Overview of Human and Natural Resource Impacts of the Oyu Tolgoi Project
- Consequences to herders, their livestock, traditional nomadic lifestyle;
- Consequences to water supplies and grazing land;
- Lack of waste rock and tailings management plans and associated reclamation plans and financial assurance;
- Opportunities to increase waste water recovery and reuse at the tailings; and
- Impacts of proposed underground block cave mining.

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Camels hoping for water from a well used for decades by the herders before the soil water aquifer that sustained the well was punctured and drained by poorly constructed monitoring wells above the Gunii Hooloi Groundwater extraction area
Waste from the open pit mine being dumped on a waste rock disposal pile August 13, 2013 – Open pit operations and copper processing not affected by deferral of underground work
Oyu Tolgoi Project Area development as of March 2, 2013 showing mine facilities, construction at site of Undai Diversion Dam and Channel and alignment of subsurface flow channel.

For scale, the square tailings disposal facility approximately 2 km x 2km.

March 2, 2013 Satellite Image of Oyu Tolgoi Project Area
“WRS-2 Path/Row 130/30 – Lat 43.2 [N]/Long106.8[E]”
Figure 6.2: Ephemeral Watercourses, Springs and Wells around the Oyu Tolgoi Licence Area
Herder born at Bor Ovoo and his son looking at rust-stained water currently being provided by OT at proposed Bor Ovoo Spring replacement site

Livestock of family that lived at and used Bor Ovoo Spring to which they will never be able to return
Herder born at Bor Ovoo Spring said the spring was used regular by 10 – 20 families and their livestock but was only water available in early winter – into January - and was used by 50 - 100 families and their livestock as well as wild animals.
Water from pipes inside OT fence flowing toward Proposed Bor Ovoo Spring replacement site

Water at proposed Bor Ovoo Spring appears to soak into ground completely within 200 meters of pipes from which it flows
“The cascading well” is one of the six improperly constructed monitoring that wells that has drained the soil water decades old wells into top Gunii Hooloi deep aquifer; none of which have been repaired to prevent continued draining of soil water to the deep aquifer.

Decades old livestock water well where the soil water level has dropped significantly due to the lowering of the water level in the soil water aquifer due to faulty and unrepaired monitoring wells nearby.
Oyu Tolgoi’s ESIA says


“The design of boreholes in the Gunnii Hooloi and elsewhere has evolved over the life of the Project such that the permitted design is more protective of the shallow groundwater aquifers present in the basin. A typical well design (GH05-PB01) is presented below. Pertinent points being:

1. Surface seal around the borehole to prevent any infiltration from the surface into the annulus.
2. Solid casing from surface down to the aquifer unit.
3. **Upper sections of the well bore grouted with impermeable material (bentonite or similar)** to ensure that any surface or shallow aquifers units in the borehole are sealed and cannot flow into the annulus.
4. Gravel pack around the casing and screen through the aquifer section. This design will be adapted as required to reflect the local hydrogeology; however the key principle of preventing flows between hydraulically distinct shallow and deep aquifer horizons will be maintained in all designs.”

ACTUALLY OT acknowledges that its contractors failed to include “**grouted with impermeable material (bentonite or similar) to ensure that any surface or shallow aquifers units in the borehole are sealed and cannot flow into the annulus**” in 6 of 10 monitoring wells resulting in the surface and shallow aquifers being drained of water which flowed in down into the deeper aquifer. None of the erroneously constructed wells have been repaired and the damage to the soil water aquifer continues. Other traditionally used wells show dropping water levels as the effect of the drainage of the soil water aquifer spreads
OT Map showing the 6 wells it acknowledges were constructed incorrectly resulting in the draining of the soil water aquifer.

OT well completion record showing that borehole space around casing pipe was filled with only gravel pack without any impermeable material required to prevent draining of soil water.
Camels waiting at decades old watering well now dry as a result of draining of soil water due to erroneous monitoring well construction. That has yet to be repaired.

Camels reacting to people approaching well hoping for water to be filled into their drinking trough.
Oyu Tolgoi estimates 561 l/s of water will be lost by evaporation at the tailings site (111 l/s) or locked in tailings (450 l/s).

“The average water demand during the initial years of 100,000 tpd mine production is predicted to be 696 L/s [if there is] no water recovery from the underground or open pit mines.”

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This water is potentially recoverable by paste or dry tailings disposal and represents up to 80% of the water needed from the Gunii Hooloi groundwater extraction zone.
The March 2013 Oyu Tolgoi Technical Report states, “In 2005, Golder Associates completed an alternative TSF design with central discharge of a tailings paste thickened to densities as high as 70% solids. The capital and operating costs, and operational complexities, of a paste tailings system were found to be high compared to those associated with conventionally thickened tailings, and the reduction of water consumption by using paste was small. Therefore, this option was not pursued further.”

In its February 2013 Tailings Brief, Oyu Tolgoi states, In 2006/2007 when Oyu Tolgoi was planning its tailings storage facility, further reducing the water content to 20% through the use of dry stack technology was not identified as a realistic option. Even a middle ground option, so called ‘paste tailings’ (containing 22-24% water), was not found to be justified due to the complexity and high costs that would be required at an operation on the scale of OT.

In sharp contrast to those conclusions, Oyu Tolgoi’s 2006 Mining and Processing EIA finds: “The combined use of high-compression thickeners to increase the deposition density of tailings and of decant towers to reduce the size of the tailings pond area has the potential to reduce make-up water requirements and thereby reduce the water demand form the Gunii Hooloi well field. These water saving opportunities increase the rate of recirculation of process water and investigations are continuing as to the feasibility and cost implications” states in Section 2.4 Project Alternatives.

Since 2006-7 when Oyu Tolgoi’s tailings facility design was developed, the use of high-density thickened, paste and dry-stack tailings disposal tailings systems at large mines has grown rapidly.
Existing large-scale mine operations as large or larger than Oyu Tolgoi that use high-density thickened tailings, paste or dry stack technology include: Chuquicamata, Chile – 230,000 tons per day; Quebrada Honda, Peru – 147,000 tons per day and Esperanza, Chile – 95,000 tons per day.

Perceived and realized benefit of High-Density Thickened, Paste and Dry Stack Tailings management include both reduced operating cost and potentially large reductions in water use.

The Esperanza TSF was commissioned in late 2010, with SRK acting as technical advisors. The facility was designed to store a maximum of 750 million tonnes of copper tailings [produced at 95,000 ton per day].

Source:  [http://www.srk.cl/es/node/2375](http://www.srk.cl/es/node/2375)
Waste Rock Management Plan “Intentionally Omitted” from ESIA

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“Preliminary environmental test work has shown that some open pit waste, mainly in the central pit, is potentially acid forming (PAF), but that a significant proportion of waste also has an acid neutralizing potential....

“Design work on the waste rock dump is ongoing and further information on how the Project will ensure that the design, construction, operation and closure of the WRD incorporates good international practice and meets applicable Mongolian standards and IFC and EBRD requirements to mitigate potential impacts is set out in Chapter D9: Waste Rock Management Plan.”

“SECTION D: ENVIRONMENTAL AND SOCIAL CONSTRUCTION MANAGEMENT PLANS
CHAPTER D9: WASTE ROCK MANAGEMENT PLAN
This section is intentionally omitted and will be included with the operations- phase management plans which will be prepared in due course.”

No reclamation plan was provide for waste rock in the ESIA either, only conceptual goals, though waste is the largest volume of material being generated at the open pit mine and that will be left at the site after mining ceases.
Oyu Tolgoi Intentionally Omitted its Tailings Management Plan from the ESIA

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“An Independent Tailings Review Board (ITRB) has been established in accordance with IFC Performance Standard 4 to provide independent review and oversight of TSF design and operational management. The ITRB will:
- Review TSF design and operational monitoring during construction and the initial phase of construction;
- Ensure that TSF design, construction and operation is undertaken in accordance with good international industry practice;
- Review the final TSF designs prior to financial close of project financing; and
- Review the final TSF construction as part of the Physical Facilities Completion Certificate for project financing.”

“SECTION D: ENVIRONMENTAL AND SOCIAL CONSTRUCTION MANAGEMENT PLANS
CHAPTER D10: TAILINGS MANAGEMENT PLAN
This section is intentionally omitted and will be included with the operations- phase management plans which will be prepared in due course.”

No reclamation plan was provided for the tailings disposal site, though tailings are the second largest volume of waste material to be left at the site after mining ceases
Areas of Underground Mining using Block Cave Mining proposed at Oyu Tolgoi and illustrations showing surface collapse and subsidence zone associated with that mining method.
Extent of Collapse and Subsidence Zone projected above proposed Hugo North underground mine using Block Caving Mining Method

Grid on map above is 1 kilometer x 1 kilometer

Collapse Zone Project to be
- 3 km x 0.5 km

“Continuous Subsidence Zone Projected to be – 6 km x 3 km
Bayarglaa

Thank you for your time and attention to this critical important matter.