and Renewals

The following environmental reports/applications/renewals were submitted to the relevant regulatory authorities during 2009/2010:

- Annual Environmental Report including Annual TSF Audit and Inspection Report – DMP and DEC;
- National Pollutant Inventory – DEC;
- National Greenhouse and Energy Reporting – Department of Climate Change and Energy Efficiency;
- Energy Efficiency Opportunities – Public report posted to website due to no requirement for government reporting in third year of the five year cycle.
- EP Act Licence 4597/12 Annual Fee information – DEC;
- Notification of Incidents - DEC and DMP; and
- Biannual Groundwater Monitoring Summary – DoW; and
- Water Efficiency Management Plan Annual Report – Water Corporation.

8.2 Department of Environment and Conservation

Annual renewal of the EP Act licence 4597/12 was submitted on the DEC website on 23 September 2008. The licence expired on 27 September 2010 (a renewal was applied for and granted, details of which will be contained within next year's AER).

Inspections and Visits

No formal inspections were conducted by the DEC during the reporting period. The DEC Goldfields Regional Team Leader for Industry Regulation, Wayne Astill, visited site on 16 March 2010 for a presentation on St Barbara's proposal to increase the design height of the TSF from 1040 mRL to 1045 mRL.

Environmental Incidents

SXO notified the DEC of two incidents during the year resulting from saline water and process water releases. Refer to section 7.1 for specific information on each incident.

8.3 Department of Water

St Barbara is required to submit an annual Groundwater Monitoring Report and a triennial Aquifer Review to the DoW in accordance with the requirements of the Operating Strategy for GWL59227 and GWL153325. A biennial report was submitted during the year for the period 1 July 2007-30 June 2009 due to the report not being completed for the 2007/08 report period. A triennial Aquifer Review was required this year for the period 1 July 2007-30 June 2010. The review was submitted to the DoW in September 2010.

8.4 Department of Mines and Petroleum

No formal liaison was undertaken with the DMP during the reporting period other than discussions on perceived Environment and Community risks for the Environment and Community Risk Assessment (further details are contained in section 7.10).

8.5 Technical Reports

During the year, the following technical reports were prepared to assist decision making or environmental management activities at SXO:

- Annual Tailings Storage Audit and Management Review 2009– External audit conducted by Coffey Mining;
- Construction Report – Raising of Cell TSF 1 by 2.5m to RL1039.5m;
- Southern Cross Operations Closure Plan – GHD commenced development during the reporting period.

9 Other Site and Corporate Initiatives

9.1 Energy Efficiency Opportunities

Following from the Energy Efficiency Opportunities Assessment conducted in the previous reporting period, St Barbara implemented several energy efficiency projects which were identified by the assessment. These are summarised below:

- A variable speed drive (VSD) was installed on the Three Mile Dam Pump. Prior to the installation of the VSD, the water transfer was conducted with an oversized fixed speed pump. The volume of water pumped was controlled with a by-pass system which returned excess water to the dam. This used additional energy. The VSD regulates the water flow therefore reducing energy consumption.
- A pumping optimisation project has been ongoing in the Marvel Loch underground throughout the year. Two pumping upgrade have been implemented. The first upgrade involved moving one of the pump stations to ensure pump pressure capacity is fully utilised, reducing energy waste. The second pumping upgrade involved replacement of four 55kW pumps (running at 100% duty), with three 90kW pumps (running at 50% duty). The difference in average draw between the two pumping setups is a reduction of 85kW.

9.2 Water Efficiency Management Plan (WEMP)

In recent years as community demand for water has increased, the availability of this valuable natural resource has decreased. This makes it more important than ever to employ water conservation measures. As part of its community focus on water conservation, the Government requires all business customer sites state-wide that use more than 20,000kL of scheme water per year (of which SXO is one), to participate in the Water Corporation's Waterwise Business Program by 1 July 2009. As part of the program St Barbara was required to undertake a Water Management Assessment with the Water Corporation, develop a Water Efficiency Management Plan (WEMP) and report on progress with the plan on an annual basis. These requirements have been met and SXO's WEMP was accepted and endorsed by the Water Corporation in September 2008. Annual reports on performance of the WEMP have been submitted in 2009 and 2010.

Identified water efficiency opportunities which were implemented during the year as part of the WEMP are outlined below;

- Installation of 100,000L Rainwater tanks at the Barmingo workshop to collect runoff from workshop roof space. The collected water will then be diverted to the wash bay for use washing vehicles.
- The efficiency with which water is used for cooling the tertiary crusher radiators was increased by minor modifications resulting in a 6.5kL/day potable water saving.

Total potable water consumption decreased significantly during the year (53,000kL compared with 80,000kL in 2008/09) due to the change to campaign processing. Higher ore grade and reduced water consumption also lowered the site potable water consumption benchmark from 0.51kL/oz in 2008/09 to 0.44kL/oz in 2009/10

10 Future Activities

10.1 Exploration

The objective for SXO exploration is to establish a minimum five year mine life. Extensional underground drilling in addition to grade control drilling will continue throughout the 2010/11 reporting period to assist in achievement of this objective. St Barbara will also recommence regional surface exploration with targets identified at Copperhead, Frasers and Corinthian. The Frasers and Copperhead mines have been sources of significant past production in the Southern Cross belt, with in excess of 1.5M oz produced in aggregate from open cut and underground operations. Past exploration in these areas has been predominantly restricted to shallow drilling therefore St Barbara's exploration focus will be on deeper drilling targeting higher grade, deep deposits. The first exploration programme to be undertaken will be at Copperhead and is likely to commence in November.

To date no additional environmental surveys are required for planned exploration areas however surveys will be undertaken if new exploration targets are identified in areas without adequate survey information.

10.2 Processing

The processing plant will continue to run on a campaign basis, operating for one week on, one week off. Capital has been allocated to continue the refurbishment of the plant and to construct additional seepage management at the Marvel Loch TSF.

10.3 Mining

The Marvel Loch Underground is the cornerstone of SXO and is expected to be a continuous source of ore for the 2010/2011 reporting period. Production planned for 2010/11 is for 3,500 total development and operating meters to produce 1.19 Mt of ore at an average grade of 3.28 g/t.

Open pit mining ceased in July 2009 and there are currently no plans to recommence this activity. Planned regional exploration is targeting deeper ores which if developed are likely to be underground operations. Previously, rehabilitation programs have been designed to utilise synergies with surface mining projects. With the cessation of surface mining activities, opportunities to source suitable materials for rehabilitation of legacy areas are no longer available therefore rehabilitation will now focus on using the materials available at or in close proximity to disturbed areas.

10.4 Rehabilitation

A significant amount of rehabilitation is planned for 2010/11. Legacy areas which will be targeted include Southern Star, Yilgarn Star, Bronco/Resurrection, Leviathan, GVG and Nevoria. The outline below describes rehabilitation activities which are planned for each of these sites during the year;

- **GVG:** A significant amount of work has already been conducted at GVG with surface mining waste being used to cap the historic TSF. Rehabilitation of this landform will be completed with final reshaping, contour ripping and seeding planned. This will take the landform from its current R1 to R2 status.
- **Southern Star:** The majority of the Southern Star site has already been rehabilitated to an acceptable standard however a 3.5 ha hardstand area requires sheeting, ripping and seeding and 7.5 ha section of the waste dump requires reshaping, contour ripping and seeding.
- **Yilgarn Star:** Much of the Yilgarn Star site has been rehabilitated however 14 ha of hardstand ROM and evaporation dams and 6 ha of waste dump require reshaping, topsoiling (depending on availability), contour ripping and seeding.

- **Leviathan:** The Leviathan area contains a vat leaching pad and disturbance associated with this activity covering a total of 9.4 ha. The leach pad will be reshaped and capped with available material followed by shallow contour ripping if deemed necessary and seeding. The remaining areas of disturbance require contour ripping and seeding.
- **Nevoria:** Recommencement of mining at Nevoria in the 2007/08 reporting period resulted in the disturbance of the previously rehabilitated Nevoria TSF. The TSF was converted into a waste dump and ROM for the Nevoria and Kurrajong operations. Following the cessation of mining in this area some work was undertaken to reshape the landform. Completion of reshaping and topsoiling is proposed during the year. Contour ripping and seeding may also be undertaken if the 2010/11 rehabilitation budget is sufficient to cover this.

Adequate provenance seed has been collected for the proposed rehabilitation works in 2009/10. Additional provenance seed collection is also planned to source sufficient seed for the 2011/12 rehabilitation program.

A strategy for auditing legacy exploration rehabilitation will be developed in the 2010/11 reporting period which will assist in targeting areas which are still outstanding. Funding has been allocated within the rehabilitation budget to undertake rehabilitation of historic exploration areas. St Barbara undertake rehabilitation of areas identified as a high priority through the audit.