Open Pits Research Summary (Table 43. Appendix F)

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
AIR				
N/A	N/A	N/A	N/A	N/A
LAND				
1. Determine which types of indigenous vegetation to be used for stabilization of disturbed sites in the open pit area.	Research Methods: Develop seed collection, storage and propagation program for open pit reclamation. Particular attention paid to riparian vegetation for water edge and channel banks. Identify native plant colonizers on disturbed sites. Source native plant materials for trial in research plots, and open pit sites no longer used for mining operations. Methods to date: **Indigenous Seeds**: *Epilobium angustifolium* (Fireweed), *Epilobium latifolium* (River Beauty), *Astragalus alpinus* and *Oxytropis maydelliana* , *Oxytropis deflexa, Hedysarum mackenzii* (all legumes), were collected and used at the Fox Portal Research Plots (ABR, 1998), and in the PDC (ABR, 1999). **Indigenous Transplants:** Sprigs of *Arctophila fulva* (Arctic Pendant Grass) and cuttings of *Salix planifolia* (Diamondleaf Willow) were used in the PDC (ABR, 1999). Native plants are collected from sites that will be disturbed by future mining	Panda Diversion Channel (an example of riparian habitat): Arctic Pendant Grass (aquatic grass) has established very well at the Panda Diversion Channel (PDC) entrance, within the channel and at the outflow into Kodiak Lake. Also, transplanted willow cuttings and bundles have been successful within the PDC. Transplanted pendant grass and willows can successfully establish in the PDC, provided sufficient fine-grained sediment is available. A number of native seeds were sown at the top end of the PDC in 1999. Among them, Hedysarum mackenzii (legume) has established very well, to the extent that this has now become a seed source for other reclamation sites at EKATI.	The native plant collection program continues to be advanced and refined. A Standard Operating Procedure (SOP) for the collection and processing of native seeds has been developed, that will be updated and refined as more information becomes available and better techniques are developed. Native plants will be used to stabilize channel banks of outlet streams and pit lake edges. Seeds are best suited for sowing along upper banks where rocks provide cover and the soil is relatively dry. Aquatic grasses will assist within flow channels to slow stream flow and create areas for fines to settle. Shrub plants such as willow will be used to stabilize the lower channel banks and if required, pit lake edges.	Selection and Definition

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
	operations. Example - the collection of willow cuttings from the Koala Lake edge prior to pit development. These cuttings were used in the PDC.			
2. Identify locations and methods for enhancing vegetation colonization on open pit disturbed sites.	Research Methods: Identify locations where vegetation colonization can be enhanced to stabilize surface. Identify sites which can be used to reference similar vegetation colonization. Determine how colonization can be encouraged. Identify appropriate percentage cover for surface stabilization.	Aquatic grasses have been successful within the PDC and at the lower end of Fred's Channel to stabilize water edges and reduce bank erosion. Riparian shrubs have also been used successfully (when buried as bundles or as planted cuttings) to stabilize banks and encourage wildlife habitat.	Results from the PDC can be applied to future stabilization work in the Pigeon Stream Diversion, pit lake perimeters and outflow channels.	Operation for PDC, Identification for pit lakes and outflow channels.
WATER				
1. Determine the volumes and rates of water which can be withdrawn from source lakes for individual pit flooding, that does not significantly impact aquatic habitats in the source lakes.	Research Methods: Review candidate lakes for sourcing pit filling. Conduct baseline studies to determine natural fluctuations of source lake levels, and outflow discharges. Assess fish habitat in source lakes. Determine the volume of water that can be withdrawn that does not exceed natural lake level fluctuations. Methods to Date: Four years of baseline data have been collected from Ursula Lake, two years of data is available for Upper Exeter Lake, and data for Lac de Gras pumping has been referenced from Diavik Diamond Mine Reports. More	Preliminary pit flooding research conducted for this ICRP has been carried out and the preliminary studies indicate there would be a negligible effect on outflows from water extraction from identified source lakes based on the pumping rates provided in ICRP Vol 1 Table 21. Results from Rescan Fish Habitat assessment in Ursula and Upper Exeter indicate pumping rates in Table 21 will not impact fish habitat in these 2 lakes. Further discussion on impacts to fish habitat in sources lakes is found in Sections 8.3.5.3 - 8.3.5.4 of the ICRP Main Document Volume 1.	Baseline studies of lake outflow volumes, lake levels, and fish habitat in source lakes, as well as cumulative effects from multiple, concurrent water extraction will assist in the identification of appropriate source lakes, timing, water extraction amounts, and potential effects on fish habitat.	Identification

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
	data needs to be collected from Upper Exeter and Lac de Gras (below the Paul Lake Bridge), and at the Misery extraction point) to better determine drawdown effects and volumes available for each pit. Data collection should also include the continued use of Diavik hydrology data or establish a BHPB monitoring station.			
2. Determine Panda pit lake final surface elevation without underground plugs in place. Understand what effect/s this will have on Panda and Koala pit lake stratifications, surface discharge from Panda pit lake, and surface flow to downstream of Panda and Koala pit lakes.	Research Methods: Determine expected final elevations for both Panda and Koala pit lakes, with and without underground plugs. Determine if surface flow between Panda and Koala pit lakes is possible without underground plugs. Risk assess the effects, if any to pit lake stratification in both pits lakes, and to downstream aquatic habitats should one or more of the underground plugs fail after pit lakes are flooded, and surface flow with the downstream watershed has been reconnected.	N/A	Within the 2005 LOA six engineered plugs will be installed in the Panda-Koala underground mines. The environmental effect of plug/s failure will need to be determined to assess risk level for downstream aquatic habitats.	Identification
3. Determine long term pit lake water quality for all pits in the mine plan, through the use of modeling. **Note:** Water License MV2001L2-0008 required the Pit Lake Studies for Sable, Pigeon and Beartooth.	Research Methods: Use the Pit Lakes Studies Project to "address the potential of converting the mined-out kimberlite pipes into pit lakes. This report shall include the following: a) waste materials characterization; b) site-specific meteorological data; c) physical limnological assessments; d) water balance data; e) hydrological data;	Preliminary results from Pit Lake Studies: Task 1 - *Review of the State of Knowledge of Pit Lakes.* The review confirmed the appropriateness of the DYRESM (Dynamic Reservoir Simulation Model) for the EKATI pit lake modeling, although modifications to the model will be required, such as the addition of an ice cover module. Task 2 - *Review Data Requirements*	Results from Pit Lakes Studies will assist in predicting the expected pit lake stability (meromictic conditions), and water quality. Results will also be used to inform and establish closure criteria for pit lakes (eg. Lake stratification and discharge criteria).	Identification

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
Because this Draft ICRP has all pit flooded at closure the Pit Lakes Studies will be expanded to all open pits in the mine plan.	f) water quality data; g) potential hydrological impacts on lake water sources and their respective downstream waters, with an examination of contingencies to avoid these impacts; and h) an outline of proposed dates for deliverables." (MV2001L2-0008, Part I, 1.). <u>Methods to Date:</u> Task 1 - *Review of the State of Knowledge of Pit Lakes*, and Task 2 - *Review Data Requirements, Available Data and Data Gaps*, have been completed and submitted to the WLWB December 2005.	*Available Data and Data Gaps.* Specific gaps in datasets were identified for meteorology, hydrology, surface water quality, hydrogeology, acid rock drainage, aquatic biology and ultimate pit geometry. Further discussion on Pit Lakes Studies is found in Section 8.3.1 of the ICRP Main Document.		
WILDLIFE				
1. Design and test fish barriers for pit lakes.	<u>Research Methods:</u> Determine the location and design of fish barriers for all pit lakes. Opportunities exist for Aboriginal Elders and communities to assist BHP Billiton with the design and location.	N/A	Fish barriers at the outlet of pit lakes will prevent fish migration (from upstream and downstream) into the pit lakes.	Identification
2. Identify functional berm heights to deter wildlife from entering open pits.	<u>Research Methods:</u> Evaluate and test the use of berms as avoidance structures for wildlife. <u>Research to Date:</u> Monitoring of the current berm around the perimeter of the Misery Open Pit during the suspension of operations, and road berms of the Misery Road.	The WEMP program at EKATI has monitored caribou interactions with berms along the Misery Road for the past 4 years. Initial results indicate that caribou avoid road berms but the effective berm height which caribou avoid is unknown at this time.	Appropriate berm heights must be determined to properly function as wildlife and human deterrent from open pits during flooding.	Identification
3. Identify those areas	<u>Research Methods:</u>	A variety of bird species (including	Because the land surrounding and	Identification

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
within the pit lake components which would be functional for wildlife habitat.	Assess potential types of wildlife use. (eg. Raptor habitat on remaining pit walls after pit lakes are flooded). Ensure the landscape around the pit lake is safe for wildlife to use.	peregrine falcons, rough-legged hawks, and gyrfalcons) use, or attempt to use, pit walls as nesting habitat. In 2005 birds and /or potential nesting activity were identified in every open pit at EKATI. Although birds are discouraged from using pit walls during mining operations, once pit lakes are in place remaining steep-sided pit walls will be available for nesting.	immediately adjacent to pit lakes will be used by wildlife these areas must be safe for wildlife use. Bird activities have already indicated pit high walls as potential nesting sites. The pit lakes will not have fish passage or fish habitat. The destruction/loss of fish habitat has been compensated for in all the lakes which were originally in place prior to the pit development through legal authorizations with DFO.	
HEALTH & SAFETY				
N/A	N/A	N/A	N/A	N/A
COMMUNITY				
1. Consider ways in which communities can be involved in closure planning for open pits.	Research Methods: Regularly update and discuss with communities closure planning for the open pits. Look at opportunities during operations (that carry over into closure) and future reclamation projects where communities can assist with closure planning. Identified opportunities specific to Open Pits: Assessment of locations and types of aversion structures for the Open Pits mine component.	Inokhok and diversion fences were constructed at EKATI in 2005 and 2006 to divert caribou away from potential dangers at the minesite (eg. open pits). This is an ongoing experiment to see how the diversion structures work. There are no lessons learned to indicate at this time.	The community of Kugluktuk have assisted BHPB with wildlife aversion structures. This community has been instrumental in the development of the Naonayaotit Traditional Knowledge Project which may also provide benefits for future closure planning.	Identification
OPERATIONS				
1. Determine infrastructure requirements for pipelines.	Research Methods: Step 1: Determine source lakes, pipeline route, and timing of pit flooding. Step 2: Estimate pipeline dimensions,	N/A	Infrastructure information will provide BHP Billiton with expected footprint for pipeline construction, materials, operating and maintenance requirements.	Identification

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
	pump stations, and base infrastructure requirements. Research to Date: Steps 1 and 2 have been estimated for this ICRP, but will need refining as more source lake baseline data is collected, alternatives sources are reviewed and cost analysis is completed.			
2. Determine the feasibility, and method of processed kimberlite backfill into an open pit(s). **Note**: This option is currently not part of the closure plan for any of the open pits. However, BHP Billiton will continue with the research of redirection of processed kimberlite should an open pit become available.	Research Methods: Review the various methods of tailings thickening at other operations. Model the settling characteristics and timing for current processed kimberlite slurry discharge.	N/A	Research will assist in the redirection of processed kimberlite from the LLCF to open pits, thereby reducing the volume of processed kimberlite at the LLCF and improving long term water quality in that facility.	Identification
3. Determine the reclaim and makeup water strategy required for redirection of processed kimberlite to an open pit(s).	Research Methods: Research the volumes of water required by the Process Plant for processing, and the water volumes available from the open pit reclaim, and from the LLCF. Explore methods for reclaiming water	N/A	Research results will assist with open pit reclamation schedule as well as pit lake water quality modeling.	Identification

RESEARCH SUMMARY – OPEN PITS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
Note: This option is currently not part of the closure plan for any of the open pits. However, BHP Billiton will continue with the research of redirection of processed kimberlite should an open pit become available.	from the pit lakes as they are filled with processed kimberlite, Review the time to fill pits (volumes and final processed kimberlite elevation).			
4. Determine appropriate type and placement of engineered plugs in underground mines.	<u>Research Methods:</u> Conduct feasibility assessment of engineered plugs in the Panda-Koala Underground which would enable early flooding (or processed kimberlite backfill) during Koala Underground operations.	N/A	BHP Billiton must maintain the safety of all employees and contractors, while at the same time review efficient closure methods. The results will assist the company in determining the reclamation schedule for Panda Open pit.	Identification

Underground Mines Research Summary (Table 44. Appendix F)

RESEARCH SUMMARY – UNDERGROUND MINES				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
AIR				
N/A	N/A	N/A	N/A	N/A
LAND				
N/A	N/A	N/A	N/A	N/A
WATER				
1. Determine the ground water and salinity contributions from underground mines to pit lakes, and how this will affect pit lake water quality.	<u>Research Methods:</u> Current operations research is examining the contribution of underground saline connate water to the LLCF. The results from this will be used to model how the underground saline water will affect pit lake volumes, and water quality and meromictic conditions within the pit lakes.	Current trends indicate that there is a potential for salinity of mine water from the underground workings to increase marginally in the future.	Connate water with salinity concentrations has the potential to impact pit lake stability (meromixis) and water quality depending on flow rates. Pit lake stability models will use the current and projected salinity concentrations to model mixing and projected pit lake water quality at discharge.	Identification
WILDLIFE				
N/A	N/A	N/A	N/A	N/A
HEALTH & SAFETY				
N/A	N/A	N/A	N/A	N/A
COMMUNITY				
N/A	N/A	N/A	N/A	N/A
OPERATIONS				
N/A	N/A	N/A	N/A	N/A

Waste Rock Storage Area Research Summary (Table 45. Appendix F)

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
AIR				
N/A	N/A	N/A	N/A	N/A
LAND				
1. Determine the rate and permanence of permafrost in the WRSAs.	Research Methods: Determine WRSA design so that permafrost will aggrade and maintain in the piles. Refine model predictions of permafrost growth and maintenance over the long term. Research to Date: Monitoring of actual permafrost growth in WRSAs.	Monitoring to date in the Panda/Koala and Misery WRSAs indicates: The amplitude of temperature fluctuations at a specific depth is decreasing with time, The temperatures nearer the surface of the WRSA are getting colder with time and this is an indication that the depth of the seasonal thaw is also decreasing with time.	The results to date indicate that the design and construction of the WRSAs effectively encourages and maintains permafrost in the piles. Climate modeling is based on studies completed by Environment Canada. EKATI models can be refined as new information is available.	Identification
2. Determine which types of indigenous vegetation to be used for stabilization on topsoil storage sites, lake sediment/glacial till storage sites.	Research Methods: Identify native plant colonizers on disturbed sites. Source native plants materials and conduct growth trials on topsoil and lake sediment storage sites. Research to Date: **1997 Fox Portal Study on lake sediments used native grass cultivars, native forbs, and native shrubs.** Native grass cultivars: Tundra Bluegrass, Alpine Bluegrass, Alyeska Polargrass, and Arctared fescue. Native forbs: Alpine Milk-Vetch and Wormwood. Grass/shrub mixture: Alpine Holygrass, Labrador Tea, Alpine Azalea . Shrub cuttings: of Bearberry and Low Blueberry Willow.	Grazing of native plants by caribou and hare can be problematic during field research, as noted at Fox Portal research site. The use of native grasses in revegetation work at EKATI would only be economical and practicable if an adequate seed supply of these species existed. Grasses did not perform well on early lake sediment trials - probably because grasses prefer coarser textured soils and a modest level of nutrients. Native grass cultivars are the most successful in establishing on recontoured surfaces, and when applied at a low seeding rate, appear to enhance colonization of native species, further	Grazing impacts to vegetation research were reduced by enclosing research area with fence (egs Fox Portal and LLCF Cell B, vegetation research plots on Panda Lake Sediment piles), or applying non-toxic anti-herbivory compounds (PDC). Cultivation and propagation of indigenous plants has been tested by collecting seeds and growing them in offsite nurseries. Initial results indicate small scale propagation is expensive (growing and shipping). Large scale propagation methods have not yet been tested. This will be considered further once the vegetation types for reclamation have been identified.	Identification

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
	1999 Greenhouse Study on lake sediment used native shrubs, aquatic grass, grass cultivars and legumes. Riparian willow, Bearberry Alpine Azalea, sprigs of Arctic Pendant Grass, seed mixture of native-grass cultivars, and seed of legume (*Hedysarum mackenzii*). **Field Testing of native plant growth on lake sediment – Airstrip Lake, 1999.** Legume (*Hedysarum mackenzii*), native grass cultivar mix (same as 1999 greenhouse study), Arctic Pendant Grass, and willow. **Aerial Seeding of lake sediment and topsoil piles –** Panda and Koala North Lake Sediment/Glacial Till Storage piles (2002); Koala Topsoil storage pile) (2002); Misery Topsoil Storage Pile (manually seeded in 2002); Fox Topsoil Storage Pile (2003). Native grass cultivars -alpine bluegrass, tufted hairgrass, polargrass, tundra bluegrass. **References:** ABR 1997, 1998 (Fox Portal); ABR 2000a (Airstrip Lake research); HMA 2005 (Aerial seeding lake sediment & topsoil piles).	ameliorating site conditions by lowering wind velocity, trapping snow and providing additional microsites for colonization. **References:** ABR, 1997 and 1998 (Grazing by wildlife); HMA 2005 (Lake sediment and topsoil piles research, and native grass cultivars establishment).	**References:** ABR, 1999 (Lake Sediment and 2000	

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
3. Establish how topsoil and lake sediments/glacial till piles will be stabilized to reduce erosion.	Research Methods: Identify the location, substrate types, methods of establishing plant cover, and appropriate surface coverage. Methods to Date: Aerial seeding and fertilizing on topsoil and lake sediment piles to establish initial vegetation cover.	**Learnings from Lake sediment/glacial till research:** Preliminary results show that glacial till appears to be a more suitable material than lake sediment for site reclamation. Surface compaction appears to be a major limiting factor in mixtures containing a high proportion of lake sediment. In addition, the long term lack of organic matter and low nutrient content in lake sediment may limit plant growth and survival even for well-adapted species. **Learnings from topsoil stockpile research:** Plant cover establishment is better in free dump piles that flat open surfaces. Treated sewage sludge can benefit plant growth but should be monitored – excessive amounts of sewage sludge can lower pH, increase soluble salt concentrations and available nitrate and phosphate concentrations. **References:** ABR 1999 (Greenhouse evaluation of lake sediment); ABR 2000 (Field study lake sediment); HMA 2005 (Topsoil and lake sediment vegetation growth)	Lake sediment was previously stockpiled for use as a substrate for growth on processed kimberlite. However research on the LLCF has determined that plants can successfully grow directly in processed kimberlite, without amelioration by lake sediments. Lake sediment/glacial till also has the potential to assist vegetation establishment on camp pads and laydown areas, and this is where the focus of lake sediment research will be in the future. Stabilization of lake sediment piles (whether or not they are eventually used for reclamation) will continue.	Identification
WATER				
1. Determine methods to control seepage from WRSAs, and ensure that seepage flow meets water	Research Methods: Determine the effectiveness of toe berms in WRSAs in controlling seepage from WRSAs. Research geochemical	Sampling of waste rock seeps over the years 2003 to 2005 have shown that most seeps that drain to the receiving environment are compliant with water licenses	Permafrost is growing within waste rock piles and is colder than natural permafrost below it due to convective super-cooling	Ongoing during mining operations.

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
license discharge criteria.	mechanisms of seepage formation – how flows from the WRSA interact with tundra pH. <u>Research to Date:</u> Toe berms have been constructed around WRSAs to assist with permafrost development and freezing of the waste piles and ultimately reduce the seepage flows. Seepage monitoring is used to assist in understanding toe berm effectiveness. Sampling of seeps is conducted twice each year – during freshet (peak flow) and during autumn (low flow). Sampling is conducted at the Panda/Koala/Beartooth, Fox and Misery WRSAs, as well as reference stations for those WRSAs. In addition, sampling of ten reference stations has been conducted in the Horseshoe Watershed as baseline for the potential Sable Pit. For each seepage sample, conventional water quality variables are measured. Waste rock seepage data are reported annually. The spring survey is reported as a data report and the autumn survey is reported as a data report combined with an evaluation of survey data for the whole year.	requirements (BHPB 2006). Not all seeps drain to the receiving environment – the seeps from the Coarse Process Kimberlite Storage Facility drain to the LLCF. The exception is SEEP-018/019 that drains from the Panda/Koala/Beartooth WRSA to Bearclaw Lake. Over the last three years, the average concentration of total aluminum in that seep has exceeded the aluminum discharge criterion. In this case, the reason is that aluminum concentrations rise in autumn due to a decrease in pH to between 4 and 5. Similar decreases in pH have been observed in other seeps compared to tundra reference stations, but the geochemical mechanisms underlying the low pH are not well understood. Ion exchange mechanisms have been suggested as a possible cause. Once the cause of the pH depression is understood, then mitigation measures to stop the aluminum non-compliance of SEEP-018/019 will be implemented.	during winter. Research on geochemical mechanisms of seepage formation is ongoing. The study of toe berm effectiveness is also ongoing through mining operations.	
WILDLIFE				
1. Determine location,	Seven (7) wildlife access ramps are	WRSA access ramps used during mine	Discussions with community elders,	Identification

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
number, dimensions and slope of access ramps on WRSAs.	proposed for the Panda/Koala/Beartooth WRSA, 5 for the Fox WRSA, and 5 for the Misery WRSA. No wildlife access ramps have currently been designed into the Sable, and Pigeon WRSAs. Access ramps will be constructed during the operations of the WRSAs.	operations for haul traffic are proposed to be used as some of the wildlife access ramps at closure. Caribou have been observed using these ramps on the Panda/Koala/Beartooth WRSA during operations. The ramps are constructed at approximately 30 m wide, with a 10% grade. Use of haul road access ramps by caribou during mine operations with no reported injuries may suggest these ramps are suitable for wildlife use at mine closure.	identification of wildlife traffic patterns near WRSAs, and observations of caribou on the WRSAs will assist BHP Billiton in determining locations, numbers and dimensions of access ramps.	
HEALTH & SAFETY				
N/A	N/A	N/A	N/A	N/A
COMMUNITY				
.1. Consider ways in which communities can be involved in closure planning for WRSAs.	Research Methods: Regularly update and discuss with communities closure planning for the WRSAs. Look at opportunities during operations (that carry over into closure) and future reclamation projects where communities can assist with closure planning. Identified opportunities specific to WRSAs: Determine location, number, dimensions and slope of access ramps on WRSAs (see Wildlife 1 Above)	N/A	N/A	Identification
OPERATIONS				
1. Determine the volumes of demolition materials, and strategy for placement.	Research Methods: Refine the expected volume of demolition material at closure, less the expected volume of salvageable material.	The current total estimated volume of the landfill material from infrastructure demolition is 1.8 M m^3. This does not include any estimates for salvageable materials. An area on the south side of	Understanding the expected volume of demolition material assists BHP Billiton in identifying landfill space requirements, and the volume of landfill capping materials required at closure.	Identification

RESEARCH SUMMARY – WASTE ROCK STORAGE AREAS				
Research Objective	**Methodology**	**Lessons Learned**	**Application of Results**	**Planning Stage**
	Ensure that space and capping materials are available within the Panda/Koala/Beartooth WRSA for the demolition landfill. Research to Date: An estimate of demolition material was completed in 2001 for the update of the liability estimate.	the Panda/Koala/Beartooth WRSA has been designated for demolition landfill although this will be reviewed closer to closure.		

Key for Planning Stage Terms:
Identification: Define project opportunity, alignment with strategic objectives, potential business benefits and project deliverables.
Selection & Definition: Finalize the project scope, schedule, estimate, funding and prepare submission to authorizing body.
Execution: Implement the project and deliver the defined business benefits and project outcomes.
Operation: Integrate the outcomes into "business as usual".