EPA Submission to the Panel Inquiry for the Stockman Base Metals Project Environment Effects Statement

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Executive Summary

Role of EPA in the process

This submission is made on behalf of the Environment Protection Authority Victoria (EPA) to the Panel of Inquiry (the panel) convened under section 9 of the *Environment Effects Act* 1978 (EES Act) to hear submissions relating to the Environment Effects Statement (EES) prepared by Independence Group N/L (IGO or the proponent) on the Stockman Base Metals Project (the Project).

As a member of the Technical Reference Group, EPA has previously provided input into the preparation of the EES.

EPA has a statutory role to protect the environment and regulate pollution. In this context, EPA's primary role is in assisting the Panel in its deliberation by explaining the requirements of the Project with respect to the *Environment Protection Act* 1970 (EP Act) and relevant subordinate legislation. EPA also provides comment on the technical and scientific aspects of the EES relevant to EPA

The key statutory policies relating to the Project are:

- *State Environment Protection (Waters of Victoria) Policy 2003* (SEPP WoV); and
- *State Environment Protection (Groundwaters of Victoria) Policy* 1997 (SEPP GoV).

Environmental Risks

The Project is located near Omeo, in the sub-alpine region of Victoria and close to the head waters of the Tambo River. Protection of the Tambo River is the focus of EPA's submission.

The EES has identified the key project risks to surface water and groundwater including sedimentation, management and storage of tailings, management of tailings (supernatant) water, management of underground wall-rock seepage, management of tailings paste underground backfill, and management of other potentially acid-generating material (waste rock) during operations and at closure.

EPA's focus is on the risks posed by:

- Acidic run-off, especially later in the project and post closure; and
- Sediment runoff, especially during construction and then post closure from the spillway; and
- Salinity impacts from discharges.

Residual Risks and Final Project Design

The EES includes best practice management features to partially address these risks:

- Measures to prevent oxidation of tailings such as subsurface placement of tailings in the tailings storage facility (TSF) and avoiding permanent potentially acidic waste rock stockpiles; and
- Sediment control measures during construction; and
- Commitment to avoid overflows from the TSF during operations.

Key project design uncertainties that should be addressed prior to approval of the mine Work Plan are:

1. Preventing untreated supernatant overflow during operations and non-compliant overflows post-closure:
    1.1. Operational overflow requirements in the latter years of the Project under the scenario of 100% tailing storage at the TSF, associated approvals and associated impacts on whether SEPP WoV objectives can be met at the Tambo River; and
    1.2. Effectiveness of treatment options to sufficiently lower salinity and other contaminant concentrations, management of potential treatment by-products (brine from Reverse Osmosis plant, Barium Sulfate from treatment with Barium hydroxide, etc...), required approvals and residual impacts on whether SEPP WoV objectives can be met at the Tambo River; and

1.3. Design of TSF rehabilitation, with potential for acid loads from unmanaged upstream creeks to impact supernatant water quality in the long term (between 10 and 1,000 years) causing overflows to not comply with SEPP WoV in the long term; and

1.4. Methods to derive environmental quality objectives and criteria to determine compliance in accordance with SEPP WoV for overflow discharges of supernatant water to surface waters post-closure; and

1.5. Management and monitoring provisions post-closure will enable an effective prevention of overflows non-compliant with SEPP WoV; and

1.6. Potential sedimentation that may occur long term from the gully that will channel overflow water and impacts on whether SEPP WoV objectives can be met at the Tambo River; and

2. Minimising and managing seepage from TSF throughout the life of the infrastructure:

2.7. Whether proposed measures will sufficiently prevent seepage into fractures to an acceptable level in accordance with clause 12 of SEPP GoV in perpetuity; and

2.8. Uncertainty on criteria that will determine whether under-toe seepage must be treated prior to entering into the environment and associated impacts on whether SEPP WoV objectives can be met at the Tambo River post closure; and

3. Minimising impacts of seepage from Mine Voids post-closure:

3.9. Timing of flooding of backfilled underground workings will be fast enough to prevent the onset of AMD prior to water levels returning to 2 m above workings and impacts on whether SEPP GoV objectives can be met in the surrounding area, and whether WoV objectives can be met at the Tambo River.

Environmental Outcomes

EPA supports the Project progressing to the next step of the approvals process. Project design uncertainties as outlined above will need to be resolved to demonstrate achievement of the following environmental outcomes:

1. No discharges of supernatant water from the TSF prior to post-closure other than emergency discharges for events that exceed relevant TSF design criteria; and
2. Any post-closure discharge to Tambo River from the expanded TSF must comply with SEPP WoV; and
3. Compliance with SEPP WoV for post-closure discharges from the TSF must be demonstrated through actual event monitoring data until risks are sufficiently reduced; and
4. All practical measures will be undertaken to prevent contaminated seepage from the expanded TSF and mine voids impacting the beneficial uses of surrounding groundwater in accordance with SEPP GoV.

The Inquiry process may be a good forum to explore governance options and processes (including technical peer review and auditing) that will enable in-principle demonstration of achievement of outcomes.

Next Steps

EPA's comments are provided to the Panel to inform it's assessment of the EES. The next steps in EPA's process will be:

- Attend the public hearings; and
- Provide advice to the Panel, as requested; and
- Continue discussions with the regulator, DSDBI, to ensure that the mine Work Plan conditions are designed to achieve the outcomes and prevent off-site impacts; and
- Fulfill its regulatory role in the assessment of Works Approvals required for power generation and wastewater treatment infrastructure.

EPA Submission to Stockman Base Metals Project EES

Introduction

This submission is made on behalf of the Environment Protection Authority Victoria (EPA) to the Panel of Inquiry (the panel) convened under section 9 of the Environment Effects Act 1978 (EES Act) to hear submissions relating to the Environment Effects Statement (EES) prepared by Independence Group Limited (IGO or the proponent) on the Stockman Base Metals Project (the Project).

IGO is proposing to reopen an underground copper-zinc mine near Omeo, northeast Victoria. The Project comprises two areas of mineralisation:

- The Wilga deposit,
- The Currawong deposit.

The resources to be mined contain pyrite (FeS_2) and other sulphide-containing minerals in significant quantities. When exposed to air and water, pyrite is slowly oxidised to form sulfuric acid. Subsequently, the acid may dissolve other metals present in soil and rock and produce an acidic or contaminating leachate. Contaminants in the leachate typically include manganese, aluminium, arsenic, copper. This acid and metal laden drainage is commonly called acid rock drainage, acid mine drainage or acid and metalliferous drainage (AMD). In the case of the Project, AMD will also include zinc and lead.

The previous Benambra Mine operation (1993 to 1997 when it was abandoned) left behind an un-remediated water holding Tailings Storage Facility (TSF) containing sulfidic tailings and highly acidic, saline and metal-rich waters. Risks from continuous water acidification and discharge led to intervention by relevant authorities, which required controlled release of treated supernatant water into Straights Creek. Uncontrolled releases had the potential to impact the Tambo River, which is used for drinking water purposes and flows into Gippsland Lakes. The site was rehabilitated in 2006.

Recent monitoring indicates that, 8 years post rehabilitation, water quality at the TSF and Straights Creek is improving and is likely to continue to improve until it reaches a quasi-natural steady state within the next 10 years.

Based on the documentation in the EES, the Project will generate ten times the amount of tailings of the Benambra Mine and the tailings will contain 80% pyrite. At the end of the Project, the TSF will contain a reservoir capable of generating significant amounts of sulfuric acid. The Project must design a system capable of extracting the resource without hindering the progressive rehabilitation of the surrounding environment and managing the potential impacts of that reservoir in perpetuity (for 1,000 years).

Industry experience indicates that AMD can be managed and impacts minimised to acceptable levels under an appropriate AMD prevention and management regime, which starts with the design of projects focusing on AMD prevention. This approach is the foundation of best practice AMD management. The EES includes best practice management features to partially address these risks such as subsurface placement of tailings in the TSF and avoiding permanent potentially acidic waste rock stockpiles.

A high level of management is always required with regards to AMD risks, as if it goes wrong it is difficult to fix and can have significant impacts. An example is Mt Lyell in Tasmania.

Other best practice measures to minimise risks to environment are:

- Sediment control measures; and
- Design of TSF to prevent overflows during operations.

The earlier sections of this submission set out the legislative and policy context administered by the EPA and how it relates to the Project, whilst the last section provides recommendations specific to the Project to demonstrate or achieve compliance with relevant SEPPs.

The following aspects of the Project are the focus of this submission:

- Preventing AMD during operations and post-closure
- Minimising surface water impacts during operations and post-closure
- Minimising groundwater impacts during operations and post-closure

Role of EPA in the EES process

As a member of the Technical Reference Group, EPA has previously provided input into the preparation of the EES.

EPA is assessing the identified risks and impacts as detailed in the EES, and is providing advice on compliance with the EP Act, relevant subordinate legislation and guidance during construction, operation and closure.

Environmental Regulatory Framework

Environment Protection Act 1970

The *Environment Protection Act* 1970 (EP Act) establishes EPA, defines EPA's powers, duties and functions, and provides a number of instruments which are used to minimise wastes, pollution and environmental risks. The instruments used by EPA relevant to this Project include State Environment Protection Policies (SEPPs), environmental management guidelines, Works Approvals and licences.

Environment Protection (Scheduled Premises and Exemptions) Regulations 2007

Under the provisions of the EP Act scheduled discharges to the environment require EPA works approval and licensing. The industries so scheduled are outlined in the *Environment Protection (Scheduled Premises and Exemptions) Regulations* 2007 (Scheduled Premises Regulations).

Mining proposals fall under category CO1 (Extractive industry and mining) which require works approval and licensing except in the following cases: *"Premises, with solely land discharges or deposits, used only for the discharge or deposit of mining wastes and that are in accordance with the Extractive Industries Development Act 1995 or the Mineral Resources (Sustainable Development) Act 1990"* (MRSD Act). In addition, clause 10(1)(l) of the Scheduled Premises Regulations also state that emissions to air from a mining operation under the MRSD Act do not require a works approval or a license.

Power generation infrastructure that generates more than 5 MW capacity falls under category K01 (Power stations) and requires a works approval and a license unless it uses natural gas as fuel and turbines to generate less than 20 MW of power.

Wastewater treatment plants fall under category A03 (Sewage treatment) and require a works approval and a license, depending on the volume of wastewater treated and the method of disposal of waste.

Statutory Policies and Guidelines

State Environment Protection Policies (SEPP) and Industrial Waste Management Policies (IWMP) are declared by the Governor in Council under section 16 of the EP Act. Protocols for Environmental Management (PEM) are incorporated documents to the relevant SEPP, and have the same statutory basis as the SEPP.

A SEPP may, for a specified segment of the environment:

- Identify the beneficial uses of the environment that are to be protected
- Describe the environmental indicators to be employed to measure and define the environmental quality
- State environmental quality objectives to protect beneficial uses (where practicable); and
- Describe a program by which environmental quality objectives are attained.

Statutory policies and PEMs that relate to mining projects are:

- *SEPP (Waters of Victoria) 2003* (SEPP WoV)
- *SEPP (Groundwaters of Victoria) 1997* (SEPP GoV)
- *SEPP (Prevention and Management of Contaminated Land) 2002* (SEPP PMCL)
- *SEPP (Air Quality Management) 2001* (SEPP AQM)
- *PEM (Greenhouse Gas Emissions and Energy Efficiency in Industry) EPA 2002*
- *PEM (Mining and Extractive Industries) 2007.*

SEPPs provide a context for environmental decision making and a clear set of publicly agreed environmental objectives that all sections of the community work together to achieve. Within this framework, EPA has the primary role for pollution prevention and control, whilst other government departments and agencies have other responsibilities to ensure SEPP objectives are attained.

EPA also provides guidelines on planning, noise and other issues where the necessary detail for businesses on environmental requirements is not included in relevant SEPPs. The most relevant guidelines to the Project are:

- *Hydrogeological Assessment (Groundwater Quality) Guidelines* 2006 (EPA Publication 668); and
- *Noise from Industry in Regional Victoria 2011* (NIRV).

The following section describes the relevant policy settings that relate to key environmental risks. Further detail on policy settings that apply to the Project but are not material to key environmental risks is provided in Appendix 2 of this submission.

State Environment Protection (Waters of Victoria) Policy 2003

SEPP WoV provides a framework for protection agencies to protect beneficial uses of waterways and divides the waterways of Victoria into a number of segments. The environmental quality objectives (EQO) for each segment describe the level of environmental quality needed in most surface waters to avoid risks to beneficial uses and to protect their values. EQOs are linked to levels of protection (in percentage) of representative aquatic species. Protection levels are specified in Part VIII, Schedule A,A(1) and Tables A1 and A4 in the Australian and new Zealand Guidelines for Fresh and Marine Water Quality (2000) (ANZECC). The less modified/impacted a waterway is, the higher the value of the waterway and the higher the level of protection required. ANZECC specify 99%, 95% and 80% ecosystem protection levels in terms of concentration of contaminants in surface waters.

The EQOs for some surface waters may not be attained due to natural variation. In these cases, the background level becomes the EQO. This would only occur after conclusive baseline monitoring has been conducted to determine whether this is the case. Some beneficial uses may not be considered in artificial water bodies.

SEPP (WoV), clause 58 requires operators of extractive industries such as mines and quarries to manage their operations so that sediment and other pollutants in runoff to surface waters and groundwater are minimised.

SEPP (WoV), clause 56 requires construction works to be managed to minimise land disturbance, soil erosion and the discharge of sediments and other pollutants to surface waters.

Application to the Project

Under SEPP WoV, the Project site falls within the Highlands segment in accordance with Part VII, Annex A (3)(a). The protected beneficial uses include ecological values, natural amenity (aquatic ecosystems, aesthetic enjoyment), domestic, industrial, commercial and recreational (including agriculture, aquaculture and fishing).

Prescribed level of ecosystem protection for the Tambo River
In accordance with SEPP WoV, any discharges to surface waters must be below the 99% level of ecosystem protection, as specified in ANZECC.

Water quality studies conducted as part of the EES as well as independent peer-reviewed journals referenced in the EES indicate the presence of naturally elevated metals (copper and zinc primarily) in the upper reaches of the Tambo River above Straights Creek, where the project is located. As a result, EQOs equal to representative background levels for copper and zinc will need to be determined.

Given the high toxicity of copper and zinc to freshwater aquatic organisms, it is essential that a robust, defensible method to derive EQOs from background water quality data is implemented to ensure alignment with SEPP WoV objectives.

Operational TSF discharges
The Project proposes to operate without discharges from the TSF, although there is uncertainty whether operational discharges may need to occur in the later years if 100% of tailings are stored above ground in Stage 4 (Appendix C7). If discharges are required for operational reasons, even if only towards the end of mining operations, an EPA works approval will be required. In this hypothetical scenario, EPA considers that significant and intensive treatment of the supernatant water is likely to be required for any discharges to achieve compliance with SEPP WoV, and due consideration would have to be given to the disposal of potential treatment by-wastes.

State Environment Protection (Groundwaters of Victoria) Policy 1997

SEPP GoV provides a framework for protection of groundwaters throughout Victoria, and establishes that all practicable measures must be undertaken to prevent pollution of groundwater.

The Policy divides groundwater into five segments based on the salinity (mg/L Total Dissolved Solids) of the water, which in turn determine broadly what beneficial uses must be protected.

Similar to SEPP WoV, SEPP GoV incorporates the concept of natural variability to establish background for a number of parameters. The environmental quality objectives for some groundwaters may not be attained due to natural variation, or natural conditions may prevent the realisation of a beneficial use. In these cases, the background level becomes the environmental quality objective and the prevented beneficial use not considered for compliance purposes. This would only occur after conclusive baseline monitoring has been conducted to determine whether this is the case.

Application to the Project

There is limited data prior to disturbance of the site to determine natural groundwater quality variability across seasons. To demonstrate consistency with SEPP GoV during operations, a groundwater quality monitoring plan must be implemented in these areas to establish baseline prior to further disturbance of the sites.

Undisturbed background groundwater quality data in the area surrounding Currawong ore body indicates groundwater is classified as segment A1 (Total Dissolved Solids or TDS concentrations below 500 mg/L) in SEPP GoV, which in turn determine that all beneficial uses must be protected.

The main existing beneficial use of groundwater in the area is maintenance of ecosystems, as it provides flows to waterways that flow through the area.

Backfilling
The proposal to backfill underground workings with tailings paste is a practice that is consistent with clause 20(1) of SEPP GoV as long as it is done to the satisfaction of the relevant protection agency, in this case DSDBI as the regulator of the activity under the MRSD Act.

Further detail will be required on the properties of the tailings paste (potential to generate AMD and timing of release) and the arrangements to secure flooding of backfilled underground workings to ensure the practice of backfilling will not have significant impacts on the beneficial uses of surrounding groundwater, in accordance with clause 20(1) of SEPP GoV.

TSF Seepage
In addition, the operation proposes to store tailings and waste rock in an expanded water holding TSF. The design of the TSF should incorporate all practical design features to achieve consistency with SEPP GoV clauses 5(1) and 12, which mandate that all practicable measures must be undertaken to prevent seepage into groundwater. The end result is to maintain existing groundwater quality parameters in the area near the TSF, but the current level of information on background is very low.

ENVIRONMENTAL RISKS

Because of the location and nature of the Project, significant attention is required to surface water and groundwater impacts relating to AMD and tailings management.

EPA endorses the EES attention to risks to surface waters and groundwater. The EES has identified the key project risks to surface water and groundwater including sedimentation, management and storage of tailings, management of tailings (supernatant) water, management of underground wall-rock seepage, management of tailings paste underground backfill, and management of other potentially acid-generating material (waste rock) during operations and at closure.

EPA's focus is on the residual risks posed by:

- AMD, especially later in the project and post closure; and
- Sediment runoff, especially post closure from the spillway; and
- Salinity impacts from first flush discharges post-remediation.

If properly implemented, the Project can have a low impact on the receiving environment. Key project design uncertainties that should be addressed prior to approval of the mine Work Plan are:

1. Preventing untreated supernatant overflow during operations and non-compliant overflows post-closure:
    1.1. Operational overflow requirements in the latter years of the Project under the scenario of 100% tailing storage at the TSF, associated approvals and associated impacts on whether SEPP WoV objectives can be met at the Tambo River; and
    1.2. Effectiveness of treatment options to sufficiently lower salinity and other contaminant concentrations, management of potential treatment by-products (brine from Reverse Osmosis plant, Barium Sulfate from treatment with Barium hydroxide, etc...), required approvals and residual impacts on whether SEPP WoV objectives can be met at the Tambo River; and
    1.3. Design of TSF rehabilitation, with potential for acid loads from unmanaged upstream creeks to impact supernatant water quality in the long term (between 10 and 1,000 years) causing overflows to not comply with SEPP WoV in the long term; and
    1.4. Methods to derive environmental quality objectives and criteria to determine compliance in accordance with SEPP WoV for overflow discharges of supernatant water to surface waters post-closure; and
    1.5. Management and monitoring provisions post-closure will enable an effective prevention of overflows non-compliant with SEPP WoV; and
    1.6. Potential sedimentation that may occur long term from the gully that will channel overflow water and impacts on whether SEPP WoV objectives can be met at the Tambo River; and
2. Minimising and managing seepage from TSF throughout the life of the infrastructure:
    3.7. Whether proposed measures will sufficiently prevent seepage into fractures to an acceptable level in accordance with clause 12 of SEPP GoV in perpetuity; and
    3.8. Uncertainty on criteria that will determine whether undertoe seepage must be treated prior to entering into the environment and associated impacts on whether SEPP WoV objectives can be met at the Tambo River post closure; and
3. Minimising impacts of seepage from Mine Voids post-closure:
    3.9. Timing of flooding of backfilled underground workings will be fast enough to prevent the onset of AMD prior to water levels returning to 2 m above workings and impacts on whether SEPP GoV objectives can be met in the surrounding area, and whether WoV objectives can be met at the Tambo River.

EPA's analysis of risks against compliance with SEPP WoV and SEPP GoV associated with project design uncertainties are described below. Most of these risks are more prominent in the post-closure phase.

Surface Water Risks Relating to the Project

The proposed mine site is located in the headwaters of Straights Creek, a small tributary in the northern reaches of the Tambo River. The existing tailings storage facility (TSF) is located in a valley flowing into Straights Creek. The proposal includes expansion of the TSF to increase over ten-fold its current tailings storage capacity.

Supernatant overflow discharges during operations

In page 40, section 5.2.3 (TSF Water Quality) of Appendix C7 (Water Quality Baseline and Impact Assessment), the text reads "*For the extreme scenario where 100% of tailings are deposited in the TSF, the results show that: ...Based on water balance modelling provided by AECOM the TSF is likely to overflow some time near the end of operations*". This discharge would occur during operations as a result of operational design, which would trigger a works approval process.

At that time, supernatant water will be gypsum saturated with sulfate concentrations of approximately 1,800 mg/L. The impacts of discharging supernatant water with elevated salinity have not been quantified.

Supernatant overflow discharges at closure short term

Treatment

During the initial overflow discharges after operations have ceased, the ability to meet levels in accordance with SEPP WoV at the Tambo River (in terms of metals and salts) is extremely dependent on the management of TSF supernatant water during the later years of operations and during remediation. The information provided does not document what would be the

likely resultant water quality, the feasibility of the options (cost, practical, etc...), the need for further approvals or the suitability of by-treatment waste products.

EQOs
Further detail will be required on process for deriving the surface water EQOs for the Project in consultation with EPA to ensure alignment with SEPP WoV objectives and protection of the Tambo River.

Post-Closure overflow monitoring
It is unclear if post-closure management arrangements will enable the certification that supernatant water overflows do not impact on the environment or implementation of preventative activities to prevent non-compliant discharges.

Supernatant overflow discharges at closure long term

Risks from spillway location
The location of the spillway is proposed to discharge into a gully with extensive vegetation that flows onto Straights Creek further downstream. Discharge of saline supernatant water may have an impact on the vegetation in the gully, potentially leading to severe erosion and siltation issues in the medium to long term. It is unclear whether these risks have been assessed.

Long term chemical stability
In the long term, it is unclear whether the provision of a sand layer and organic layer over the tailings and treatment precipitates will be sufficient to maintain water quality in perpetuity. The effect of acidity contributions from upstream creeks on the organic layer and sand layer over long periods of time has not been modelled. If the load of acidity from upstream creeks is bigger than the load of organic matter and alkalinity from the sand layer, after long periods of time the metal sulfide precipitates may start dissolving or the tailings may start generating AMD. A physical barrier based on crushed NAF on top of the tailings, as suggested in Appendix C7 (Appendix Q) may be effective. Alternatively, passive (eg limestone) treatment of upstream creeks may prevent the risks.

Undertoe seepage

The TSF preliminary design document mentions that the embankment toe will be designed to enable free-flowing drainage of seepage. Based on industry experience, it is likely that the seepage will require treatment prior to discharge to waterways, particularly so close to the Montane Swamp. It is unclear what amount of seepage is expected from the spillway saddle embankment and how it will be managed.

EPA recommends that the decision-making process and criteria that will be used to determine whether an anaerobic treatment wetland will be required to treat undertoe seepage at the main embankment be established prior to the mine Work Plan approval.

Groundwater Risks Relating to the Project

The current level of groundwater quality information is insufficient to determine an appropriate baseline that would enable the detection of impacts of the Project during operations and post-closure. Baseline information will assist the proponent to detect remedy any impacts of the Project on groundwater.

Supernatant seepage through fractures in TSF flooded beach area

The technical studies in the EES document suggest that the existing fracture seepages are collected as surface seeps at the toe of the TSF and treated in the downstream wetland. Limited groundwater quality data indicates past dam water quality has impacted on groundwater through these seepages. Measured improvements in supernatant water quality indicate groundwater is unlikely to be impacted in the absence of further works.

The proposal includes a ten-fold expansion of the TSF. Based on project description, the quality of existing supernatant water will significantly deteriorate as a result of mixing with Wilga mine void water at the beginning and later on with the addition of process water during operations. In addition, an increase in the head of water and the potential to miss fractures is likely to cause impacts on groundwater around the TSF area.

The technical studies indicate the area that will be flooded with process water as part of the TSF expansion is subject to the presence of fractures. These fractures can perform as conduits between supernatant water in the tailings dam (high pH, elevated metals, elevated salts) and natural groundwater, potentially leading to pollution.

The tailings will be saturated at deposition. Due to operational constraints and limited maneuverability of infrastructure, tailings are likely to be deposited primarily throughout the tailings body rather than at the perimeter. As a result, the possibility that they act as a barrier to natural groundwater is minimal and primarily constrained to short periods before every new embankment lift.

EPA recommends further exploration of the feasibility of lining the bedrock of the tailings dam in addition to the embankments, to meet SEPP GoV clause 12 considerations.

AMD from Mine Workings

The groundwater around the Wilga mine void indicates it has been impacted by AMD. The EES technical reports do not demonstrate whether it is a result of previous operations or a naturally occurring phenomenon. The groundwater around the Currawong deposit is classified as segment A1.

IGO proposes to backfill mine voids with tailings paste and subsequently flood the mine post-closure to prevent the onset of AMD. Clause 20(1) of SEPP GoV provides criteria to guide DSDBI in its determination on whether subsurface deposition of

tailings paste is in line with SEPP GoV. The primary criterion is whether the practice is likely to lead to changes in groundwater quality that prevent beneficial uses.

There is a risk that backfilling with tailings paste will result in an increase in metal and salt contents in surrounding groundwater. Given groundwater is sitting in the upper limits of Class A1, there is a clear risk that after operations, AMD impacted seepage will affect groundwater beneficial uses (as is potentially the case observed in and around Wilga void).

EPA recommends that the properties of the tailings paste (potential to generate AMD, properties of AMD and timing of release) and the arrangements to secure "flooding" of backfilled underground workings (water quality and timing of flooding) be established sufficient to determine whether the practice of backfilling with tailings paste will impact the surrounding groundwater in conflict with SEPP GoV.

Regulatory Settings

Work Plan

The Department of State Development, Business and Innovation (DSDBI) is the primary regulatory agency for mining activities through the MRSD Act and associated regulations. All project design uncertainties material to significant environmental risks should have been addressed prior to approval of the Mine Work Plan issued under the MRSD Act. EPA is a referral agency under the process outlined for the approval of mine work plans to ensure the Project is aligned with relevant SEPPs.

Appendix 1 provides examples on how EPA's recommendations in relation to surface water and groundwater risks can be addressed. Other options may be relevant and available.

Works Approvals

If the Project is implemented, EPA will undertake a Works Approval assessment of power generation infrastructure at the Currawong plant site and wastewater treatment plant at the workers village. A preliminary analysis of the documentation exhibited has not identified any major issues that would prevent the timely acceptance of the Works Approval application for assessment.

Compliance and Enforcement

Once the project is in a construction, operational and rehabilitation phase DSDBI has compliance and enforcement powers under the MRSD Act to ensure on-site management practices prevent pollution events.

EPA plays the primary role of compliance and enforcement on the infrastructure that operates under an EPA licence (following any works approvals), and when pollution is likely to occur or confirmed. EPA will follow its Compliance and Enforcement Policy.

Next Steps in the EES process

EPA's comments are provided to the Panel to inform it's assessment of the EES. The next steps in EPA's process will be:

- Attend the public hearings; and
- Provide advice to the Panel, as requested.

Appendix 1

Risk or Project Design Uncertainty	Example
Operational overflow requirements in the latter years of the Project under the scenario of 100% tailing storage at the TSF, associated approvals and associated impacts on whether SEPP WoV objectives can be met at the Tambo River	Prior to mine work plan approval, determine what proportion of tailings will be stored above ground and likelihood of supernatant water overflowing during operations under that scenario.
Effectiveness of treatment options to sufficiently lower salinity and other contaminant concentrations, management of potential treatment by-products (brine from Reverse Osmosis plant, Barium Sulfate from treatment with Barium hydroxide, etc...), required approvals and residual impacts on whether SEPP WoV objectives can be met at the Tambo River	Prior to commissioning, undertake a feasibility study to demonstrate the potential supernatant water treatment options considered in the EES documentation can deliver the level of water quality required to achieve default EQOs equivalent to ANZECC 99% protection levels for all contaminants except copper and zinc (which can be temporarily adopted as ANZECC 95% protection levels) at the Tambo River for initial overflow discharges post-remediation without impacting on other areas of the environment
Design of TSF rehabilitation, with potential for acid loads from unmanaged upstream creeks to impact supernatant water quality in the long term (between 10 and 1,000 years) causing overflows to not comply with SEPP WoV in the long term	During operations, undertake a revision of the rehabilitation plan to determine what measures must be implemented to prevent the acidity load from upstream creeks impacting the long-term stability of supernatant water, metal sulfide precipitates and tailings
Methods to derive environmental quality objectives and criteria to determine compliance in accordance with SEPP WoV for overflow discharges of supernatant water to surface waters post-closure	Prior to commissioning, an independent auditor/technical reviewer is appointed by IGO to guide IGO and the relevant agencies in the appropriateness of data and methods to derive EQOs at the Tambo River
Management and monitoring provisions post-closure will enable an effective prevention of overflows non-compliant with SEPP WoV	Continuous monitoring of supernatant water levels at the TSF Targeted sampling of surface water quality parameters Treatment of supernatant water if required prior to any discharges to surface waters post-closure.
Potential sedimentation that may occur long term from the gully that will channel overflow water and impacts on whether SEPP WoV objectives can be met at the Tambo River	Prior to commissioning, IGO undertakes a review of the tailings dam risk assessment to incorporate risks associated with the saddle embankment and location of new spillway
Whether proposed measures will sufficiently prevent seepage into fractures to an acceptable level in accordance with clause 12 of SEPP GoV in perpetuity	Prior to commissioning, establish a comprehensive baseline of groundwater quality and levels in the areas surrounding the TSF and mine voids in accordance with EPA Publication 668 "Hydrogeological Assessment (Groundwater Quality) Guidelines" 2006; and Prior to disposing of Wilga mine void water to the TSF, repair any bedrock fractures that are currently in contact with supernatant water During operations, implement further best practice measures to more effectively and comprehensively seal all possible fractures in the bedrock in the area of expansion of the TSF Makes provisions for on-going monitoring of ground water quality in areas surrounding the TSF

Risk or Uncertainty	Example to provide clarification
Decision criteria that will determine if measures must be implemented to prevent untreated undertoe seepage entering into the environment and associated impacts on whether SEPP WoV objectives can be met at the Tambo River post closure	Prior to commissioning, document in the mine work plan the process to set criteria to determine the conditions upon which an artificial wetland may be required to treat undertoe seepage post closure
Timing of flooding of backfilled underground workings will be fast enough to prevent the onset of AMD prior to water levels returning to 2 m above workings and impacts on whether SEPP GoV objectives can be met in the surrounding area, and whether WoV objectives can be met at the Tambo River	Prior to mine work plan approval, undertake studies to determine with greater certainty the potential for tailings paste to generate AMD, properties, quantities and the timing of AMD release Prior to mine work plan approval, document the volume and quality of water that will be used to flood underground mine voids, and the time frame that it will take for groundwater to recharge 2 m above material deposited underground IGO makes provisions for on-going monitoring of ground water quality in areas inside and around backfilled mine workings

Appendix 2. Supplementary Policy Settings and Application to the Project

State Environment Protection (Ambient Air Quality) Policy

The SEPP AAQ incorporates the Ambient Air Quality NEPM standards for six criteria pollutants and the associated goals and monitoring and reporting protocols. The SEPP AAQ also incorporates an ambient air quality objective for visibility. The SEPP AAQ standards do not apply to individual sources but to regional air quality. They apply at sites that are generally representative of the exposure of the general population not at peak sites.

State Environment Protection (Air Quality Management) Policy 2001

SEPP AQM sets out the framework for managing emissions into the air environment. These emissions are managed in such a way as to ensure that the air quality objectives of the SEPP AAQ are met, and continuous improvement in Victoria's air quality occurs, in accordance with the State's other environmental, social and economic development goals.

As well as managing local air quality impacts, the SEPP AQM sets out the framework for managing greenhouse gas emissions in Victoria. Through clauses 19(1) and 33(1), the policy requires that a generator of a new or substantially modified source of emissions of greenhouse gases must apply best practice to the management of those emissions. Clauses 33(2) and 33(3) provide that EPA may use protocols of environmental management to develop measures for the management of greenhouse gases and energy efficiency, and apply these protocols to generators of emissions subject to works approvals and licences and in assessing the potential impacts of other development proposals. Protocols for Environmental Management are incorporated documents to the SEPP (AQM), and have the same statutory basis as the SEPP.

Protocol for Environmental Management (PEM) (Greenhouse Gas Emissions and Energy Efficiency in Industry) EPA 2002.

Developed in accordance with clauses 33(2) and 33(3) of the SEPP AQM, the PEM provides detailed guidance for businesses on the requirements for the management of greenhouse gas emissions and energy efficiency, and specifies the steps that need to be taken to demonstrate compliance with SEPP (AQM) in relation to these matters.

In particular, section 2.1 of the PEM sets out requirements and procedural steps for applicants. These apply to an applicant for works approval, and are used by EPA in assessing the potential impacts of other development proposals (such as those requiring an EES), as provided in clause 33(3) of SEPP AQM.

Application to the Project:

The power generation component of the Stockman project will require an EPA works approval and a license, therefore will have to comply with section 2.1 of the PEM. EPA is confident that any issues relating to greenhouse gas emissions are likely to be resolved at the formal works approval application and assessment stage.

Protocol for Environmental Management (Mining and Extractive Industries) 2007

Large area-based sources of emissions such as mines are less easily defined than industrial premises as the majority of emissions arise from disturbance of soil due to earth moving equipment and vehicle emissions. Apart from wind generated emissions from stockpiles of displaced material, the emissions sources are mobile and therefore require a different approach to assessment than that for stationary sources from readily defined discharge points such as stacks on industrial premises.

The PEM (Mining and Extractive Industries) establishes the statutory framework for the assessment and management of air emissions from these industries in Victoria.

Application to the Project

The technical studies undertaken as part of the EES indicate that emissions of relevant air quality indicators will be well below the assessment criteria.

Noise in Regional Victoria Guidelines 2013

State Environment Protection Policy (Control of Noise from Commerce Industry and Trade) No. N-1 (SEPP N-1) is the Victorian standard for noise emissions from commercial, industrial and trade premises within the Melbourne metropolitan area.

Because SEPP N-1 is not policy outside the Melbourne metropolitan area, EPA issued the *Noise from Industry in Regional Victoria 2011* (NIRV) document to provide guidance in setting noise targets for areas outside Melbourne. The NIRV guidelines adopt the SEPP N-1 method to derive noise targets. The NIRV guidelines make provision for lower noise limits in very quiet areas.

Application to the Project

The documentation provided indicates noise levels will be well below NIRV guideline values.