Preliminary Economic Assessment of the Laguna Salada Uranium-Vanadium Deposit, Chubut Province, Argentina

Report Prepared for

U3O8 Corp.



Report Prepared by

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PRELIMINARY ECONOMIC ASSESSMENT OF THE LAGUNA SALADA URANIUM-VANADIUM DEPOSIT, CHUBUT PROVINCE, ARGENTINA

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1 SUMMARY

U3O8 Corp. ("U3O8 Corp." or "the Company") is a Toronto-based, Toronto Stock Exchange ("TSX") (TSX: UWE) and OTCQX (OTCQX: UWEFF) listed company focused on exploration and development of uranium resources and associated commodities in South America. The Company has an advanced portfolio of uranium projects in the region with resources defined in Argentina, Colombia and Guyana and a clear strategy to continue to drive further resource expansion on the back of positive preliminary economic studies.

U3O8 Corp. engaged Tenova Mining & Minerals (formerly Bateman Engineering N.V.) ("Tenova") to undertake an independent Preliminary Economic Assessment ("PEA") on its 100% owned Laguna Salada Project. The Laguna Salada Project is located in the semi-desert environment of the central plain of Chubut Province ("Province") in southern Argentina, about 270 kilometres ("km") southwest of the provincial capital, Rawson and approximately 230km from the main commercial port of Comodoro Rivadavia.

Subsequent to acquiring the Laguna Salada Project in April 2010, U3O8 Corp. advanced an extensive trenching program to define an initial near-surface, free-digging uranium-vanadium resource on the property. Mineralisation was found to occur within three metres ("m") of surface in soft gravel that requires no blasting before mining and no crushing prior to beneficiation. Initial metallurgical test work identified positive beneficiation and leach characteristics for uranium, to the extent that a resource estimate was justified. Coffey Mining Pty Ltd. ("Coffey Mining") completed a maiden resource estimate on the Laguna Salada Project in 2011, with an Indicated resource of 6.3 million pounds ("Mlb") of uranium and an Inferred resource of 3.8Mlb of uranium (Coffey Mining, 2011). Mineralisation was found in two similar but distinct gravels at Laguna Salada with the Guanaco sector containing approximately 88% of the resource and the remaining 12% located in the Lago Seco area.

Continuous surface mining is well suited to the mesa-like topography in which the layer of uranium-vanadium mineralisation is found. Approximately 80% of the tonnage would be mined with continuous miners. The remaining 20% of the gravel to be mined, which lies along the edges of the mesas where the topography is irregular; and therefore not conducive to efficient use of continuous mining equipment, would be extracted with bulldozers and front-end loaders ("FEL"). Mineralised gravel would be trucked a short distance to semi-mobile beneficiation trains where the gravel would be scrubbed and screened with saline water to separate the pebbles and coarse sand from the fine-grained material in which most of the uranium is concentrated.

Test work shows removal of the pebbles and coarse sand from the gravel increases the uranium grade by 12 times from the *in situ* grade of the Guanaco gravels and seven times those of the Lago Seco gravels. Vanadium grades in the residual fine material increase 3.7-4 times relative to the grade of the *in situ* gravel from Guanaco and Lago Seco respectively. However, more conservative enrichment factors were used in the processing and economic modelling: 11 and seven times enrichment for uranium at Guanaco and Lago Seco respectively; and 3.7-3.8 times for vanadium from Guanaco and Lago Seco respectively. These more conservative enrichment factors lead to estimates that the fine material being fed to the hydrometallurgical plant ("Hydromet Plant") would have, on average, grades of 850-870ppm U_3O_8. These grades are similar to the mill feed grade of operating surficial uranium deposits in other parts of the world. Fine material from the gravel would have an average grade of 2,340-2,370ppm V_2O_5. Uranium and vanadium would be extracted from the fine material by alkaline leach, in which the reagents are sodium carbonate (washing soda) and sodium bicarbonate (baking soda) at an optimal temperature of 80° Celsius ("°C").

Continuous mining would involve the cutting of a long trench with gravel being extracted from the leading edge of the excavation, and barren gravel, as well as the coarse component of gravel that had been processed through the beneficiation train, being replaced against the trailing edge of the trench where it would be smoothed and rehabilitated. The mined area would be replanted with indigenous shrubs, which had been removed from the leading edge of the trench prior to mining, as well as with seedlings of local indigenous flora. This mining method has the advantage that no excavation is left open at the end of the mine life and rehabilitation progresses continuously with, and at approximately the same rate, as mining. Continuous mining is considered by U3O8 Corp. to be in compliance of the current mining law in Chubut Province where open pit mining is not allowed.

U3O8 Corp. is in advanced negotiations with Petrominera Chubut S.E. ("Petrominera"), the Chubut provincial resource development company, in relation to a joint venture ("JV") on the Laguna Salada Project. The proposed agreement is in two parts: (i) a 3-year option period in which to explore Petrominera's three concessions that lie in the larger Laguna Salada Project area; and (ii) based on exploration results obtained during the option period, the right to enter into a JV with the participation of each party based on a formula that incorporates the percentage of the overall mineable reserve on Petrominera's concessions relative to U3O8 Corp's.

The PEA will help to position the Laguna Salada Project for further advancement as Argentina seeks local uranium supply to reduce its 100% reliance on imported fuel for its expanding nuclear reactor fleet.

1.1 PEA Highlights:

The PEA provides a base case valuation for the Laguna Salada Project on the initial uranium-vanadium resource estimated in accordance with National Instrument 43-101 ("NI 43-101") of 6.3Mlb at an average grade of 60ppm U_3O_8 Indicated resources and 3.8Mlb at 85ppm U_3O_8 Inferred resources. Vanadium resources are 57Mlb at 550ppm V_2O_5 Indicated and 27Mlb at 590ppm V_2O_5 Inferred.

All figures in this report are in US Dollars, unless otherwise noted. The economic model is based on a $60 per pound ("lb") uranium (U_3O_8) price and $5.50/lb for vanadium ($V_2O_5$). Hence, the PEA estimates a life-of-mine ("LOM") average cash cost of $21.62/lb of uranium ($U_3O_8$), net of a vanadium credit and including a 3% net smelter royalty ("NSR") due to the Province. The study demonstrates that the cash cost of production on Laguna Salada would be within the lower quartile of the uranium industry. The Project has a payback of 2.5 years with an average cash cost of $16.14/lb (net of the vanadium credit) for uranium over that period. This low initial cash cost is due to the shallow, flat-lying nature of the Laguna Salada Deposit allowing production to start in the higher grade zones to maximise revenue during the payback period.

1.3Mlb of uranium would be produced in year 1, with an average annual production of 0.64Mlb of uranium and 0.96Mlb of vanadium over the 10-year mine life. The initial Laguna Salada Deposit is expected to yield revenue of approximately $9.92 per tonne ("t") of mineralised material against an operating cost ("Opex") of $4.34/t and to generate operating cash flow of $5.58/t. Laguna Salada's pre-tax net present value ("NPV") is $55 million at a 7.5% discount with an internal rate of return ("IRR") of 24% and an estimated post-tax IRR of 18%. The Project would require a total capital investment ("Capex") of $135.7 million (including start-up capital of $108.5 million, sustaining capital of $5.3 million including mine closure and mining equipment overhaul, and $21.9 million for an approximate 20% contingency).

U3O8 Corp. undertook this PEA before the full extent of the deposit is known in order to have independent verification that Laguna Salada's production cost would be comparable with the uranium industry's lowest-cost producers. As both of the IRR and NPV are sensitive to deposit size, the next step is to increase the Laguna Salada resource, which could justify a higher production rate and significantly improve both of these economic measures. Potential to achieve an increase in resources lies in two areas of similar uranium-vanadium mineralisation that have been discovered in the Laguna Salada Project area subsequent to the resource estimate made by Coffey Mining (2011).

The principal recommendation of this study is that the Laguna Salada Project be advanced to pre-feasibility, and subject to the outcome, a decision then be taken on feasibility level evaluation.

This report has been prepared in compliance with NI 43-101 and Form 43-101F1. The PEA is preliminary in nature as it includes Inferred Mineral Resources that are considered too speculative geologically for economic consideration that would enable their classification as Mineral Reserves. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. There is no certainty that the results of the PEA will be realised.

1.2 Project Description

The Laguna Salada Project is an advanced exploration project located in the central part of Chubut Province, Argentina, with defined Inferred and Indicated mineral resources of uranium and vanadium. The property is located about 270km southwest of the provincial capital, Rawson and approximately 230km from the main commercial port city of Comodoro Rivadavia. Laguna Salada comprises 23 concessions over an area of 174,315 Hectares ("Ha"), which are 100% owned by U3O8 Corp. through its wholly-owned subsidiaries, Gaia Energy Inc. ("Gaia Energy") and Maple Minerals Exploration and Development Inc. ("Maple").

1.3 Investment Climate in Argentina

Policy changes on repatriation of revenue, import restrictions and debt default issues have led to a challenging economic environment developing in Argentina. However, recent positive moves such as settlement with the Paris Club and compensation to Repsol for the nationalisation of its stake in YPF, have resulted in an improved economic outlook as outlined below. In addition, Argentina has been unwavering in its commitment to nuclear as a key component of its energy mix.

1.3.1 National Level

- In March 2012, Argentina nationalised YPF by expropriating the 51% stake controlled by Spanish energy company, Repsol. This move was believed to be specific to YPF in reversing its privatisation in the late 1990s. Argentina has since compensated Repsol for its YPF stake.
- On May 29, 2013, Argentina reached a settlement with the Paris Club of lenders. The country also settled arbitration claims with five companies through the World Bank and improved economic data reporting at the request of the International Monetary Fund. 93% of the bondholders from the 2001 bond default have accepted restructured debt. The remaining 7% "holdouts" are hedge funds that purchased debt at discounted prices and sued for full payment; holdouts are reported to have credit default swaps, so could also benefit from a default. Argentina deposited the interest payment due to the 93% bondholders, but USA courts blocked payment because of the legal dispute with holdouts, which triggered a "selective default" event on July 30, 2014.

- Since July 2013, almost $9 billion in investment has been committed by oil majors to develop the massive Vaca Muerta shale basin and other oil and gas projects in Argentina. Chevron has JV'd with YPF to spend over $3 billion to develop the Vaca Muerta shale play. France's Total SA is leading a consortium with Germany's largest oil and gas producer, Wintershall, and BP subsidiary, Pan American Energy, in a $1.2 billion gas project – the largest offshore natural gas investment in Argentina to date. Other companies that have concluded oil and gas deals are: Exxon Mobil, Dow Chemical, Brazil's Petrobras, Malaysia's Petronas and China's China National Oil Corp. In mining, Yamana Gold announced a $450 million investment to bring its Cerro Moro mine into production by 2015 and Minera IRL secured $80 million in financing from Argentinean investors to develop its Don Nicolas gold mine.

1.3.2 Chubut Province

- In May 2003, Chubut's Provincial Legislature approved Law No. 5001 prohibiting open pit mining and the use of cyanide for gold extraction. In June 2012, a draft bill proposed the lifting of the open pit mining ban, but with significant tax increases, and the bill was ultimately not put forward to the provincial congress. Importantly, the continuous surface mining method on which the Laguna Salada PEA is based, would see no open excavation left after mining. Cyanide is also not used to process the mineralised material; therefore, the mining and processing methods contemplated for Laguna Salada are considered by U3O8 Corp. to be in compliance with current Chubut mining legislation.
- In addition, U3O8 Corp. is in advanced negotiations with Petrominera, the provincial resource company, regarding a JV on the Laguna Salada Project. The proposed partnership would establish a framework for potential development of Laguna Salada.

1.3.3 Investment in Argentina's Nuclear Energy Industry

Argentina has demonstrated consistent support for growing its nuclear energy industry. 9% of Argentina's electricity is to come from nuclear when its third reactor reaches full capacity in late 2014 – and the stated strategy is to double nuclear energy supply by 2025. In August 2014, China was awarded the contract to construct a fourth reactor and discussions are underway on a fifth. The Development Bank of Latin America has provided a $240 million loan to refurbish Argentina's Embalse reactor to extend its life for 25 years and increase output by 7%. Nuclear co-operation agreements have been signed with China, Russia, South Korea, India, the United Arab Emirates ("UAE"), Saudi Arabia and Brazil. In addition, Argentina has its own uranium enrichment facility, produces medical isotopes, has built research reactors for domestic use as well as in Australia, Peru, Egypt, and its small reactor design is being considered to power desalination plants in Saudi Arabia. Plans were recently announced to construct a new enrichment facility in Argentina's Formosa Province. Due to the closure of former uranium mines for economic reasons, a conspicuous gap in Argentina's nuclear fuel cycle is local uranium production.

1.4 Geology and Mineralisation

Uranium-vanadium mineralisation at Laguna Salada is contained in flat-topped mesas that are approximately 10m higher than the surrounding plain, on the north bank of the Rio Chico, one of the principal rivers in the region that flows northeast into the Rio Chubut.

"Caliche"- and "Calcrete"-type deposits are surficial uranium deposits found in semi-desert environments. Caliche-type deposits differ in that they typically occur in unconsolidated clastic sediments such as gravel, as opposed to cemented sediments in the case of Calcrete-type uranium deposits. Examples of surficial uranium deposits are Lake Maitland in Western Australia and Langer Heinrich in Namibia. Laguna Salada is similar to the free-digging Tubas Red Sand Deposit in Namibia.

Mineralisation at Laguna Salada occurs in a tabular, gently undulating layer that contains yellow-green uranium-vanadium minerals at shallow depth in unconsolidated, sandy gravel. The mineralised layer lies beneath shallow soil and typically a barren cap of gravel on the top of the mesas. This style of mineralisation occurs in the Guanaco and Lago Seco areas of the Laguna Salada Deposit in gravel-dominated clastic facies of different ages – Pleistocene at Guanaco and Holocene at Lago Seco. Carnotite, the principal uranium-vanadium mineral at Laguna Salada, occurs as a powdery filling between the sand grains and as a partial rim on pebbles in the gravel. The mineralised layer ranges between 0.2m and 1.5m thick, averaging 0.9m thick, and lies at surface to a maximum depth of 3m.

1.5 Exploration

Reconnaissance work on Laguna Salada was first conducted in 2007 by Mega Uranium Ltd. ("Mega") with the aim of confirming anomalies detected in a 1978 airborne radiometric survey undertaken by Comision Nacional de Energia Atomica, Argentina's National Nuclear Authority ("CNEA"). U3O8 Corp. acquired this project from Mega in April 2010 and immediately undertook metallurgical test work. Results identified the exceptional beneficiation characteristics of the mineralisation, which provided the justification to continue exploration, principally by pitting and trenching, in the Guanaco and Lago Seco areas of the Laguna Salada Project. Given the unconsolidated sandy nature of the gravel that led to severe core recovery problems with drilling, and the shallow depth of mineralisation, trenching and pitting was favoured over drilling for further exploration of the Project area.

Exploratory pitting and trenching confirmed that mineralisation was extensive. Wide-spaced trenching (~1km square grid) was undertaken to establish the broad distribution of mineralisation. Pitting was undertaken at a spacing of 400m, and subsequently 200m in a square grid over areas of interest. Pit spacing was further reduced to a 100m square grid to demonstrate continuity between wider-spaced pit intercepts. Pitting was undertaken over an area of approximately 40 square kilometres ("km^2") at Guanaco and 25km^2 at Lago Seco. Trenches and pits were dug to a maximum depth of 6m, but averaged 2.8m deep. U3O8 Corp's 2010 trenching program culminated in 2,146 trenches, of which 2,089 were used in the initial resource estimate on the Laguna Salada Project. Mineralisation remains open in both the Guanaco and Lago Seco sectors, which comprise the Laguna Salada Deposit.

Mineralisation has also been discovered in the La Rosada and La Susana areas in the Laguna Salada Project area, which is not included in the current resource estimates of Coffey Mining (2011). La Susana appears to be a southeastern extension of the Laguna Salada Deposit.

Uranium and vanadium at Laguna Salada was initially discovered along the edge of the gravel mesas where the mineralised layer is exposed from beneath a typically barren gravel cap. It was only with trenching and pitting in the interior of the mesas that the extent of the mineralisation became clear at Laguna Salada. Similar mineralisation is evident in the La Susana area, where the uranium-vanadium bearing layer has been traced along the western and eastern edges of the mesa, some 10km to 15km apart. The mineralised layer at La Susana lies at an average depth of 0.5m below surface and vertical channel samples defined an average grade of 78ppm uranium (U_3O_8) and 290ppm vanadium (V_2O_5) from a gravel layer averaging 0.5m thick. Mineralisation at La Susana is hosted in the same unconsolidated gravel unit that hosts the Guanaco sector of the Laguna Salada Deposit. The next step in exploration of La Susana is pitting and trenching to determine the extent of mineralisation beneath the barren cap in an area of about 100km^2.

The La Rosada discovery has the highest grades encountered to date in free-digging gravels and is located about 45km northeast of the Laguna Salada Deposit. Vertical channel samples through the gravel have a weighted average grade of 1,500ppm uranium (U_3O_8) and 780ppm vanadium (V_2O_5) from a layer of gravel about 0.7m thick starting at an average depth of 0.3m below surface. This average grade is from two areas of gravel, totalling 3.2km^2 in extent, that are perched on Jurassic basement strata. The highest grade encountered in the gravel at La Rosada is 11,780ppm (1.1%) U_3O_8 and 5,168ppm (0.5%) V_2O_5 in a 0.4m thick horizontal layer.

The La Rosada and La Susana discoveries highlight the district-wide prospects of the region. It is recommended that further exploration be undertaken to determine the potential of these newly identified mineralised areas towards the goal of increasing the current mineral resource.

1.6 Mineral Processing and Metallurgical Test Work

Extensive mineral processing test work resulted in the recognition of the exceptional beneficiation characteristics of the Laguna Salada gravels. The Guanaco and Lago Seco gravels are geologically distinctive, and this is reflected in their beneficiation characteristics that are described below under "Beneficiation".

Test work showed that fine material from Laguna Salada is amenable to either acid or alkaline leach. However, acid consumption is high (approximately 150 kilogram per tonne ("kg/t") of mineralised fines) due to the presence of calcite in the mineralised material. Alkaline leach generated excellent uranium extraction results of 96% from Guanaco and 99% from Lago Seco. Vanadium extraction from both Guanaco and Lago Seco was 71%. Optimal leach time is two to six hours, and uranium extraction peaks at a temperature of 80°C.

The Laguna Salada gravels contain gypsum which consumes the alkaline leach reagents, sodium carbonate (washing soda) and sodium bicarbonate (baking soda). Although the Lago Seco gravels have a higher gypsum content (12.7%) than those from Guanaco (3.2%), the gypsum at Lago Seco is more crystalline and is removed more efficiently by screening and hydrocycloning, resulting in 92% of the gravel's gypsum being rejected by beneficiation. The Guanaco gypsum is finer-grained, which makes screening and use of a hydrocyclone less efficient. Beneficiation test work resulted in 75% of the Guanaco gypsum being rejected from the fine (<75 microns ("µm")) fraction. Residual gypsum is removed by leaching the fines in saline water, removing calcium from the water using either membrane systems or the ettringite process, and recirculating the water to leach more gypsum. This is expected to reduce alkaline reagent consumption significantly.

Overall recovery through beneficiation, alkaline leach, precipitation and refining is 78.7% for uranium and 14.7% for vanadium in the Guanaco gravels and 70.5% for uranium and 20.4% for vanadium in the Lago Seco gravels.

1.7 Mineral Resource Estimates

The PEA is based on a NI 43-101 resource estimate prepared by Coffey Mining and reported in the May 20, 2011 technical report ("Coffey Mining, 2011"). A summary of the resource estimates is presented in Table 1-1. The recommended cut-off grades for the two mineralised areas, taking into account their distinct beneficiation characteristics were 25ppm U_3O_8 for Guanaco and 100ppm U_3O_8 for Lago Seco.

Table 1-1: Summary of Resource Estimate on the Laguna Salada Deposit

Summary of Resource for the Laguna Salada Project using recommended cut-off grades for the Guanaco and Lago Seco areas						
Category of Resource	Lower cut-off (ppm U_3O_8)	Tonnes (millions)	Average Grade		Contained Metal	
			U_3O_8 (ppm)	V_2O_5 (ppm)	U_3O_8 (Mlb)	V_2O_5 (Mlb)
Indicated Resources						
Guanaco	25	44.6	55	530	5.5	52.0
Lago Seco	100	2.7	145	840	0.9	5.0
Total Indicated		47.3	60	550	6.3	57.1
Inferred Resources						
Guanaco	25	19.4	80	555	3.4	23.7
Lago Seco	100	1.3	130	1,065	0.4	3.1
Total Inferred		20.8	85	590	3.8	26.9

No mineral reserve estimate has been undertaken for the Laguna Salada Project at the date of this PEA.

1.8 Mining Methods

The PEA is based on a mining plan that contemplates the extraction of:

- 34.6 million tonnes ("Mt") of mineralised gravel (9,475 tonnes per day ("tpd")) and 6.7Mt of soil and barren gravel from the Guanaco area over a 10 year mine-life. The strip ratio at Guanaco is 0.19. The mining rate is 2.5Mt in year 1, 3.3Mt from years 2 to 8, and 4.4Mt in years 9 and 10;
- 9.2Mt of mineralised gravel (3,159tpd) and 2.7Mt of waste over eight years from the Lago Seco area. The strip ratio at Lago Seco is 0.29. Production rates of mineralised material are 0.9Mt in year 1, 1.2Mt in years 2 to 8;
- These mining rates equate to total production of 43.8Mt (12,000tpd) over the LOM: 3.4Mt in year 1, 4.5Mt in years 2 to 8, and 4.4Mt in years 9 and 10. 9.4Mt of barren waste is mined over the 10 year mine life for an overall strip ratio of 0.20.

The mining plan excludes areas in which mineralised gravels have a gypsum content greater than 2.5% at Guanaco and 11% at Lago Seco. These high-gypsum areas are excluded because the cost of extraction of the sulphate, which would otherwise consume reagents in the alkaline leach of uranium and vanadium, renders these gravels sub-economic.

Approximately 80% of the mineralised gravel included in the mining plan lies in mesa-like topography in which the free-digging material is amenable to continuous surface mining. The remaining 20% of the resource to be mined is located at the edge of the mesas where the uneven topography makes continuous mining less effective and therefore conventional mining with bulldozers and FELs is planned for these areas.

Mining would be undertaken in strips that would be excavated as long, narrow trenches that have a step-like cross section as follows:

- At the leading edge of the strip, the shrubs would be removed for transplanting in the restored area on the trailing edge of the strip;
- The soil, which is typically 25cm thick, would be removed with graders, loaded onto trucks with FELs and transported the short distance to the trailing edge of the strip where it would be spread over gravel backfill with bulldozers and graders, or piled for spreading over backfill gravels later;
- The removed soil would constitute the first step in the step-like cross section of the trench-like excavation. Barren overburden gravel would then be removed, creating the second step in the trench's profile. The unmineralised gravel would be cut either with a 400 tonne per hour ("tph") continuous miner in the areas of the deposit that have a mesa-like topography, or with bulldozers where the topography is irregular. The continuous miner would make a cut 2.2m wide and up to 30cm deep with each pass, and would make as many passes as necessary to remove the barren overburden gravel. Once the excavation has reached its roughly constant operating width, barren gravel would be lifted on the miner's conveyor belt and poured directly into the deepest part of the trench from which the mineralised gravel had been removed as described below, or it would be loaded into truck-trailers for transport to the trailing edge where it would be dumped onto barren footwall gravel in the deepest part of the trench;
- Removal of the overburden exposes the mineralised gravel that is cut by a continuous miner or bulldozer to create the third step in the trench's profile. Mineralised gravel would be lifted by the continuous miner's conveyor belt or by FEL into 50t truck-trailers and transported a short distance to one of two semi-mobile beneficiation units for processing;
- The pebbles and sand that is coarser than 75µm, and rejected during scrubbing and screening in the beneficiation train (approximately 92% of the original gravel mass from Guanaco and 89% from Lago Seco), would be trucked to the trailing edge of the trench to be levelled by bulldozer and then covered with soil and smoothed with a grader to reflect the land's original topography; and
- The last stage of the mining operation would be restoration with the shrubs removed from the leading edge of the strip and planted in the replaced soil at the trailing edge of the strip. The soil would be scoured perpendicular to the prevailing wind direction and seeded with indigenous flora. The restored area would be fenced for protection from overgrazing until the flora is sufficiently established to withstand utilisation by animals. This reclamation would be continuous throughout the mine life and would ensure that the mining strip or trench is kept to minimum dimensions and that no open excavation would be left on completion of mining.

1.9 Beneficiation

Beneficiation trains, that consist of 360tph scrub and screen units, are designed to be semi-mobile so that they can be moved periodically to be close to the mining areas to minimise transport distances for the mineralised material. These units would be located on compacted gravel with an adjacent ramp and platform built from compacted gravel that would provide access for haul trucks to dump mineralised gravel directly into a 30 cubic meter ("m3") hopper.

The Guanaco gravel would feed from the hopper into twin 180tph capacity trommels that would where they would be scrubbed with water at 50%-75% solids with a 15 minute residence time. Scrubbed gravel from the trommels would be fed to a Derrick Stacker Sizer, or equivalent, for screening to 75µm. This <75µm fraction constitutes approximately 7.7% of the mass of Guanaco mineralised gravel and contains 85% of the gravel's uranium, 29% of its vanadium and 25% of its gypsum.

The Lago Seco gravel would pass from the intake hopper over a dry screen and the oversized gravel would be wet scrubbed in one 180tph trommel for one minute at 50%-75% solids and the <15mm fraction would be wet scrubbed in the second 180tph trommel for five minutes at the same 50%-75% solids density. The material from the two trommels would be combined and screened with the <75µm fraction flowing to a hydrocyclone array. The overflow fraction from the hydrocyclone would constitute 11.1% of the gravel's original mass with 74% of its uranium, 41% of its vanadium and 8% of its gypsum.

The fines from both beneficiation trains would be discharged into a conditioning tank, re-pulped to 35% solids and the slurry pumped 5km-8km to a central Hydromet Plant for further processing.

Residual gypsum in the combined fines would be leached with saline groundwater from the property and the sulphate would be separated from that solution in a membrane system so that the saline water can be re-circulated.

1.10 Tailings Management Facility

The 3.2Mt of tailings that would be generated in the Hydromet Plant over the LOM, would be accommodated in a facility with a 3.7Mt capacity. The tailings management facility ("TMF") would be located at an elevation approximately 18m lower than, and approximately 2.5km to the northeast of, the Hydromet Plant. The site for the TMF is on relatively flat, barren gravel that forms a stable base above impermeable mudstone. The facility would consist of four, 10m high cells constructed from compacted gravel. The cells would be constructed and filled sequentially so that each can be remediated on being filled to design capacity. Each cell would be lined with clay and a 1m thick clay cap would be placed over each cell at the time that it reaches design capacity. The clay cap is designed as a radiation control measure. The clay cap would be covered with at least 2m of barren gravel that would be covered with soil and revegetated to complete the restoration of each tailings cell. Radiation monitoring and bore holes designed to detect seepage would be undertaken from the time that the TMF is constructed and would continue after mine closure.

1.11 Recovery Methods

Extraction of uranium and vanadium would be by alkaline leach at a temperature of 80°C, followed by the precipitation of a uranium-vanadium intermediate product. The PEA contemplates separation of the uranium and vanadium and calcining of the uranium to produce a high-grade uranium oxide as well as recovery of the vanadium as ammonium metavanadate which would be calcined to vanadium pentoxide.

1.12 Production

The PEA is based on the extraction of 43.8Mt of mineralised material, commencing with the higher-grade areas in order to maximise cash flow during the payback period. Hence, the uranium production profile is 1.3Mlb in year 1, 1.1Mlb in year 2 and thereafter decreasing gradually to 0.32Mlb in year 10. The average annual uranium production would be 0.64Mlb over a 10-year mine life. Average annual vanadium production would be 0.96Mlb over the LOM. Vanadium production would peak at 1.3Mlb in year 2, decreasing gradually to 0.72Mlb in year 10.

1.13 Project Infrastructure

The principal access to Laguna Salada is by travelling west on paved Provincial Route 25 that links Trelew with the town of Las Plumas. From Las Plumas, one travels 53km south on the all-weather, unpaved Provincial Route 48, before turning west and travelling on farm roads for approximately 1km to the base camp. Las Plumas is the closest source of fuel and is likely to become the main centre for provision of services to the Project. Communications from site would be via satellite.

The PEA contemplates the Project being linked to the national electric power grid by a 70km wood post powerline from the town of Garayaldi. Steam for the leach circuit would be provided by light petroleum gas ("LPG") boilers with gas being trucked 230km to site from a depot located at Comodoro Rivadavia.

Water for the beneficiation trains and gypsum leach in the Hydromet Plant would be sourced and pumped from the Laguna Salada depression. A fresh water resource is indicated by geophysical surveys in fracture systems in basement strata.

1.14 Preliminary Economic Assessment

Based on a \$60/lb uranium (U_3O_8) and \$5.50/lb vanadium (V_2O_5) price, the PEA provides an independent valuation of a base case on the initial mineral resource to yield a NPV of \$55 million at a 7.5% discount with a pre-tax IRR of 24% and estimated post-tax IRR of 18%. At the consensus uranium price forecast of \$70/lb, the Project's NPV (at a 7.5% discount rate) would increase to \$98 million, the IRR would increase to 35% and the payback period would shorten from 2.5 years to 1.9 years (Table 1-2). As both the IRR and NPV are sensitive to deposit size, the next step is to increase the resource, which would significantly improve both of these economic measures.

The PEA estimates a LOM cash cost of \$21.62/lb of uranium (U_3O_8), net of a by-product credit from vanadium (V_2O_5), and including a 3% NSR to the Province. Vanadium contributes an average of 13.7% of revenues.

Since the Laguna Salada mineralisation lies in a tabular sheet just below surface, there is very little practical restriction on where mining starts. Hence, mining is planned to start in the richest part of the deposit where revenue would be maximised so that capital can be paid back as quickly as possible in 2.5 years. By taking this approach, the initial uranium cash cost averages \$16.14/lb during the payback period or \$11.66 in year 1 and \$14.05 in year 2, gradually rising as uranium grades decrease over the 10-year mine life for an average cash cost of \$21.62/lb U_3O_8.

The PEA is preliminary in nature as it includes Inferred mineral resources that are considered too speculative geologically for economic consideration that would enable them to be classified as mineral reserves. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that the results of this PEA will be realised.

Table 1-2: Discounted Cash Flow Estimates on the Laguna Salada NPV and IRR to Uranium Price

Uranium Price		$45	$50	$60 (Base Case)	$70
Discount Rate (in $ millions)	0%	$16	$47	$109	$170
	5%	($3)	$22	$70	$118
	7.5%	($10)	$12	$55	$98
	10%	($16)	$4	$43	$82
	15%	($25)	($10)	$23	$55
IRR		**4%**	**11%**	**24%**	**35%**
Pay-back period (years)		4.7	3.7	2.5	1.9

Capital Costs

The PEA estimates Capex of $135.7 million, the main components being $16.0 million for mining and beneficiation equipment, $79.1 million for the Hydromet Plant, indirect costs of $10.9 million and contingency of $21.9 million (Table 1-3).

Table 1-3: Summary of Capital Costs

Items	(in $millions)
Mining and beneficiation	$16.0
Sustaining capital	$3.3
Hydromet Plant and infrastructure	$79.1
Mine closure*	$2.0
Indirect costs (EPCM, insurance, temporary works, first fills & spares etc.)	$10.9
Working capital	$2.5
Contingency (20%)	$21.9
TOTAL	**$135.7**

**Mine site reclamation and closure would be ongoing during the LOM and the majority of this cost is captured in operating costs.*

Operating Costs

Revenue of approximately $9.92/t of mineralised gravel against Opex of $4.34/t would generate operating cash flow of $5.58/t (Table 1-4).

Table 1-4: Summary of Operating Costs

Items	Per tonne of mineralised gravel
Revenue	$9.92
Operating Costs:	
Revenue-based royalties	$0.30
Mining	$0.99
Hydromet plant & G&A	$3.06
Total Operating Costs:	**$4.34**
Operating Cash Flow	**$5.58**

**Numbers may not add due to rounding*

1.15 Conclusions

The PEA study has shown that, based on the information available at this time, the initial resource is economically viable and the Project should be progressed to pre-feasibility ("PFS"), and subject to the outcome, then a decision taken on a feasibility study ("FS").

The economics of the Project are sensitive to uranium pricing and the Project valuation has been based on medium-term forecasts that are substantially higher than present spot prices for uranium.

Project returns would be substantially improved if the mining and processing facility production rate could be significantly increased. Exploration results suggest that further work in gravels adjacent to the current resource area at Laguna Salada provide good potential to significantly increase the mineral resource.

The technical basis for the beneficiation trains and Hydromet Plant has been based on preliminary information, and should be confirmed by further laboratory and pilot scale test work in preparation for PFS and FS to be undertaken.

1.16 Recommendations

Based on the technical work completed to date, Tenova recommends the following:

On the basis of the positive results of this PEA, it is recommended that the Laguna Salada Project advance to the stage where a PFS and FS level study can be completed.

The total budget for the work recommended for preparation of the Laguna Salada Project for pre-feasibility is $3.7 million (Table 1-5) plus $750,000 for a PFS and $1.5 million for a FS. Estimates should also be made for owner's costs during the development phase and for a range of approvals and finance raising costs that will be required. These costs are best estimated during the PFS phase of the Project when more precise information on the Project and associated risks are likely to be available.

Table 1-5: Budget Summary for Recommended Further Work at Laguna Salada

Item	Budget
Resource estimation	$1,817,000
Metallurgy	765,000
Pilot plant test work	500,000
Water resource studies	315,000
Social and environmental	300,000
Sub-total of recommended work	**$3,697,000**
PFS	$750,000
FS	1,500,000
TOTAL BUDGET	**$5,947,000**

Recommendations regarding resource upgrades and expansion at Laguna Salada are as follows:

- Since the PFS and FS must be based on Measured and Indicated resources, the infill pitting and limited vibrosonic drilling required to convert current Inferred resources to Indicated, is approximately $587,000. This would involve the excavation of approximately 260 exploration pits and approximately 2,500m in 10m to 15m deep bore holes with a vibrosonic rig;
- The budget for the conversion of mineralised areas that were uncategorised, and therefore excluded from the resource estimate undertaken by Coffey Mining (2011), to Indicated resources, is approximately $475,000. This work would involve the excavation of approximately 100 pits and 4,000m of vibrosonic drilling in 10m to 15m deep bore boles; and
- Pitting required to establish an initial Inferred resource in the La Susana and La Rosada areas, is estimated at $360,000 and $395,000 respectively. Approximately 300 pits are planned for resource estimation purposes at La Susana and approximately 400 at La Rosada.

None of these four resource expansion programs are dependent on one another, although they are likely to be carried out sequentially. The aim of the $1,817,000 program outlined above is to double the resource at Laguna Salada to 20-25Mlb (the conceptual target is 150-225Mt at 50ppm to 60ppm U_3O_8).

Recommended metallurgical test work is budgeted at $765,000 and includes:

- Routine beneficiation and leach tests on the four areas of resource expansion potential outlined above ($125,000);
- Filtration test work on the beneficiated fine material from the four programs ($220,000). Since filtration accounts for $10.9 million or 14% of direct capital cost of the Hydromet Plant, detailed study of filtration characteristics of gypsum-free fines could have a significant impact on capital costs;

- Tests on the ettringite process for the control of gypsum ($50,000). Specifically with respect to the ettringite process, further test work should focus on saline water compositions from the Laguna Salada Project that would form the basis for optimisation of the process and testing of the efficiency of ettringite precipitation from such saline water, as well as determining more precise reagent consumption data. These data would allow the sizing of the process equipment to be determined to PFS or FS standards;
- Test work on the efficiency of extraction of sulphate with membranes ($90,000), including the investigation of the effect of scaling, the lifetime of membranes and the ability to operate at sufficient pressure to cater for the high concentrations of salts;
- Test work on the concentration of uranium and vanadium and reagent recovery with membranes ($80,000);
- Further leach test work to better determine optimum leach conditions and reagent consumption for the recovery of uranium and vanadium, and including limited ammonium carbonate/bicarbonate and acid leach tests ($100,000);
- Test work on the extraction of uranium and vanadium from the pregnant liquor solution ("PLS") ($50,000), which would include testing the efficiency of ion exchange ("IX") as a means of extracting uranium and subsequently vanadium from the PLS as an alternative to the sodium diuranate ("SDU") circuit contemplated in the current Hydromet Plant design; and
- Characterisation tests on beneficiation plant waste rock, gypsum removal wastes, carbonate leach tailings and other waste streams ($50,000).

Recommended pilot plant-related test work is budgeted at $500,000 and includes:

- Trial mining with a continuous miner as well as a FEL to confirm effectiveness, efficiency and operating cost ($75,000);
- On-site scrubbing is a critical component of further test work to optimise scrub time, percentage solids, scrub type (the extent to which lifters versus smooth roll affect uranium and vanadium recovery while maximising gypsum rejection), velocity of rotation and the effect on gypsum leaching, among other factors ($150,000);
- After scrubbing, the gravel would be subjected to screen tests designed to optimise the efficiency of separation of the maximum proportion of uranium and vanadium into a small mass of fines with a minimum of gypsum content; and
- The scrubbing and screening test work is required on gravel from multiple trenches throughout the resource area to provide data on the extent of inherent variation of the gravel for incorporation in mine plans for PFS and FS. This beneficiation test work would generate a large mass of fines for gypsum dissolution tests, ettringite/membrane tests, alkaline leach work, further testing of membrane systems within the uranium-vanadium circuit, and optimisation of metal recovery methods ($275,000).

Water resource studies are recommended at a budget of $315,000 that includes drilling and associated pump tests for fresh water resources and pitting to better define the near-surface saline water resource.

Work in the local farms and the community at Las Plumas should continue to build a platform from which the more critical issues could continue to be identified and start to be addressed. The focus should be on the development of small business strategies and educational support that would dove-tail with provincial government initiatives. An important initiative is to test water treatment systems for installation on the farms to improve the quality of the naturally contaminated shallow groundwater found in the gravels in the region. Social and environmental test work is budgeted at $240,000.

Developments in alternative energy systems such as solar and wind energy should continue to be monitored as a potential source of electricity to augment the power draw from the national grid. It is recommended that the existing weather station be upgraded with a small wind turbine that allows measurement of its efficiency under gusting wind conditions as well as measuring stress on the rotor blades. Measurements of efficiency of energy generation from solar panels is also recommended, involving various means of protecting the panels from abrasion by dust in the prevailing high winds. $60,000 is budgeted for this work.

2 INTRODUCTION

2.1 Scope of Work

This PEA for the Laguna Salada Project, located in Chubut Province, Argentina, was conducted by Tenova for U3O8 Corp.

This PEA is presented at a relatively early stage of the Project, prior to the full extent of the deposit being known. The rationale for this approach is to:

- Confirm the economic viability of Laguna Salada in order to justify further exploration expenditure on the Project;
- Provide estimates of realistic cut-off grades for future resource estimation;
- Provide some guidance on economies of scale that could be used to estimate the optimal target size for a resource that maximises the economics of this specific type of surficial uranium deposit; and
- Details of the Capex and Opex estimates reveal specific areas where greater efficiencies may be achieved through the application of alternative methods and technologies that should be tested for incorporation in future PFS and FS.

This report complies with disclosure and reporting requirements set forth in NI 43-101, Companion Policy 43-101CP, and Form 43-101F1.

2.2 Principal Sources of Information

Information related to the legal status of the properties that constitute the Laguna Salada Deposit was provided by independent legal counsel in Argentina. Geological information, the history of the project and the nature of the deposit relative to known deposits elsewhere, were provided by U3O8 Corp.

This PEA is based on the initial resource that was estimated by Coffey Mining (2011). Mr Neil Inwood, whom at that time worked for Coffey Mining, and principal author of the report, visited the Laguna Salada Project from 13th to 16th May 2010 during the preparation of the mineral resource estimate.

The PEA incorporates results of metallurgical test work reported in the NI 43-101 resource estimate (Coffey Mining, 2011) as well as subsequent test work undertaken under the general guidance of Mr John Goode, as further described below and in Section 13. Metallurgical test work has been undertaken by two independent, internationally renowned laboratories located in Canada and in laboratories in Argentina and Brazil. Reports on the test work results include: SGS, 2012; SGS, 2013; Wang, 2013, Zhang, 2013 and Zhang, 2014.

The mine design and financial model were prepared by Mr Pedro Véliz who has extensive specialist knowledge of various mining methods, including continuous surface mining which is pertinent to the Laguna Salada Project. Mr Véliz visited the Laguna Salada Project from 12th to 14th August, 2013.

Information on socioeconomic and environmental components of the report are based on reports of external consultants including Ms Viviana Alric and Ms Joice Owen of C&A Patagonia ("C&A") who have specialist experience in environmental assessment and EIA studies in Patagonia.

2.3 Qualifications and Experience

The PEA was completed under the supervision of Mr Louis de Klerk, Pr. Eng., BSc(Eng) (Chemical), P Grad Dip in Advanced Process Design, whom held the position of Manager: Process Engineering at Tenova, Australia until the end July 2014. Mr de Klerk is now an independent consultant and is a Professional Engineer registered with the Engineering Council of South Africa, a Chartered Chemical Engineer registered with the Engineering Council of the United Kingdom, and a fellow of the Institution of Chemical Engineers (IchemE) (United Kingdom). Mr de Klerk has over 35 years of experience in project development and process engineering.

Tenova is part of the Techint Group, a leading global engineering firm that has been providing process design, development and construction services to the resource sector for over 90 years with extensive and specific process and engineering experience in the extraction of uranium and vanadium. Uranium projects on which Tenova has provided design criteria and has been involved in construction include AREVA's Imouraren mine, Cameco's Key Lake mine, Rio Tinto's Rossing mine, Kazatomprom's Kyzylkum and Akbastau facilities and Toro Energy's advanced Wiluna project.

Mr John Goode, an independent metallurgical consultant, oversaw the metallurgical test work carried out on the Laguna Salada Project. Mr Goode has 50 years of experience in metallurgy and related test work. He is a fellow of the Australasian Institute of Mining and Metallurgy (AusIMM) and is a fellow of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).

Mr Pedro Pino Véliz, Director of PEK Teknep Overseas Engenharia Ltda ("PEK"), is a Civil Mining Engineer (P.E.) (Brazil), Eng. Dr. (IT) SME and has more than 35 years of experience in mining operations and executive management. He heads up PEK's 315 person team headquartered in Rio de Janeiro. In operation since 1992, PEK has extensive experience serving its Brazilian and international clients with rock mechanics, rock characterization, underground stability and hydrological studies, feasibility studies and designing and planning of surface mining, open pit mines and underground mines. This has included detailed design of tunnels and stations, methods of excavation and specifications for support methods in the expansion of the Rio de Janeiro subway system for the 2014 Soccer World Cup and 2016 Olympic Games. Numerous projects for Rio Tinto included the Salobo Copper open pit mine, the Fortaleza de Minas open pit/underground nickel project, the Rossing Uranium expansion project and study of surface Voest Alpine Continuous Miners for the Morro do Ouro gold mine.

Mr Johann van der Westhuysen, Pr Eng., M.Eng., B.Eng. (Chemical), Managing Director of Synexus (Pty) Ltd. ("Synexus"), was responsible for membrane separation design and its integration in the overall process for the Laguna Salada Project. Mr Van der Westhuysen is a Professional Engineer registered with the Engineering Council of South Africa, a Chartered Chemical Engineer registered with the Engineering Council of the United Kingdom, and is a fellow of the Institution of Chemical Engineers (IchemE) (United Kingdom). Synexus is a process engineering company specialising in the application of membrane systems to improve hydrometallurgical (and related) processes.

Messrs de Klerk, Goode, Véliz and van der Westhuysen each has the appropriate relevant qualifications, experience and independence to be considered a Qualified Person ("QP") as defined under NI 43-101 of the Canadian Securities Administrator ("QP"). The QPs for this report are listed in Table2-1 along with their area of responsibilities.

Table 2-1: Qualified Persons and Area of Responsibility

QP Name	Area of Responsibility
Louis de Klerk, Pr. Eng	Recovery Methods, Capital and Operating Costs Report Sections 17 and 21 Project Management Report Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,15, 16, 17, 18,19, 20, 21, 22, 23, 24, 25, 26, 27
John Goode, P. Eng	Mineral Processing and Metallurgy Parts of Report Sections: 1, 13 (excluding 13.3.3), 25 and 26
Johann van der Westhuysen, Pr. Eng (Chem), M.Eng	Membrane component of Metallurgical Test Work and Processing: sections 13.3.3, 17, 25 and 26
Pedro Véliz, P.Eng.	Geology, Exploration and Mining Methods Report Sections: 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16, 18, 21, 22, 25, 26

2.4 Limitations and Caution

This PEA is preliminary in nature. It is based on approximately 63% Indicated and 37% Inferred resources. Inferred resources are considered too speculative geologically to have the economic considerations applied to them that would allow them to be categorised as mineral reserves. There is no certainty that the results and conclusions of the PEA will be realised.

Note that mineral resources that are not mineral reserves do not have demonstrated economic viability.

It also needs to be noted that the metallurgical test work is preliminary in nature and that significantly more test work is needed.

It is important to note that a PEA is defined as a conceptual study of the potential viability of mineral resources. Capex and Opex reported herein are estimated to an accuracy of ±35%. The Capex and Opex accuracy is dependent on the understanding of the metallurgy and physical properties, and this is presently based on preliminary test work and data from similar processes used in other similar operating plants. The confidence level of the economic viability of a deposit in a PEA is less than that of a PFS which has in turn, a lower confidence level than that of a FS. Capex and Opex estimates for PFS, for example, would typically be to an accuracy of ±20%, while in a FS, they would be estimated to an accuracy of ±10 to ±15%

2.5 Conventions and Standards

All units in this report are according to the International System of Units. All currency values are in US Dollars (“$”). Acronyms and abbreviations used in this report are commonly used in the minerals industry and are listed with brief explanations in Appendix A.

2.6 Independence

Tenova is independent of U3O8 Corp. Tenova is not an insider, associate or affiliate of U3O8 Corp.

3 RELIANCE ON OTHER EXPERTS

Tenova has relied on information provided by various sources in the compilation of this PEA as follows:

For Section 4 of this PEA:

Tenova has relied on information provided by the Company and Saravia Frias & Mazzinghi ("SFM"), independent legal counsel in Argentina. SFM was established in Argentina in 2007 and is one of the leading minerals resource legal firms in Argentina. It is led by Dr Carlos Saravia Frias who has been practicing law since 1992 and was instrumental in the drafting of Argentina's current mining legislation in 2001.

Tenova has relied on the opinion of SFM as to the standing and legal status of the concessions that constitute the Laguna Salada Project. Specifically:

- Tenova has not performed an independent verification of land title and tenure as summarised in Section 4 of this PEA;
- Tenova did not verify the legality of an underlying agreement that is currently being negotiated with Petrominera, the provincial resource company in Chubut, Argentina;
- Tenova relied on U3O8 Corp. to provide correct information regarding the title and legal status on the exploration concessions that constitute the Laguna Salada Project as well as on details regarding environmental legislation and requirements, which were provided by SFM; and
- Tenova was informed by U3O8 Corp. that there are no known litigations potentially affecting the Laguna Salada Project.

For Sections 5 to 10 of this PEA, Tenova has relied on information provided by Mr Pedro Véliz, principal of independent consulting firm PEK.

For Sections 11, 12, 14 and 15, Tenova has relied on information provided by Coffey Mining in the NI 43-101 report entitled "Laguna Salada Project, Chubut Province, Argentina: NI 43-101 Technical Report Laguna Salada Initial Resource Estimate" dated May 20, 2011.

For Section 13, Tenova has relied on information provided by Mr John Goode, an independent, external consultant on metallurgy, and on information provided by Mr Johann van der Westhuysen for section 13.3.3.

For Sections 16 and 18 of this PEA, Tenova has relied on information from Mr Pedro Véliz of PEK.

For Section 17 of this PEA, Tenova has relied on information relating to membrane processing beneficiation by Mr Johann van der Westhuysen of Synexus.

For Section 19, Tenova has relied on information provided by the U3O8 Corp.

For Section 20 of this PEA, Tenova has relied on information provided by Ms Viviana Alric and Ms Joice Owen whose consulting company, C&A, has undertaken environmental and social studies on the Laguna Salada Project, and have an intimate knowledge of permitting processes in Chubut Province. Ms Alric and Ms Owen founded C&A in 1996 as an independent consulting company to provide expertise in environmental baseline work for environmental impact assessment reports, designing and implementing environmental remediation programs and subsequent monitoring. C&A calls on the expertise of other external consultants with appropriate experience and expertise in the areas of sociology, archaeology, hydrology and specific aspects of the environment as required. In terms of the Laguna Salada Project, the work reported in Section 20 was undertaken under the supervision and guidance of Ms Alric and Ms Owen.

For Section 21 of this PEA, Tenova has relied on Capex and Opex estimates relating to mining and beneficiation by PEK, as well as reagent and utility cost information provided by U3O8 Corp.

For Section 21 of this PEA, Tenova has relied on Capex and Opex estimates relating to membrane processing beneficiation by Mr Johann van der Westhuysen.

For Sections 22 of this PEA, Tenova has relied on information provided by PEK.

For Sections 23 and 24, Tenova has relied on information supplied by U3O8 Corp.

For Sections 25 and 26, Tenova has incorporated interpretations, conclusions and recommendations based on information provided by SFM, PEK, Coffey Mining (through reference to the prior NI 43-101 report on the Laguna Salada Property), Mr John Goode, Mr Johann van der Westhuysen, Ms Alric, Ms Owen and U3O8 Corp.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Description, Location and Area

The Laguna Salada Project is located in the central region of the Chubut Province, approximately 270km southwest of the provincial capital, Rawson. The Project is located at 3,401,500m East and 5,088,500m North in the Gauss Kruger coordinate system.

The exploration project comprises 23 concessions totalling 174,315Ha.

4.2 Investment Climate in Argentina

4.2.1 General Statistics

Argentina has a population of ~41 million, GDP of ~$471 billion, or $17.50 per capita in 2013 (World Bank). Argentina's growth has been markedly cyclical with periods of strong growth followed by sharp declines in GDP growth rate (Figure 4-1). Argentina's GDP growth rate is currently 8.9% with a 5-year average GDP of 6.8%. Unemployment stands at 7.2% and foreign direct investment is $7.2 billion (The Heritage Foundation, 2014).

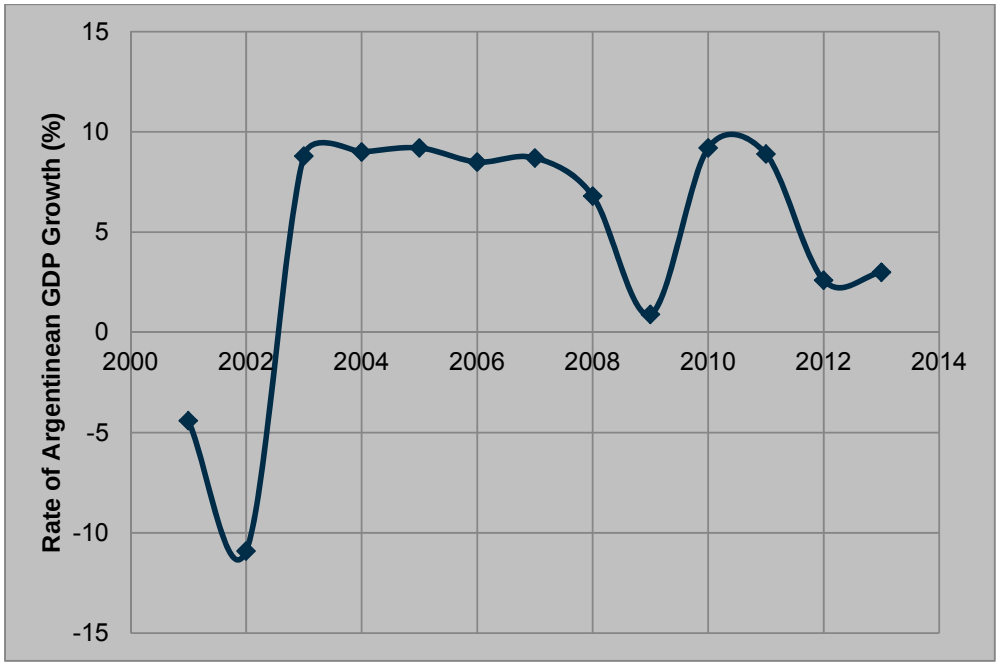


Figure 4-1: Argentinean GDP growth

Source: Global Finance, The Odora, Yahoo Finance

4.2.2 Nuclear Industry in Argentina

Despite the controversial nature of some the economic decisions that Argentina has taken in the last decade, it has been unwavering in its commitment to nuclear as a key component of its energy mix. Argentina's third reactor reached criticality in early 2014 and is gradually being brought to full power output. When the new power station reaches output capacity, 9% of the country's electricity will be generated by nuclear. Argentina has a stated strategy to double nuclear energy supply by 2025, and to that extent, signed a contract for the construction of a fourth reactor with the Chinese government in mid 2014. In addition, the Development Bank of Latin America has provided a $240 million loan to Argentina for the refurbishment of the Embalse reactor to extend its life for 25 years and increase its output by 7%. Argentina and Brazil are currently co-operating in the construction of two new research reactors, one to be built in each country.

Argentina has an enviable nuclear industry that includes five locally built research reactors and a nuclear industry that includes medical isotope facilities, a heavy water production facility that has export facilities for CANDU reactors elsewhere in the world, and an enrichment facility. Argentina has built an additional five research reactors outside of Argentina, including Australia's only reactor. The conspicuous gap in this nuclear repertoire is local uranium production.

In December 2013, the Argentine federal public investment minister announced a $65 million financing to build the first CAREM-25 small modular reactor. This 25 megawatt ("MW") reactor design is reported to be under consideration by Saudi Arabia to provide energy for desalination plants.

4.2.3 Foreign Investment

With Argentina having compensated Repsol for the nationalisation in 2012 of its stake in YPF, and reached a settlement with the Paris Club of bond-holders on which Argentina defaulted in 2001, Argentina appears to be moving to attracting significant foreign investment. However, failure to resolve a dispute with some hedge funds related to bonds issued in 2001 resulted in Argentina being declared in "selective default" at the end of July, 2014.

Since the second half of 2013, there has been a spate of foreign investment in the hydrocarbon industry in Argentina as a result of an initiative by the government to attract foreign investment in resource development. Chevron has JV'd with YPF to invest over $3 billion to develop the Vaca Muerta, one of the world's biggest shale oil and gas fields. In October 2013, the French company Total SA, in partnership with Germany's largest oil and gas producer, Wintershall, and BP subsidiary, Pan American Energy, announced plans for a $1.2 billion gas project in the Vega Pleyade field – the largest offshore natural gas investment in Argentina to date. This venture is expected to save Argentina $1.6 billion in fuel imports each year. Development of the Vaca Muerta unconventional hydrocarbon resource is projected to make Argentina energy independent, and to result in between $200 billion and $300 billion of foreign direct investment.

In terms of the mining industry, Yamana Gold is investing $450 million in construction of its Cerro Moro mine which is slated for production in 2015. London-listed gold producer, Minera IRL, secured $80 million in financing from a consortium of Argentine industrial companies to develop its Don Nicolas gold mine with production planned for late 2014. Goldcorp is advancing its Cerro Negro gold mine with planned production in early 2015. In addition, Orocobre Ltd. is constructing its Olaroz lithium mine, which is scheduled to reach full production in late 2014.

Inflation is an issue that has dogged Argentina and was estimated at 36%-38% in 2013.

4.3 Legal Aspects and Tenure of the Mineral Titles

4.3.1 Corporate Structure Related to the Laguna Salada Project

Mineral properties that constitute the Laguna Salada Project are owned by U3O8 Corp. through its wholly-owned subsidiaries Gaia Energy and Maple (Figure 4-2).

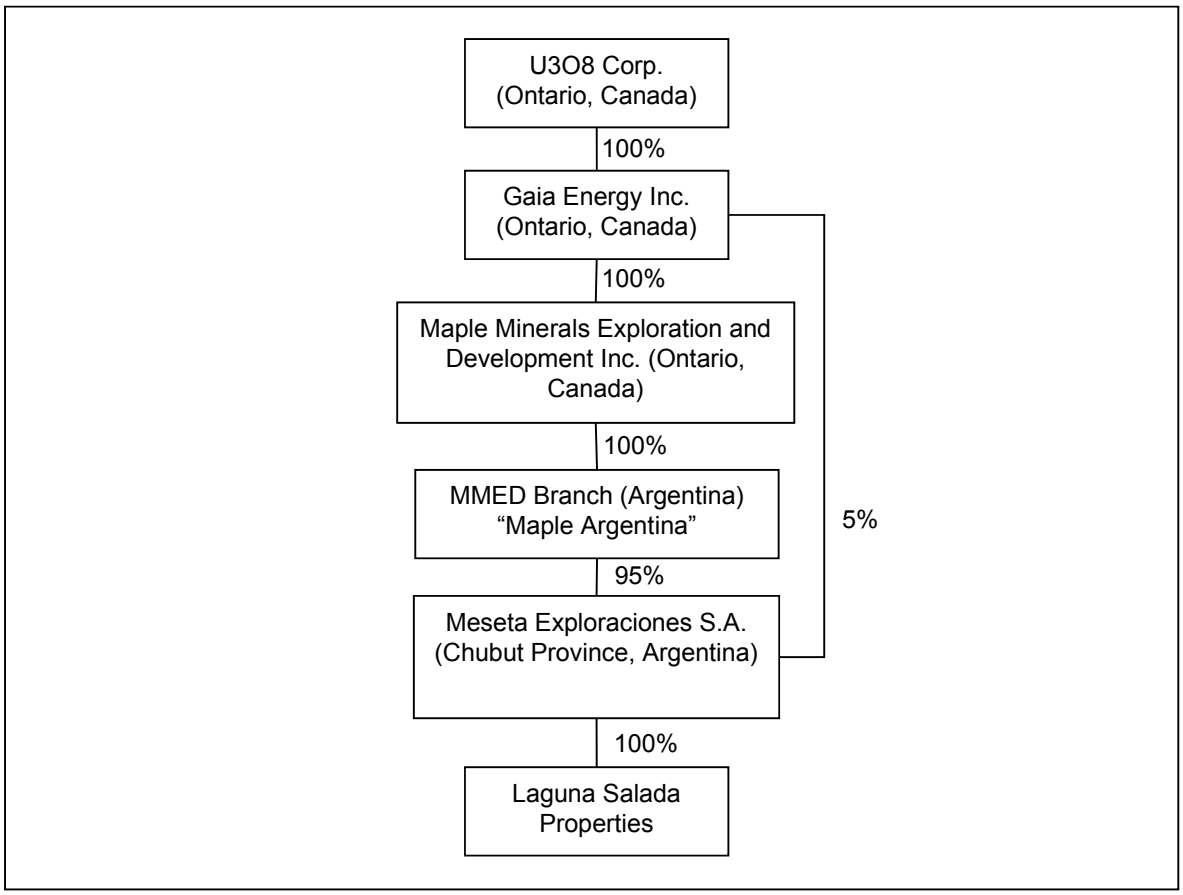


Figure 4-2: Corporate structure in which mineral concessions of the Laguna Salada Project are held

4.3.2 History of Ownership of the Laguna Salada Concessions

On April 7, 2010, U3O8 Corp. purchased Gaia Energy, a subsidiary of Mega, which included the purchase of Maple, a wholly-owned subsidiary of Gaia Energy. Maple has a branch registered in Argentina ("Maple Argentina"), which has a 95% ownership interest in a subsidiary, Meseta Exploraciones S.A. ("Mexsa"), that is domiciled and registered in Chubut Province, Argentina. The remaining 5% of Mexsa is held by Gaia Energy (Figure 4-2). Mexsa and Maple Argentina hold the Laguna Salada concessions directly, or through a purchase option agreement with Mr Gonzalo Riobó, an Argentine private businessman.

At this time, U3O8 Corp. does not own surface rights in the Laguna Salada Project area. Access to the surface rights that cover the concessions would be negotiated with the landowners, with arbitration by the Provincial government, if required.

4.3.3 Mineral Concessions

There are two principal types of mineral concessions in Argentina: exploration concessions called "Cateos" and mining concessions termed *Manifestación de Descubrimiento* ("MD" – literally "notice of discovery").

4.3.3.1 Exploration Concessions (Cateos)

A Cateo provides the title holder with the exclusive right to explore for specified minerals within a defined area for a period of up to three years. The maximum size allowed for a Cateo is 10,000Ha, made up of units that are up to a maximum size of 500Ha. Property boundaries are defined in the exploration concession application or title and are not required to be physically marked in the field.

The period for which a Cateo is valid is variable, depending on the size of the area requested, with 1,100 days being the maximum term for the maximum size (10,000 Ha). No renewals or extensions of the term originally granted are allowed. On or before the end of the granted term, the concession holder may apply for the conversion of the Cateo into a MD.

To formally request a Cateo, the applicant must: (i) pay a license application fee of approximately AR$400 per unit of 500Ha; (ii) submit a minimum exploration plan and budget; and (iii) deliver an environmental impact assessment ("EIA") for the proposed work program.

4.3.3.2 MDs

Legislation allows for MDs to be established in two ways:

- By discovering an area of potentially significant mineralisation as a consequence of an exploration program on an exploration concession (Cateo); or
- When significant mineralisation is discovered by chance; that is, without an exploration process. This means that a mining concession (MD) can be applied for directly, without applying for an exploration concession first.

In the first case described above, a MD, or a Mina as it is sometimes called, is the mining concession that evolves from a Cateo and has a maximum size of 3,500Ha. The conversion of a Cateo to a MD requires proof of discovery of mineralisation that in practice means the submission of a physical sample along with an associated assay certificate.

A MD granted by the Provincial Mining Directorate ("PMD") confers on the title holder the right to mine specific minerals for an indefinite term provided that the concession is kept in good standing with the authorities as discussed in Section 4.3.5 below.

In order to legally register a MD, the applicant must reach agreement with the surface rights holder in a negotiation that is mediated by the PMD, if necessary. Property boundaries are defined in the exploration concession application or title and are not required to be physically marked in the field until the third anniversary of the date on which the MD was granted.

4.3.4 Details of the Principal Properties Constituting the Laguna Salada Project

Details, such as name, file reference number, date of registration and size of the concessions that constitute the Laguna Salada Project, are provided in Table 4-1. The concessions that constitute the project total 174,315Ha. 15 of the concessions are Cateos and eight are MDs. A map of the location and shape of the concessions is shown in Figure 4-3 and the co-ordinates of the corner points of the concessions are listed in Appendix B.

Table 4-1: Details of the Number, Type and Area Covered by Concessions that Constitute the Laguna Salada Project

Concession Name	Reference Nº	Owner	Type	Date of Application	Status of Work Commitment & EIA	Size (Ha)
Hope 1	15.280/07	Riobó	Cateo	3-Sep-07	Approved	10,000
Hope 2	15.281/07	Riobó	Cateo	3-Sep-07	Approved	9,992
Hope 3	15.282/07	Riobó	Cateo	3-Sep-07	Approved	9,992
Hope 4	15.283/07	Riobó	Cateo	3-Sep-07	Approved	9,373
Hope 5	15.284/07	Riobó	Cateo	3-Sep-07	Approved	9,982
Lago Seco	15.222/07	Riobó	Cateo	28-May-07	Approved	3,442
Lago Seco 2	15.229/07	Riobó	Cateo	15-Jun-07	Approved	9,998
Rosadita	16.495/14	Maple	Cateo	6-Aug 14	Pending	9,888
Rosada 1	16.496/14	Maple	Cateo	6-Aug 14	Pending	10,000
Rosada 2	16.497/14	Maple	Cateo	6-Aug 14	Pending	10,000
Rosada 3	16.498/14	Maple	Cateo	6-Aug 14	Pending	10,000
Rosada 4	16.506/14	Maple	Cateo	5- Sept 14	Pending	9,907
Lago Seco Nuevo	16.499/14	Maple	Cateo	6-Aug 14	Pending	9,276
Gap 1	16.362/13	Mexsa	Cateo	9-May-13	Pending	9,979
Gap 2	16.363/13	Mexsa	Cateo	9-May-13	Pending	9,973
Guanaco	15.313/07	Mexsa	MD	5-0ct-07	Approved	7,000
Guanaco I	15.496/08	Mexsa	MD	10-Sep-08	Approved	4,000
Guanaco II	15.497/08	Mexsa	MD	10-Sep-08	Approved	4,000
Guanaco III	15.498/08	Mexsa	MD	10-Sep-08	Approved	4,000
Guanaco IV	15.657/09	Mexsa	MD	6-0ct-09	Approved	3,194
Guanaco V	15.873/10	Mexsa	MD	18-Nov-10	Approved	3,691
Guanaco VI	15.874/10	Mexsa	MD	18-Nov-10	Approved	3,950
Guanaco VII	15.875/10	Mexsa	MD	18-Nov-10	Approved	3,678
Subtotal Laguna Salada			**23**			**174,315**

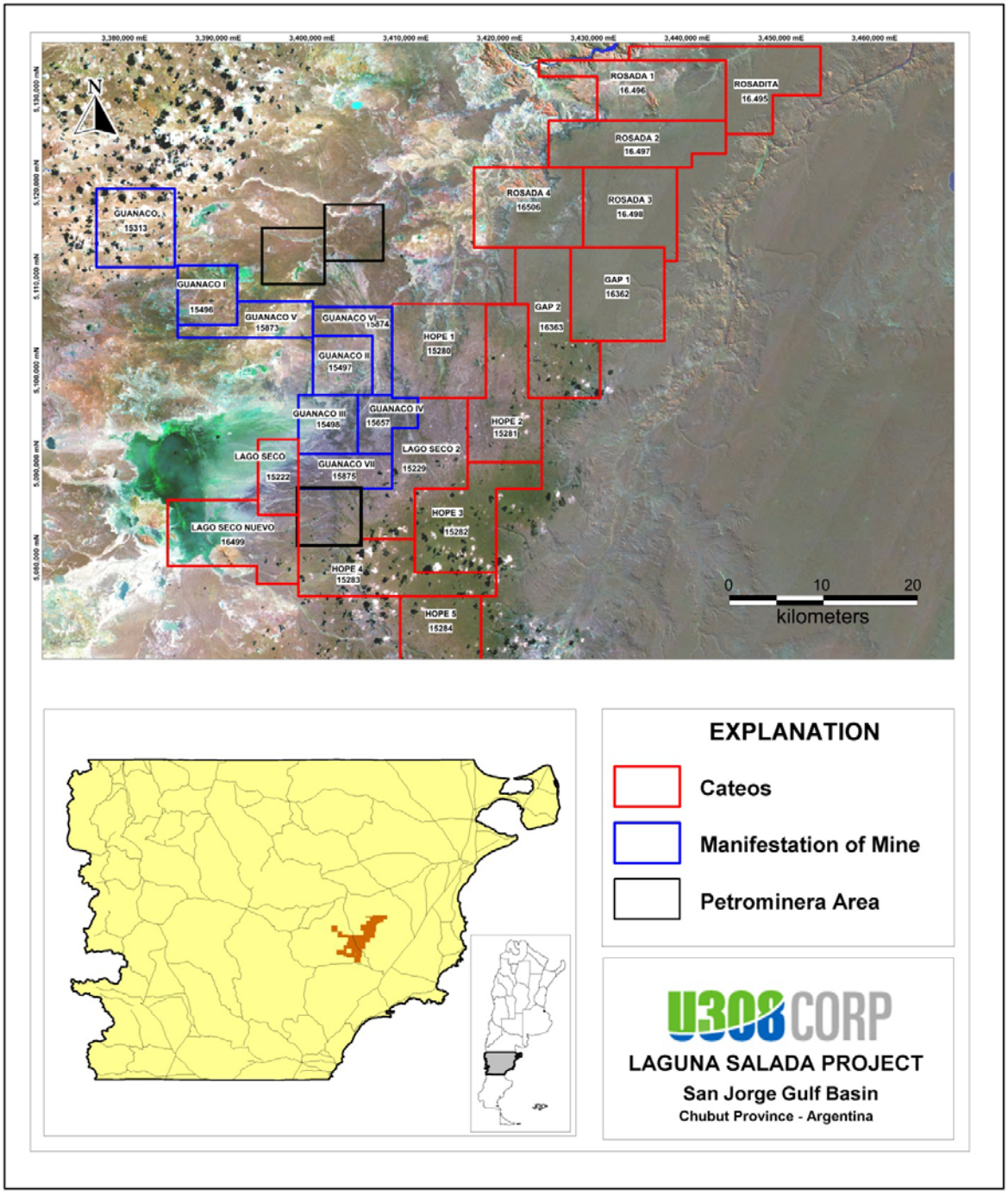


Figure 4-3: Location of the Concessions constituting the Laguna Salada Project shown on a Satellite Image

Cateos are shown in red and MDs in blue.

4.3.5 Maintenance of Concessions

Once a Cateo is registered after the payment of the fee, delivery of the work plan and EIA, the applicant is free to explore the property for a fixed period of time, based on the size of the area. No renewals or extensions of the term originally granted are allowed.

To maintain an MD in good standing, the titleholder is required to fulfil the following obligations:

- Fee: must be paid twice a year (June 30th and December 31st). Non-payment results in the revocation of the permit, unless the title holder pays the fee (with a 20% penalty) within a 45-day cure period. A 3-year period free of fees is granted if a mine is established. The annual fee for a MD is $AR800 per 100Ha unit;
- PMD ratification: The PMD is required to visit the property to confirm the location and character of the mineralisation within 100 days of the registration of the MD. Within 30 days after compliance with the inspection, an application requesting a legal survey must be made; and
- Working and Investment Plan: a working and investment plan with the minimum goal of generating cash flow equivalent to 300 times the average annual fee paid in the five years following the year in which the application for the legal survey is submitted, must be submitted to the PMD.

On or before a MD is granted, an EIA must be completed and filed with the PMD. Field work may not start until the EIA has been submitted to the authorities. The EIA must be updated and submitted to the PMD every two years.

4.3.6 Location of Mineralised Zones Relative to the Properties

The location of the principal mineralised zones encountered to date in the Laguna Salada Project area are shown relative to the property boundaries in Figure 4-4.

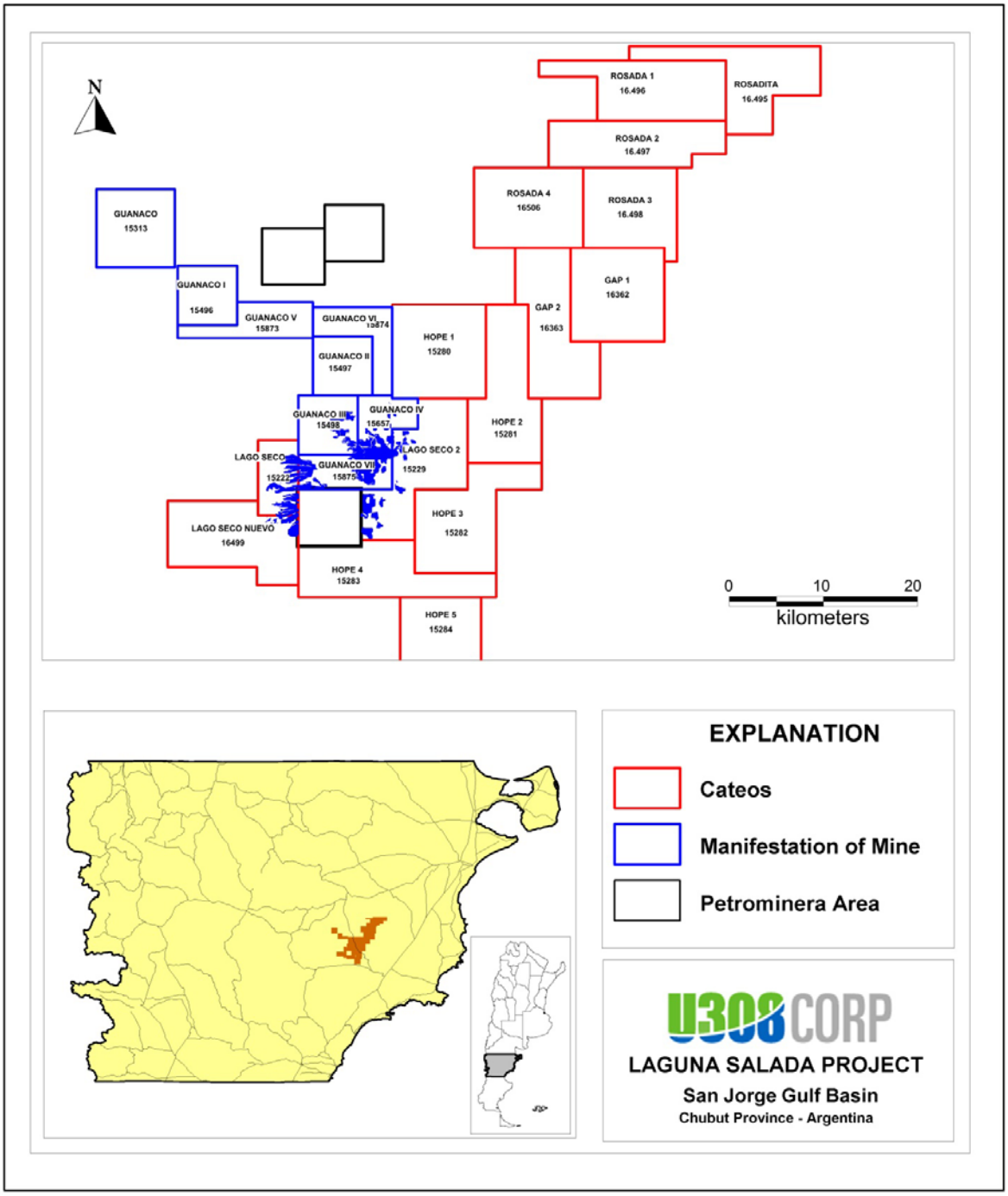


Figure 4-4: Map Showing the Location of the Principal Areas of Uranium Mineralisation in the Laguna Salada Project relative to the Property Boundaries

4.4 Material Agreements

4.4.1 Specific Property-Related Option Agreements

Mexsa has option agreements through which it has the right to purchase mineral properties that are held by Mr Gonzalo Riobó. The terms of these agreements are confidential, but are in line with industry standards for such agreements covering early-stage exploration and mining concessions.

4.4.2 Agreement with Petrominera

On August 22, 2013, a letter of intent ("LOI") was signed with Petrominera, the resource company owned by the Chubut provincial government. The definitive agreement is being drafted, with the due date for signature of September 30, 2014. Although the terms of this agreement are confidential until such time as the definitive agreement has been signed, the general commercial terms are of a JV arrangement in which three concessions owned by Petrominera would be ceded to the Laguna Salada Project, to form the "Greater Laguna Salada Project" for a percentage participation in the Project. Petrominera's percentage participation would be calculated at the end of a 3-year option period, on the basis of a formula related to the reserves defined on the three Petrominera concessions relative to those defined on the Mexsa properties.

4.5 Royalties and Other Taxes

According to Argentine federal legislation (Law No. 24. 196 "Mining Investment Law"), provinces may not demand a NSR in excess of 3%. The NSR due to the Chubut Province is 3%. The corporate tax rate in Argentina is 35% and there is a 10% dividend withholding tax. Value added tax ("VAT") is 21%.

4.6 Environmental Liabilities

EIAs are required as part of the process of maintaining exploration and mining concessions in good standing with the PMD, as discussed in Section 4.3.5. An initial EIA is required before field work is permitted on a concession and an update to the EIA is required when the approximate location and number of planned trenches and/or bore holes has been established from initial exploration. The updated EIA requires approval by the PMD before the planned trenching and/or drilling can commence.

At the date of this technical report, the authors are unaware of any environmental liabilities related to any of U3O8 Corp's concessions outside of work-related commitments associated with routine exploration, including trenching and drilling, that has been in accordance with industry standards.

4.7 Permitting Requirements

No other permits, apart from those described in Sections 4.3.3 and 4.6, are required during the exploration and resource definition phase of the Project.

Location of a pilot plant on the property, which is considered necessary to provide data for a PFS or FS, and/or trial mining, would need approval from the environmental department of the PMD.

Three permits are required for a uranium mine as follows:

- EIA: Once a preliminary mine plan has been established based on a PEA, PFS or FS, an EIA is required to be submitted to the PMD. On provisional acceptance by the PMD, the document is made available for public review for a period of three months and issues raised by the public must be addressed to the satisfaction of PMD;

- Permit to produce yellowcake: The license to operate and process uranium is granted and controlled by the Nuclear Regulatory Authority (Autoridad Regulatoria Nuclear ("ARN")), a self-governing agency that reports to the federal government of Argentina. This permit is based on the mining, extraction and tailings disposal components of the project plan being deemed to be appropriate and acceptable; and

- Mining permit: An application for a mining permit is made to the PMD on the basis of the mine plan detailed in the technical study on which the mine decision is based.

Argentine federal regulation (Law 24.804 "National Law of Nuclear Activity") delegates oversight of the management and control of the production of radioactive materials to the ARN and the CNEA.

The ARN specifically regulates matters of nuclear safety, physical protection, the transport and use of radioactive materials as well as the licensing and operation of nuclear facilities. Article 31 of the above law states that nuclear and radiological safety, safeguards and physical protection are the responsibility of the operator.

Law 25.018 regulates the management of radioactive waste. CNEA is the entity charged with applying the law directly and with the assistance of provincial mining and environmental authorities. CNEA is responsible for establishing site-specific protocols for the transport and management of any radioactive waste materials, and these protocols must be approved by the ARN. Article 6 of Law 25.018 states that the entity responsible for the generation of radioactive waste is responsible for the safe conditioning and storage of this material. However, CNEA has responsibility for the final storage of radioactive waste generated by nuclear operations.

4.8 Known Risk Factors

In May 2003, the Provincial Legislature of Chubut approved Law No. 5001 that prohibits metal mining by open pit methods as well as the use of cyanide in the processing of ore. The law does, however, make provision for mining under special permission in specific areas.

The continuous surface mining operation contemplated and modelled in Section 16 is judged, in the opinion of U3O8 Corp., to be compliant with current mining legislation because there is no open excavation left after mining and the processing and extraction of uranium does not use cyanide. The mining method selected for the Laguna Salada Project would result in a long trench being excavated in the gravel layer. The trench would migrate sideways across the gravel plain with a continuous miner extracting gravel from the leading edge of the trench. The gravel would washed and screened with water to separate the pebbles and coarse sand from the mineralised fine material. Approximately 90% of the damp gravel would be returned to the trailing edge of the trench where it would be recontoured to its original shape and revegetated with indigenous shrubs removed from the leading edge of the trench.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES AND PHYSIOGRAPHY

5.1 ACCESS

The Laguna Salada Project is located in Chubut Province, southern Argentina, in the Department of Martires. Commercial airlines have regular scheduled flights to the towns of Trelew and Puerto Madryn, located in the northeast of the province, and Comodoro Rivadavia, located in the southeast (Figure 5-1). The paved National Highway RA3 runs roughly parallel to the coast and is the artery between the principal towns of the province including Puerto Madryn, Trelew, Rawson and Comodoro Rivadavia.

The Project lies some 250km from Trelew and 230km from Comodoro Rivadavia. Principal access is by paved Provincial Route 25 which links Trelew with the village of Las Plumas. From Las Plumas, one travels 53km south on the all-weather, unpaved Provincial Route 48, before turning west onto a farm road for approximately 1km to reach the base camp (Figure 5-1).

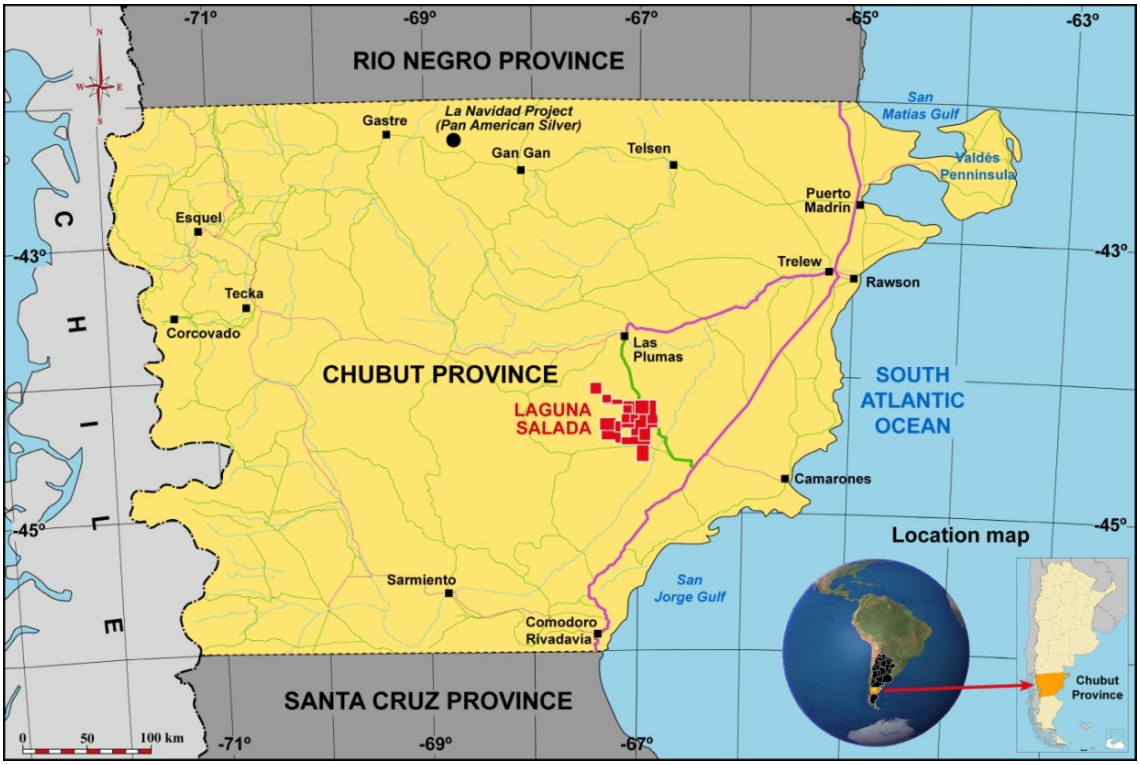


Figure 5-1: Location of the Laguna Salada Project in Chubut Province, southern Argentina

5.2 TOPOGRAPHY, ELEVATION AND VEGETATION

The Laguna Salada Project is located at an average altitude of 330m above mean sea level ("amsl") in a relatively flat plain that is dissected by an ephemeral, dendritic drainage system (Figure 5-2).

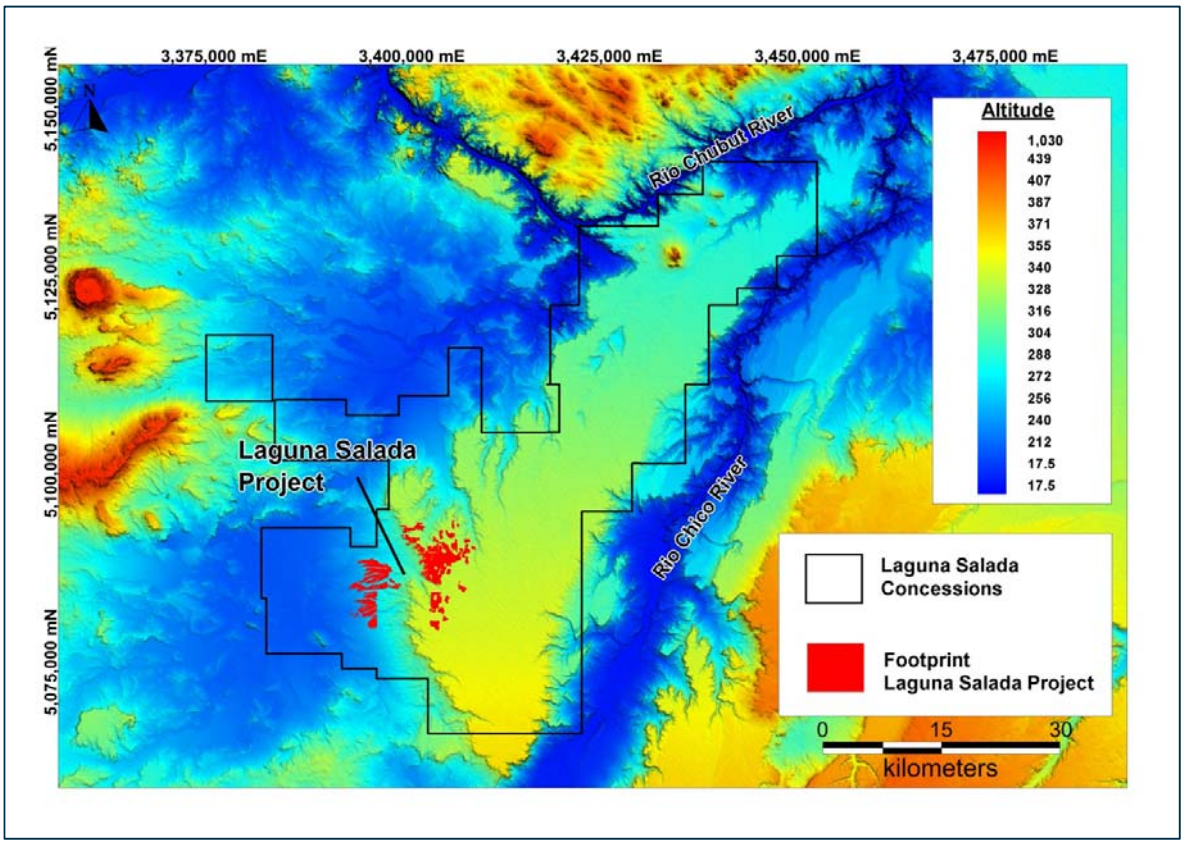


Figure 5-2: Shuttle Radar Topography Mission ("SRTM") satellite imagery of the area in which the Laguna Salada Project lies, showing the footprint of the resource area

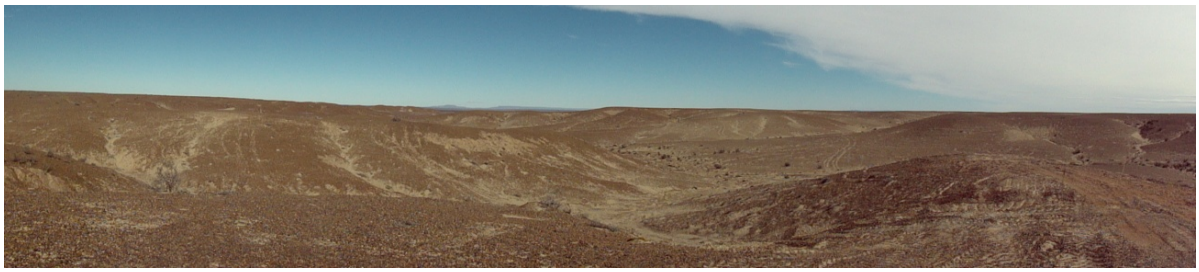


Figure 5-3: Typical landscape at Laguna Salada. This photo is of one of the deepest and widest gullies (Guanaco Quebrada) that drains southwest through the Project area

The Project is located in an area of flat-topped mesas that stand above the surrounding plain by approximately 10m (Figure 5-3). The mesas are separated by shallow, ephemeral and dry stream beds that drain westwards and north-westwards into a confined, shallow, saline lake bed located on the western margin of the concession area. The lake bed is only temporarily covered with water after occasional rains.

The region is semi-arid with sparse grass-cover between isolated shrubs (Figure 5-4). Common species include *Nassauvia ulicina* and *Frankenia patagonica*.



Figure 5-4: Photo showing the Typical Landscape and Vegetation (including *Nassauvia ulicina* and *Frankenia patagonica)*

5.3 POPULATION CENTRES AND TRANSPORT

The exploration base camp is located at a farm house within the project area. Electricity at the camp is provided by a generator and telephone and internet communication is via satellite. A weather station was installed near the camp in 2011 to provide baseline data for the Project.

It is anticipated that personnel that live in other parts of the Province, principally the larger population centres, would be transported by bus to Las Plumas, where they would be housed for the duration of their work cycle. The Project is linked to the town with all-weather gravel roads and personnel based in Las Plumas would be transported by bus to and from the mine site on a daily basis.

Due to the extensive oil industry development in Chubut Province, skilled and semi-skilled personnel are widely available and many people in Las Plumas are currently unemployed, providing a ready pool of potential employees and contractors.

The Martires department, in which the Project is located, has a surface area of 15,445km² and has a total population of 800 people of whom 605 live in the town of Las Plumas. The remainder of the population is widely distributed between large, isolated farms. Farms are typically 10,000Ha in extent.

Chubut's largest city is Comodoro Rivadavia with a population of approximately 180,000 and located on the coast near the Province's southern border with Santa Cruz Province. Comodoro Rivadavia has a deep water port. The administrative capital of Rawson with 40,000 people, is located on the coast in the northeastern part of the province. Puerto Madryn, north of Trelew (Figure 5-1), has a mid-sized, deep water port on the Atlantic Ocean where a 400,000 tonne per year ("tpy") aluminium plant, owned by ALUAR, is located. Puerto Madryn and Comodoro Rivadavia have services that support heavy industry related to the aluminium refinery.

Chubut's economy is heavily dependent on the oil industry and, to some extent, farming and fishing. These industries were largely responsible for Chubut having Argentina's fourth-highest per capita economic output in 2011 of $25,250. Oil refining is the mainstay of the economy, principally from offshore fields. The province provides approximately 13% of Argentina's oil. Chubut is also one of the principal commercial fishing provinces in Argentina, providing about one-fifth of the national catch. Sheep farming is the main economic activity of the dry interior plain that lies between the coast and the Andes Mountains in the west, although a decade-long drought and volcanic ash have decimated the sheep population with associated impact on the local economy. Economic activity in the project area is largely confined to sheep farming for wool and meat.

5.4 CLIMATE AND OPERATING SEASON

The climate in the region is characterised as arid to semi-arid with an average rainfall of approximately 200 millimeters (''mm") per year. Rainfall occurs sporadically throughout the year with a peak of approximately 30mm per month between March and August (30-year average from 1977 to 2007) according to the meteorological station located in Paso de Indio, 200km west of the Project. Average daily temperatures reported from the Paso de Indio meteorological station range from 13°C to 26°C in mid-summer (December and January) and 2°C to 10°C in mid-winter (June-July).

Patagonia lies in the Roaring Forties – the wind blows strongly with average annual velocities of approximately 15km per hour ("km/h") gusting to a maximum of 100km/h.

Climate does not have a significant impact on routine activities and exploration is undertaken year-round.

5.4.1 On-site weather station

With a view to obtaining detailed on-site measurements to accurately characterise weather parameters, U3O8 Corp. set up a PEGASUS Weather Station and a "Class A" evaporation pan, in January 2011 (Figure 5-5).



Figure 5-5: Weather Station and "Class A" Evaporation Pan, Laguna Salada Project

5.4.1.1 Temperature

Data were collected from January 2011 to December 2012 revealing daily and monthly maximum, mean and minimum temperatures that range from 23°C in summer to 4°C in winter (Figure 5-6).

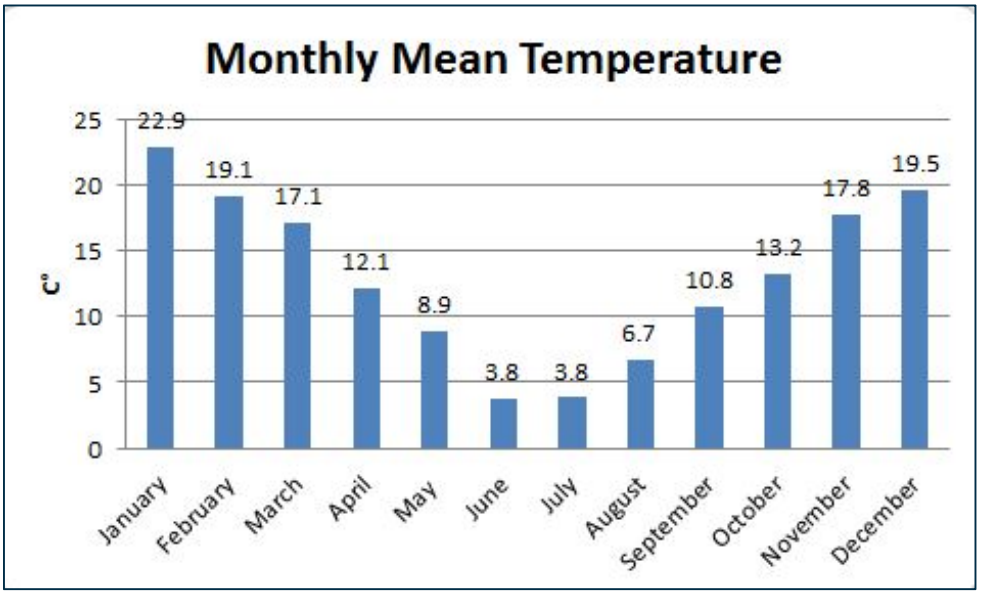


Figure 5-6: Monthly Mean Temperatures recorded at the Laguna Salada Weather Station

5.4.1.2 *Precipitation*

Average monthly precipitation measured between January 2011 and December 2012 is shown in Figure 5-7. Average annual precipitation over this period was 108mm, approximately half of the long-term average of 200mm per year.

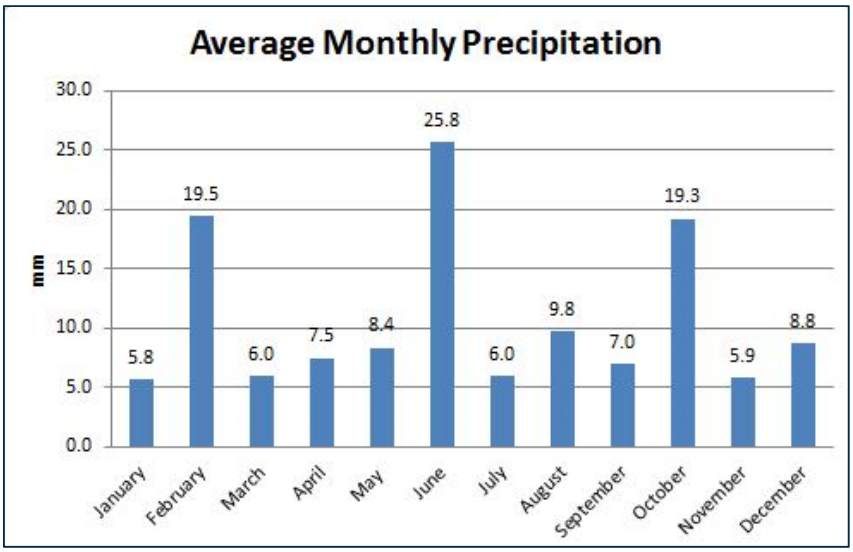


Figure 5-7: Average Monthly Precipitation, January 2011 – December 2012

5.4.1.3 *Evaporation*

Evaporation was measured directly by means of a standard American "Class A" evaporation pan. Data collected between January 2011 and March 2012 showed evaporation of 2,792mm per year ranging from a low of 80mm in June to a maximum of 450mm in November and December (Figure 5-8).

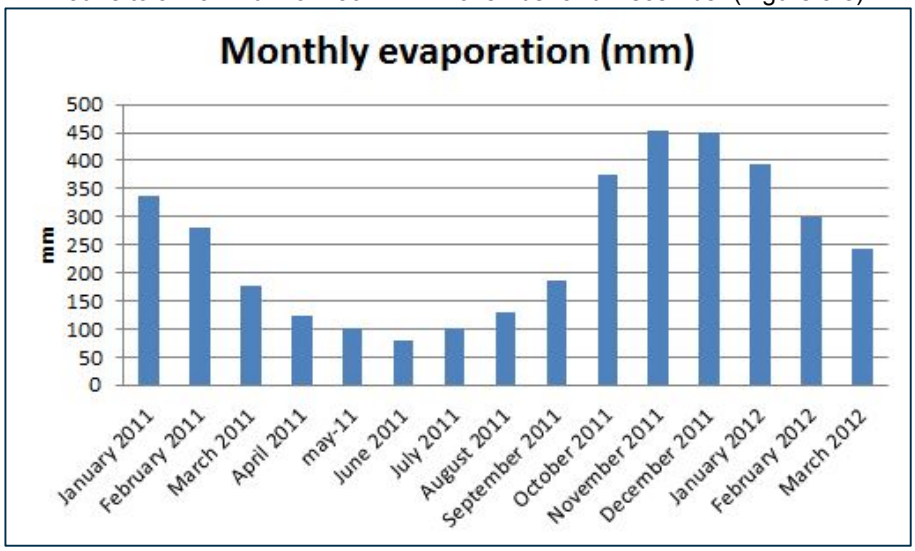


Figure 5-8: Monthly Evaporation Rates, January 2011 – March 2012

5.4.1.4 Wind

The wind speed data presented here were gathered from January 19 to May 4, 2011, from July 27 to January 30, 2012, and from February 9 to October 28, 2012. Wind speed is lowest, on average, between August and October, increasing to a maximum between November and January (

Figure **5-9**), with an average annual wind speed of 15km/h. Data from the weather station show that wind speeds were below 7.8 meters per second ("m/s") (28 km/h for 87% of the time). The highest recorded wind speed occurred on May 4, 2011, when a gale blew out of the west-northwest at 20.6 m/s (74km/h) for an hour, at which time the instrument stopped recording data.

The wind direction data presented here were gathered at Laguna Salada from January 19 to May 4, 2011, and from July 27 to December 21, 2011. Wind direction data show that the prevailing winds are from the northwest, west and southwest (Figure 5-10). During February, May, August, October and December, winds are more variable with winds from the north being more prevalent.

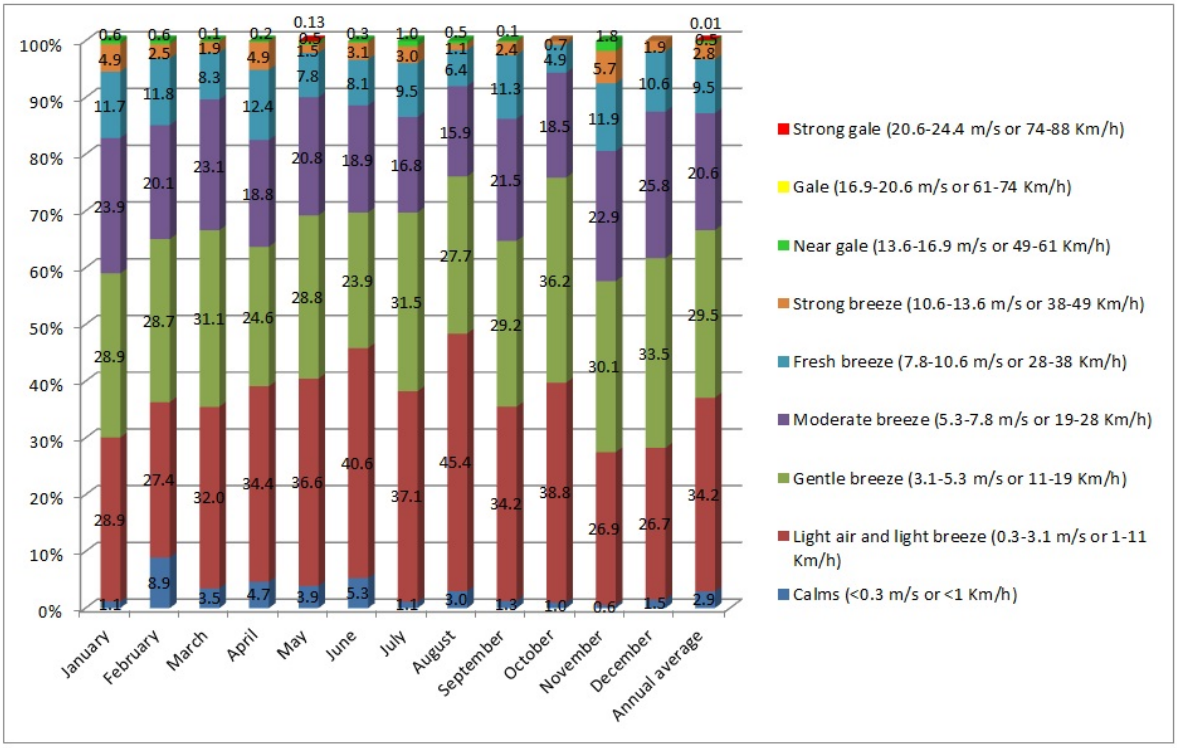


Figure 5-9: Monthly Wind Speed Frequency Distribution at the Laguna Salada Weather Station

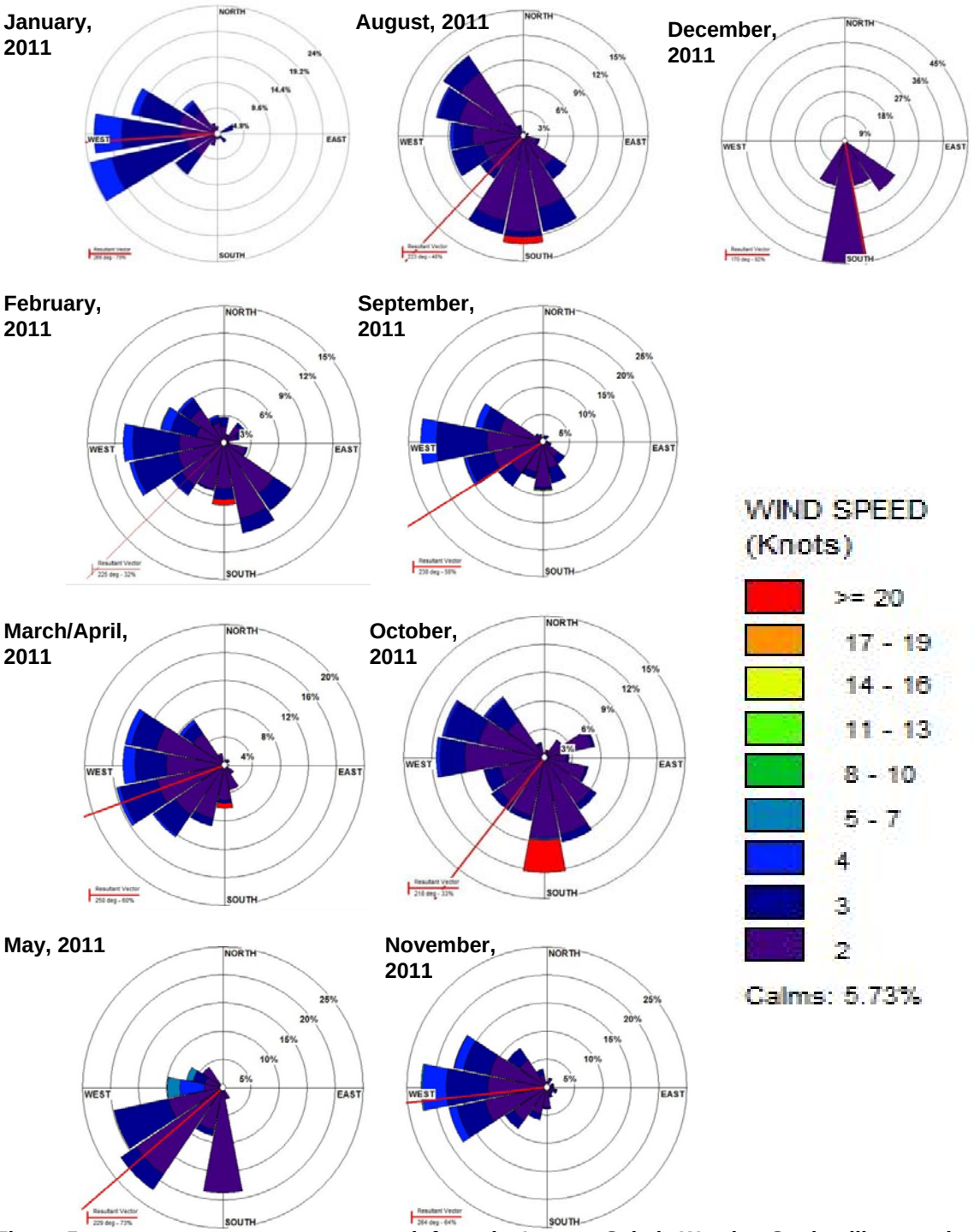


Figure 5-10: Wind direction data by month from the Laguna Salada Weather Station illustrated on rose diagrams

The red line in the graphs indicates the average wind direction for each period.

5.5 Surface Rights and Access to Infrastructure

U3O8 Corp. does not own surface rights in the Laguna Salada Project area at this time. Surface rights would ideally be acquired from the owners of the properties on which mining is planned to extend, or on which installations are likely to be made. Due to the flat nature of the topography, there is very little constraint on selection of sites for the construction of mine infrastructure including plant processing sites and administration buildings.

The mining plan contemplated in this PEA calls for the replacement of gravel on the gravel plain once the uranium-vanadium – bearing fines have been removed, and hence no specific waste dump locations are required. A TMF would be located in a topographic re-entrant on barren gravel underlain by an impermeable mudstone base that has been naturally eroded between adjacent mesas.

The closest point on the national electricity grid is at the town of Garayalde, and has a capacity of 132kW. The PEA calls for this power line to be extended 70km to the mine site. Las Plumas is the closest source of fuel and other basic supplies, and is expected to develop into the principal service centre for the Project.

Water for the mining, beneficiation and processing of the gravels would be from two distinct source areas: saline water pumped from wells in a large basin in which the Lago Seco sector lies, and fresh water sources from wells drilled into reservoirs in the basement rocks, whose location is indicated by geophysical surveys.

6 HISTORY

6.1 Prior Ownership

Laguna Salada was first identified as a potential area for uranium mineralization in 1978 during a regional airborne radiometric survey by CNEA that covered part of the Project. CNEA undertook field work to follow up on airborne radiometric anomalies, but ceased exploration in the early 1980's, at which time the exploration concessions lapsed.

Mega applied for two exploration licenses covering airborne anomalies in early 2007. This initial land position was subsequently added to, and continued to be expanded, after the acquisition of Mega's subsidiaries by U3O8 Corp. in April 2010.

6.2 Historical Exploration for Uranium

The regional airborne radiometric survey in which the Laguna Salada area was first identified as an area of interest, covered approximately 100,000km² in Chubut and the adjoining Santa Cruz province. The regional survey covered only the western part of what is now the Laguna Salada Project, and succeeded in identifying radiometric anomalies over the Lago Seco and Madreselva (now called "Guanaco") areas (Figure 6-1). CNEA recognised that the uranium mineralisation is related to "caliches" – partial cementation of the host gravel by calcium carbonates – and undertook an exploration program that consisted of ground radiometric surveys and trenching. Results of this exploration showed that a mineralised layer from 0.5m to 2m thick occurred in an extensive area with U_3O_8 grades of up to 1,000ppm.

After an evaluation of the exploration potential of the region, Mega applied for the right to explore for uranium in two areas of the Laguna Salada Project and commenced field work in May 2007. Mega made additional concession applications in the Laguna Salada Project area in 2007, 2008 and 2009.

Mega drilled 57 reverse circulation ("RC") holes for 1,561m on the Laguna Salada Project in 2008 (Figure 6-2):

- 15 of these holes were drilled relatively deep (average bore hole length was 80m) with the objective of exploring for mineralisation in favourable stratigraphic units beneath the unconsolidated gravel beds; and
- 42 shallow holes (maximum 10m depth) were drilled in three principal target areas of the Laguna Salada Project area to explore the shallow, caliche-style of mineralisation.

The relatively long bore holes were unsuccessful in identifying significant mineralisation at depth and led to a focus on investigation of shallow mineralisation. The shallow holes identified potential for uranium mineralisation within, and at the base of, the gravel unit.

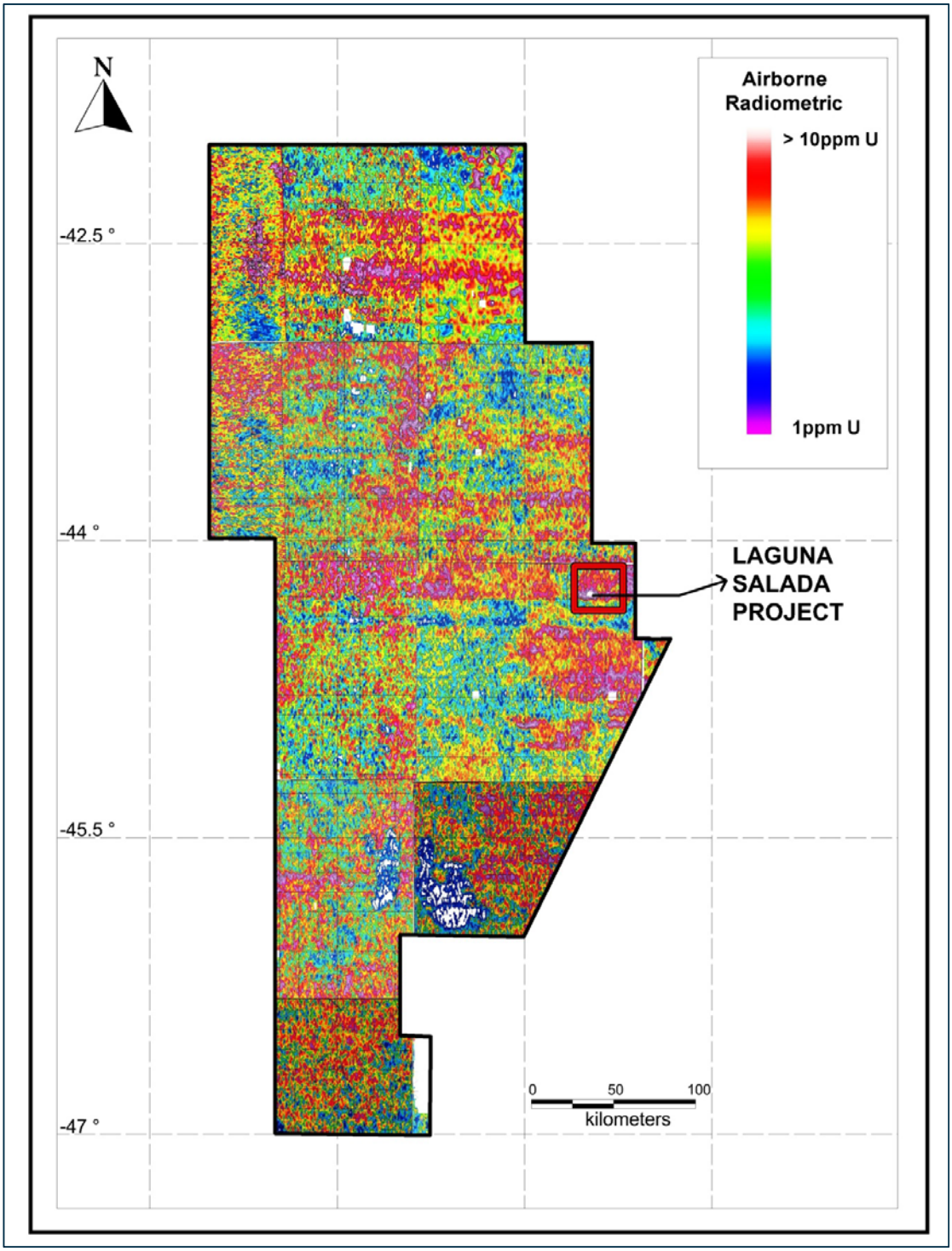


Figure 6-1: Map showing the extent of the CNEA Radiometric Survey that covers part of the Laguna Salada Project

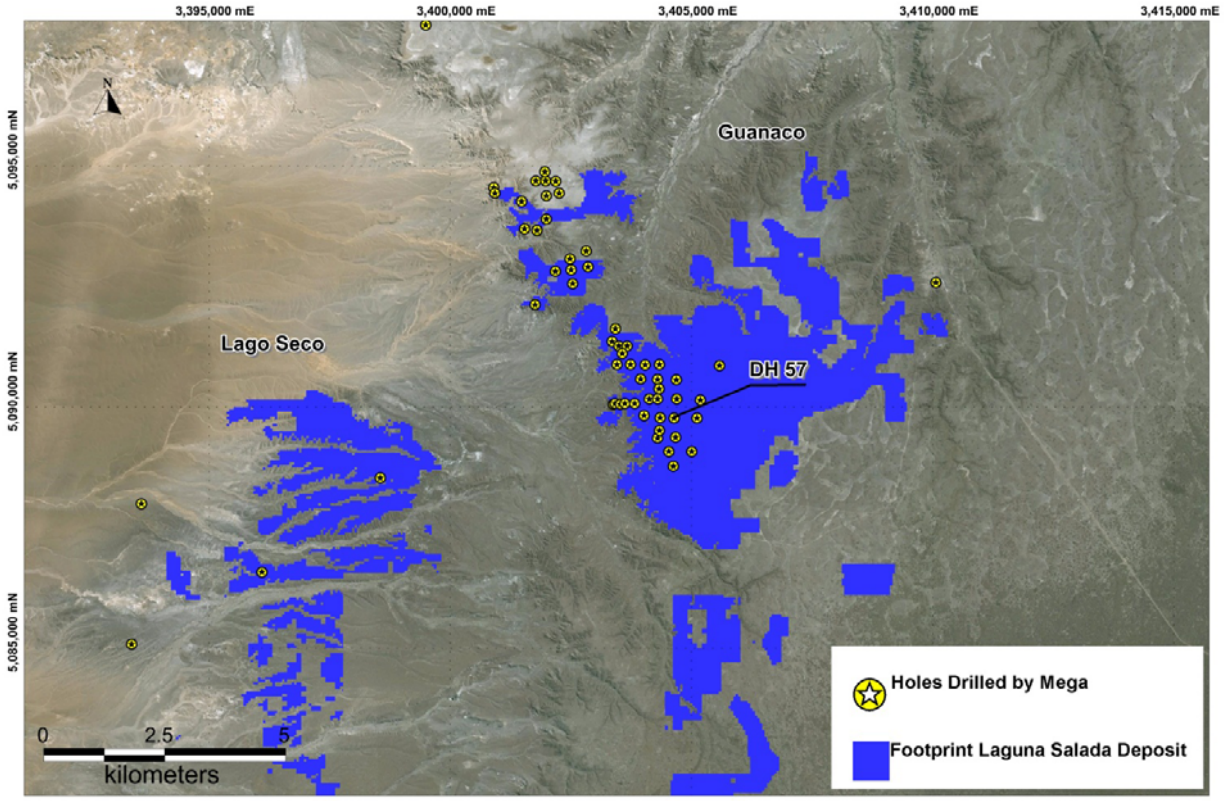


Figure 6-2: Map showing the bore holes drilled in prior exploration of the Laguna Salada Project as well as the location of the trenches from which samples were taken for prior metallurgical test work

Shown relative to the current resource defined by Coffey Mining, 2011.

6.3 Historical Mineral Resource Estimates

There is no recorded prior historical mineral resource estimate on the Laguna Salada Project.

6.4 Historical Production

There is no recorded historical production of uranium or vanadium from the Laguna Salada Project.

7 GEOLOGICAL SETTING AND MINERALISATION

7.1 Regional Geology

The Laguna Salada Project area is covered by the "4566-1 Garayalde" 1:250,000 scale geological sheet produced by SEGEMAR, the Institute of Geology and Mineral Resources of Argentina (SEGEMAR, 2003: Figure 7-1).

The Laguna Salada Project is located near the western edge of the Cretaceous San Jorge Basin, which covers most of Chubut Province. The basement to the San Jorge Basin comprises a sequence of sedimentary, metamorphic, intrusive and volcanic rocks of Palaeozoic and Triassic age that are overlain by the Jurassic volcanic complex of the Marifil Formation. The Jurassic contains a thick sequence of ignimbrites and rhyolitic lava flows that are exposed in outliers and in the floor of some of the deeper valleys in the Project area (Figure 7-1).

The basal part of the San Jorge Basin consists of conglomerates and sandstones of the Cretaceous Puesto Manuel Arce Formation (Figure 7-2). These are in turn, overlain by the littoral marine sandstones and interlayered mudstones of the Early Tertiary Salamanca Formation that is interpreted to have accumulated during one of the last marine transgressions by the Atlantic Ocean (Sylwan, 2001).

In the Project area, the Puesto Manuel Arce and Salamanca Formations are unconformably overlain by Quaternary strata of fluvial and alluvial origin that constitute the Pleistocene Pampa de Arroqui (or Montemayor) Formation and the Holocene Gran Laguna Salada Formation. The Pampa de Arroqui Formation consists of layers of unconsolidated gravel with a sandy to silty matrix. Clasts are well-rounded, moderately well sorted and mainly volcanic in origin. These gravels constitute an outwash plain that marks the migration of the course of the Rio Chico River through Quaternary times. This vast outwash plain, located to the east of the Andes Mountains, measures tens of thousands of square kilometres in extent, and is now being dissected by the active ephemeral stream system that feeds into the Rio Chico.

The Gran Laguna Salada Formation is restricted to an area several tens of square kilometres in extent on the east flank of the saline lake called the "Laguna Salada" that lies near the western edge of the project area. This formation is Holocene in age and consists of a polylithic, matrix-supported gravel in which the matrix is fine-grained sand and silt. Discontinuous, 20cm to 30cm thick gypsum beds occur within the gravel sequence. The Gran Laguna Salada Formation is interpreted to have accumulated in the depocentre of the Gran Laguna Salada from material eroded from the Pampa de Arroqui Formation (Figure 7-1).

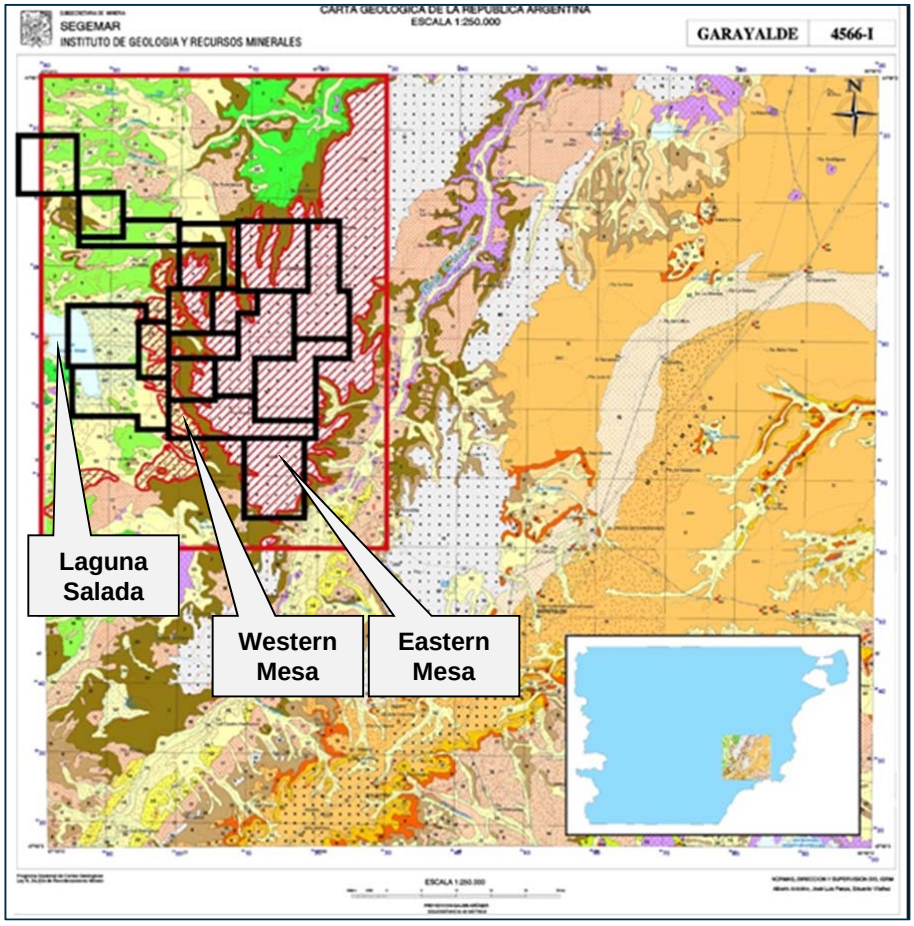


Figure 7-1: Regional Geological Map of the Laguna Salada Project area

Boundaries of the Concessions constituting the Laguna Salada Project are shown in black.

Uranium mineralisation in the Laguna Salada Project occurs in several lithological associations:

- In the unconsolidated gravels of the Pampa de Arroqui Formation;
- In the unconsolidated gravels of the Gran Laguna Salada Formation; and
- Near the unconformity between the Quaternary strata (Pampa de Arroqui and Gran Laguna Salada formations) and its substratum that include sandstones and pelites of the Salamanca Formation and sandstones and gravels of the Puesto Manuel Arce Formation.

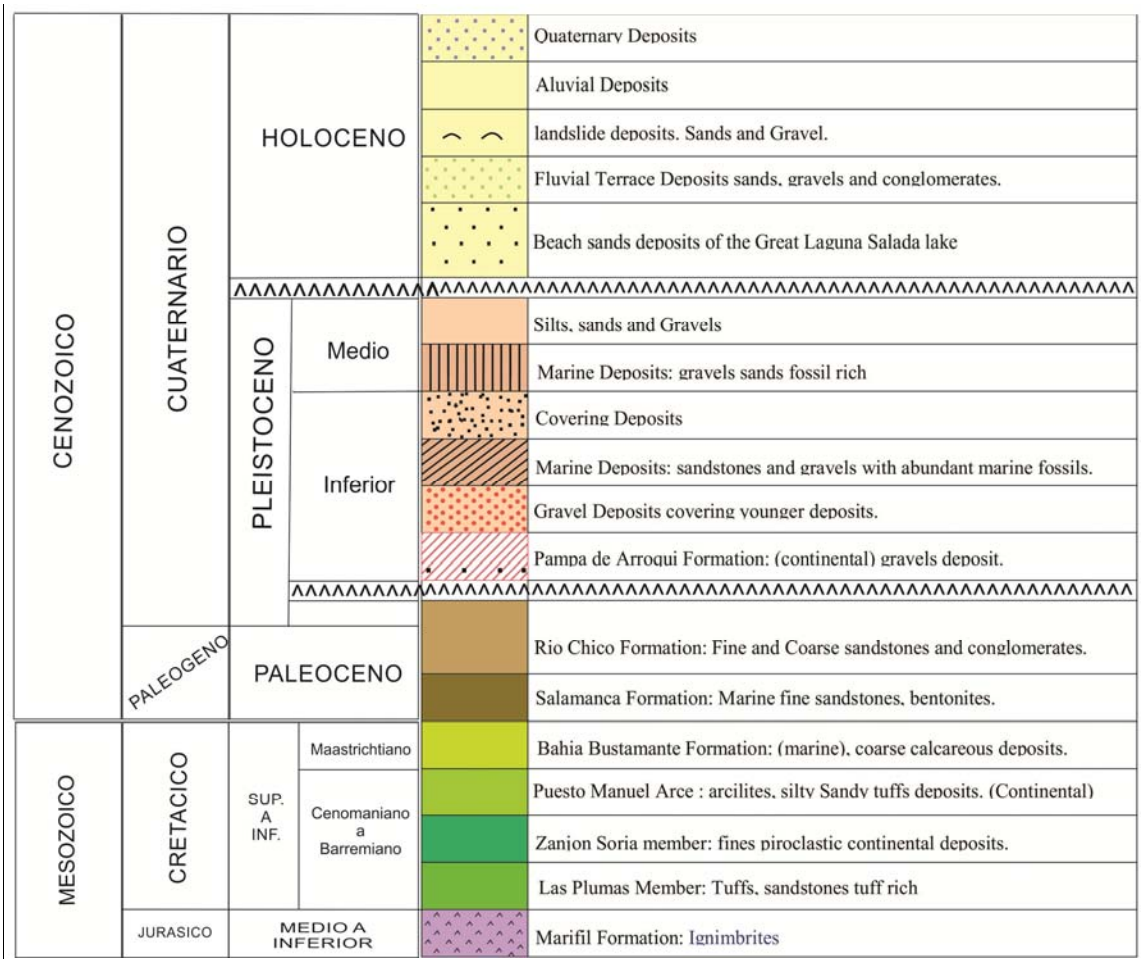


Figure 7-2: Stratigraphic column of the San Jorge Basin showing detail of the units present in the Laguna Salada area and lithostratigraphic location of the uranium-vanadium mineralisation

7.2 Property Geology

7.2.1 General Geology

Uranium mineralisation in the Laguna Salada Project has been encountered in terraces on the north bank of the Rio Chico, one of the principal rivers in the region that flows north-eastwards into the Rio Chubut. Jurassic rocks of the Marifil Formation are exposed in the most deeply incised areas adjacent to the river and as inliers to the south-west and immediately west of the Laguna Salada Lake (Figure 7-1).

Cretaceous rocks in the Laguna Salada Project are represented by tuffs and fine-grained sandstones that are exposed as inliers immediately to the north, west and southwest of the property. Cretaceous sandstones and interbedded green to brown siltstones of the Puesto Manuel Arce Formation are concentrated in the western part of the property package (Figure 7-1). These strata are overlain in the central and eastern part of the property by sandstones and interlayered greenish mudstones of the Salamanca Formation, which prior drilling (Section 6), identified as being approximately 30m thick in the Project area.

In the central part of the Project area, the Salamanca Formation is exposed in an elongate, north-trending inlier that separates Pleistocene strata in the east from younger Holocene strata in the vicinity of the Laguna Salada Lake to the west (Figure 7-1). The north-trending inlier forms a palaeochannel on which the north- and west-flowing Holocene drainages were superimposed.

A Quaternary terrace of the Rio Chico river system lies to the east of the north-trending paleochannel, constituting a mesa that is hundreds of square kilometres in extent. This “Eastern Mesa” consists of the Pleistocene Pampa de Arroqui Formation, which is an unconsolidated gravel unit that rests on a generally planar basal contact that is occasionally interrupted by erosional channel features into the underlying Salamanca Formation. Gravels of the Pampa de Arroqui Formation are clast- and matrix-supported and are arranged in crude, planar beds interlayered with cross-bedded sand beds and lenses of sand. Clasts consist mainly of volcanic rocks including rhyolite, andesite and basalt. The matrix consists of sand with some interstitial silt and is partially and patchily cemented with calcite and or gypsum. The “Guanaco” mineralised area is located on the west side of the Eastern Mesa (Figure 7-1).

The west side of the north-south – orientated palaeochannel (that exposes the Salamanca Formation) forms part of an extensive, fault-related depression in which the Laguna Salada Lake is located. This area has a mesa-like morphology and is called the “Western Mesa”. The Western Mesa consists of gravels and sands of the Gran Laguna Salada Formation which has a geomorphology and facies distribution typical of an alluvial fan that is now being dissected and eroded by the present ephemeral stream system. Gravels of the Gran Laguna Salada Formation are clast- and matrix- supported and have a silty matrix. Clasts are similar in composition to those of the Pampa de Arroqui Formation. The “Lago Seco” area of mineralisation is located on the eastern edge of the Western Mesa.

7.2.2 Geology of the Guanaco Area

The Guanaco area lies in the Eastern Mesa where the surface of the terrace slopes slightly westwards. Mineralisation has been identified over an area of approximately 40km² in Pleistocene gravels of the Pampa de Arroqui Formation. The gravel unit, which is 3m to 6m thick in the mineralised area, has a generally planar basal contact that is occasionally interrupted by erosional channel features scoured into the underlying green to brown siltstones of the Salamanca Formation. The gravel sequence is covered by a layer of carbonate-rich soil that is typically unmineralised and is 20cm to 40cm thick.

The unconsolidated, clast- and matrix-supported gravel unit is arranged in crude, planar beds interlayered with sandy beds. The matrix consists of sand with some interstitial silt and powdery calcareous minerals and is partially and patchily cemented with gypsum. The uranium-vanadium mineralisation of this area is evident as greenish and yellow staining in the sand and carbonate matrix of the gravel and as partial rims on clasts.

7.2.3 Geology of the Lago Seco Area

Mineralisation in the Lago Seco Area extends for tens of square kilometres along the eastern side of the Western Mesa which slopes gently westward toward the topographic depression in which the Laguna Salada Lake lies. Uranium-vanadium mineralisation occurs in the interlayered gravel and sand facies of the Gran Laguna Salada Formation which is 2m to 4m thick in the area of interest and lies unconformably on the greenish mudstones and sandstones of the Salamanca Formation and partially on sandstones and gravels of the Puesto Manuel Arce Formation. The gravel unit is partially covered by unmineralised calcareous soil up to 30cm thick.

The main lithology constituting the Gran Laguna Salada Formation is matrix- and clast-supported gravel with rounded pebbles up to 5cm in diameter. The matrix consists of sandy silt with powdery calcite and gypsum. Discontinuous layers of massive gypsum up to 30cm thick occur in some parts of the Lago Seco Area. The nature and composition of the mineralisation is similar to that of the Guanaco area.

7.2.4 Geology of the Buried Lake Area

"Buried Lake" refers to a different style of mineralisation located in the northern part of the Guanaco area and is observed at the unconformity between the Pampa de Arroqui Formation and the underlying Salamanca Formation. Mineralisation is concentrated near the base of the gravel, on the unconformity surface and in fractures in mudstone in the underlying Salamanca Formation.

7.3 Mineralisation

7.3.1 Mineralisation Styles

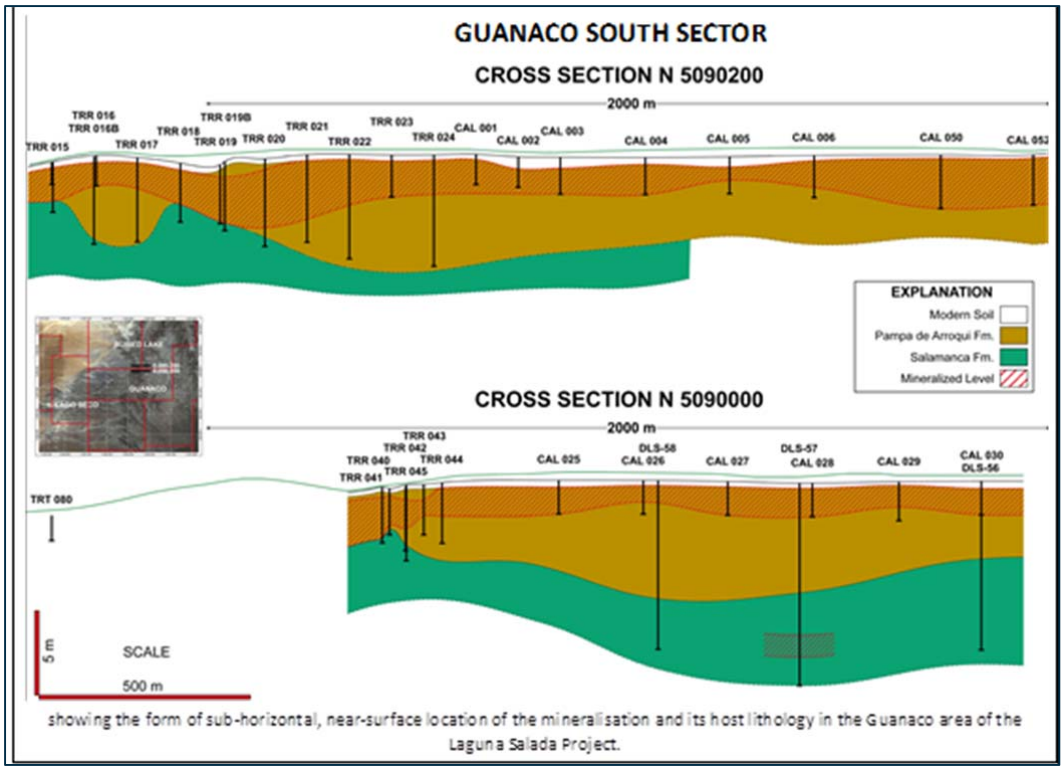
Two principal styles of uranium-vanadium mineralisation have been identified at Laguna Salada as follows:

- Of principal economic interest is a tabular, gently undulating layer that contains yellow-green uranium-vanadium minerals at shallow depth within unconsolidated, sandy gravel. This style of mineralisation occurs in the Guanaco and Lago Seco areas in gravel-dominated clastic facies of different ages – Pleistocene at Guanaco and Holocene at Lago Seco. Powdery and finely crystalline uranium-vanadium minerals occur between the grains in the sandy matrix of the gravel and also as partial coatings on sand grains and clasts. Studies indicate that approximately 10% of the contained uranium occurs as rinds on clasts. Carnotite ($K_2(UO_2)2(VO_4)_2.3H_2O$) is the dominant uranium-vanadium mineral and has a variable habit from slightly cohesive to compact masses of crystals.
- The second style of mineralisation is found in the Buried Lake area where carnotite straddles the unconformity between the gravel sequence and the underlying, organic-rich mudstones. Mineralisation within this layer occurs in interstices in the sandy matrix and on pebbles in the gravel as well as within cracks and associated with organic material in the underlying mudstone. The true potential of this style of mineralisation at Laguna Salada is undefined at this time.

7.3.2 Guanaco Area

Uranium-vanadium mineralisation in the Guanaco area is closely associated with carbonate distribution in the gravel layers of the sedimentary sequence of the Pampa de Arroqui Formation. Mineralisation is generally evident as a yellow-green staining on the sides of trench walls and the generally tabular mineralised zone is marked by abruptly gradational, slightly undulating boundaries that cross-cut contacts between conglomerate and sand layers.

The generally sub-horizontal layer of mineralisation at Guanaco extends from beneath the patchy soil cover to a maximum depth of 3m to 4m (Figure 7-3). The mineralised area that has grades above 50ppm U_3O_8 ranges from 0.2m to 2m thick with an average of 0.94m in the Guanaco area. Mineralisation at Guanaco is made up of a number of mineralised sheets, each of which is several square kilometres in extent in which mineralisation shows remarkable continuity. Each mineralised sheet is separated from the next by a gap of lower-grade mineralisation that may be up to 200m wide.



showing the form of sub-horizontal, near-surface location of the mineralisation and its host lithology in the Guanaco area of the Laguna Salada Project.

Figure 7-3: East-west oriented Vertical Cross Sections (Sections 5,090, 200 and 5,090,000) showing the Pampa de Arroqui Formation overlying the Salamanca Formation

The Mineralised Zone is shown in red hatching.

7.3.3 Lago Seco Area

Uranium mineralisation in the Lago Seco sector covers an area of more than 25km² and lies within 1m of surface beneath poorly developed, partial soil cover. The average thickness of the mineralised interval in trenches with grades above 50ppm U_3O_8 is 0.85m with a range between 0.3m and 1.9m (Figure 7-1). Mineralisation forms a sub-horizontal layer that is associated with carbonate and gypsum that has formed partially cemented nodules in the gravel and sand facies of the Gran Laguna Salada Formation. The majority of the uranium mineralisation is located in the matrix of the gravel with a lesser component encrusting clasts.

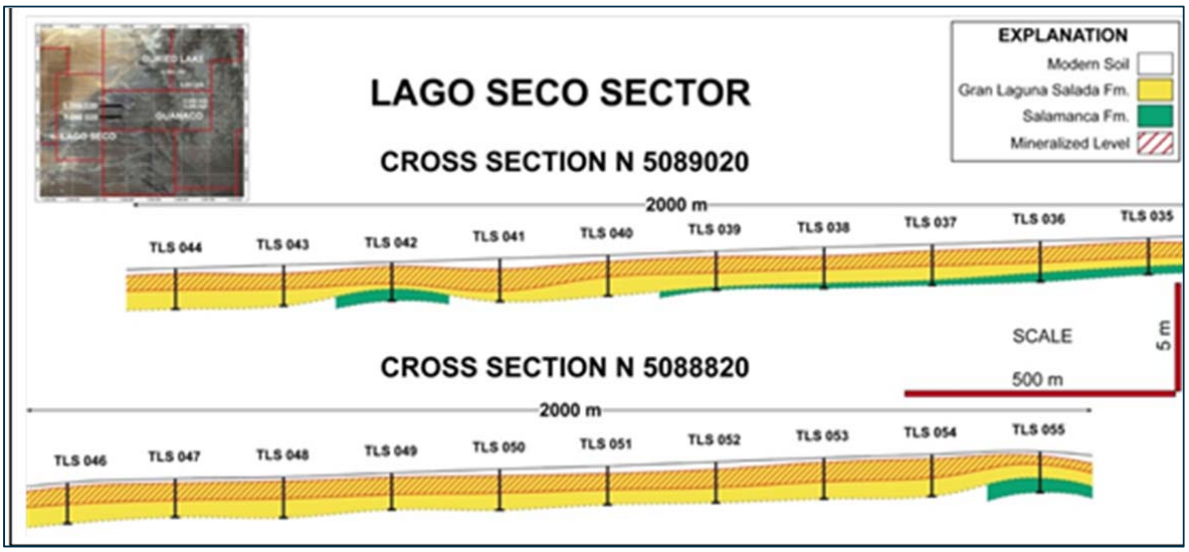


Figure 7-4: East-west oriented Vertical Cross Sections (Sections 5,089,020 and 5,088,820) through part of the Lago Seco area of the Laguna Salada Project showing the Tabular Near-Surface Location of the Mineralisation and its host Lithology

7.3.4 Buried Lake Area

The Buried Lake area contains a different style of mineralisation that occurs at a lower stratigraphic level adjacent to the Guanaco area. Mineralisation of this type is located at the unconformity between the gravel sequence of the Pampa de Arroqui Formation and the underlying organic-rich mudstones of the Salamanca Formation.

Mineralisation has been defined over an area of approximately 6km² although the full extent of this mineralisation has not yet been adequately established. The mineralised unconformity lies at an average depth of 5m below surface in the area in which the unconformity has been investigated, and has been found at depths of up to 10m. The thickness of the mineralised layer ranges from 60cm to 1.5m and averages approximately 1m thick.

This target has not been intensely investigated because it generally lies at a depth that is beyond the reach of trenching and pitting, and this area should be further investigated with vibrosonic drilling (Figure 7-5).

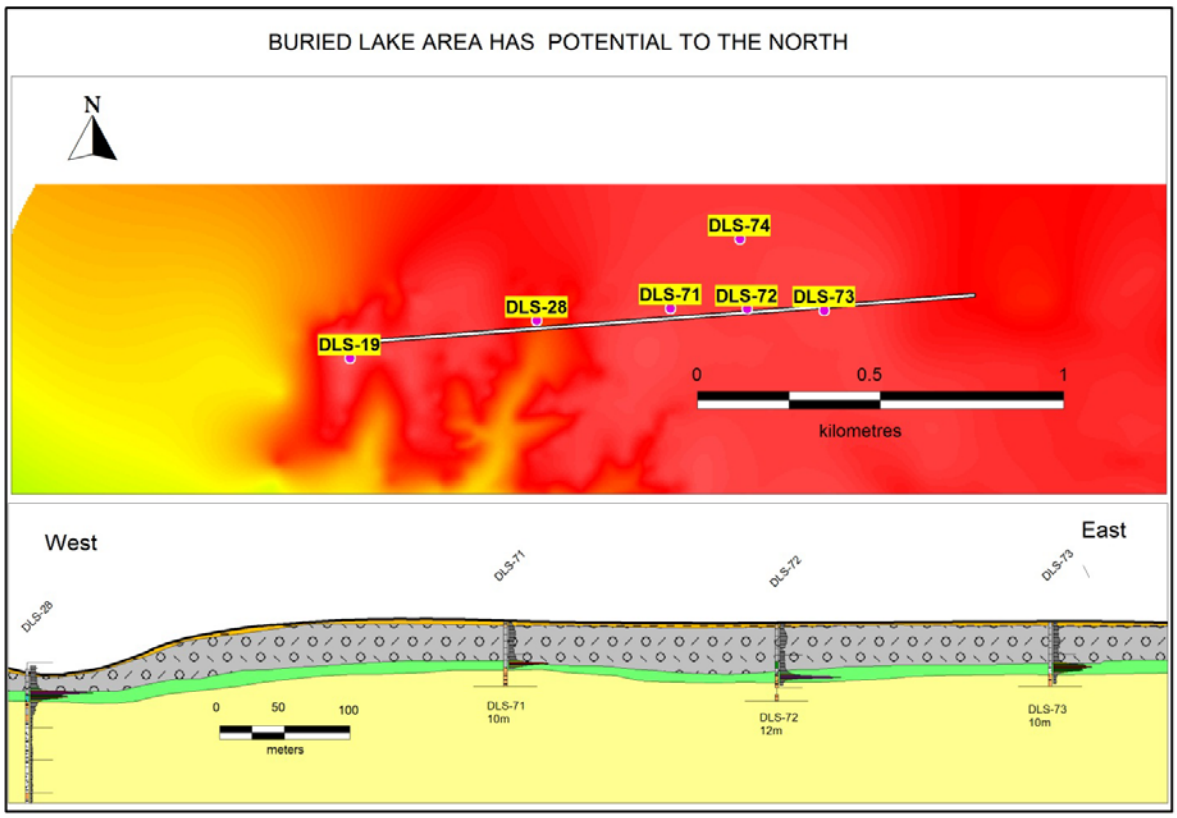


Figure 7-5: Buried Lake Schematic Cross Section

7.4 Mineralisation Model for Laguna Salada

The current conceptual model for mineralisation in the Laguna Salada Project is as follows:

- Uranium was derived from fertile source rocks such as rhyolites in the Jurassic basement. Uranium was transported in solution by oxidised meteoric waters that flowed through the permeable, gravel terraces of the Rio Chico.
- Vanadium is likely to have been derived from the mudstones of the underlying Salamanca Formation. Samples from the mudstone contained up to 600ppm vanadium (V_2O_5), showing that they represent a viable source for the vanadium-bearing fluids at Laguna Salada.
- These metals deposited together as a result of evaporation causing an increase in their concentration in the near-surface environment, resulting in a blanket-like, near-surface layer of mineralisation.
- Mineralisation in the Pampa de Arroqui Formation may have been eroded, leached and subsequently precipitated in the younger Gran Laguna Salada Formation in the Holocene depocentre.

A feature of the gravels in the Buried Lake area is that they are largely devoid of carbonate and gypsum, which is ascribed to leaching by the downward migration of oxidising fluids. The upper part of these gravels is also largely devoid of uranium-vanadium mineralisation and this too, is ascribed to the high solubility of these metals in oxidising fluids. Uranium and vanadium precipitated near the unconformity between the gravels and the underlying mudstones in response to locally reducing conditions associated with organic matter in the mudstones, and principally due to adsorption on clays.

8 DEPOSIT TYPES

8.1 Surficial Uranium Deposits

Uranium-vanadium mineralisation in the Laguna Salada Project has the principal characteristics of surficial uranium deposits according to the classification of Toens *et al*., 1984.

Surficial deposits comprise approximately 4% of the world's uranium resources (World Nuclear Association, 2009). These deposits are typically tabular bodies of mineralisation that are located in close proximity to the surface. They are typically located in sequences of Tertiary to Recent age in fluvial, alluvial and eolian clastic sediments and associated playa lake facies. These uranium accumulations occur with carbonate and, in some cases, sulphate minerals. Surficial uranium accumulations span a diverse group ranging from mineralisation associated with marginally carbonate-cemented sediments to that associated with hard, calcrete accumulations. Surficial uranium deposits form a continuum from those in which carbonate and or sulphate partially cement the host, termed "Caliche"-type systems, to those in which the carbonate and or sulphate cementation is intense, forming a hard layer within the host. The latter end-member is termed "Calcrete"-type. It appears that Caliche-type systems would develop into Calcrete-type systems over time.

Carbonate precipitation and calcrete formation occurs in areas that have a fluctuating water table in temperate parts of the world that are arid and that have a high evaporation rate as well as a source of calcium carbonate. During the wet season in temperate climates, carbonate is dissolved in the vadose zone by oxidised meteoric waters percolating down through the upper parts of the clastic stratigraphic profile. During dry periods, when evaporation is most intense, groundwater is drawn upwards, precipitating calcium carbonate as encrustations which develop into nodules that grow and coalesce to form a calcrete layer (Figure 8-1), Thomas *et al*., 2007). Calcrete can also form as a hardpan or duricrust within playa lake environments.

Figure 8-1 shows the typical host environment of a surficial uranium accumulation, which lies adjacent to basement rocks that are relatively enriched in uranium and other associated elements such as vanadium. Uranium in surficial deposits is thought to have been leached from such source rocks and transported to the site of deposition in the younger sediments by groundwater flow. Precipitation of uranium-vanadium minerals at these sites is ascribed to various possible factors as follows (Otto, 1984, Kyser & Cuney, 2009):

- Dissociation of soluble uranium-bearing complexes such as uranyl $(UO_2)^{2}$+ carbonates through the loss of CO_2 to the atmosphere or through precipitation of carbonate minerals such as calcite;
- Increased concentration of dissolved species through loss of water due to evaporation;
- A change in the valence state of either uranium or vanadium ions or both that may lead to the precipitation of a uranium-vanadium mineral. For example, the oxidation of the V^{4+} cation to V^{5+} in the presence abundant U^{6+} may lead to the precipitation of carnotite;
- Mixing of waters of different compositions; and
- Sorption by silica, iron hydroxides, oxyhydroxides and clay. Sorption on clay is particularly pertinent to the Buried Lake style of mineralisation at Laguna Salada where uranium-vanadium minerals are concentrated on the contact of the gravels with the underlying mudstone, and also where they line fractures that penetrate the clay immediately below the unconformity.

Examples of surficial uranium deposits are Yeelirrie and Lake Maitland in Western Australia and Langer Heinrich and Trekkopje in Namibia (World Nuclear Association, 2009). Surficial uranium deposits can be large, ranging up to a resource of 164Mlb at Langer Heinrich (Table 8-1).

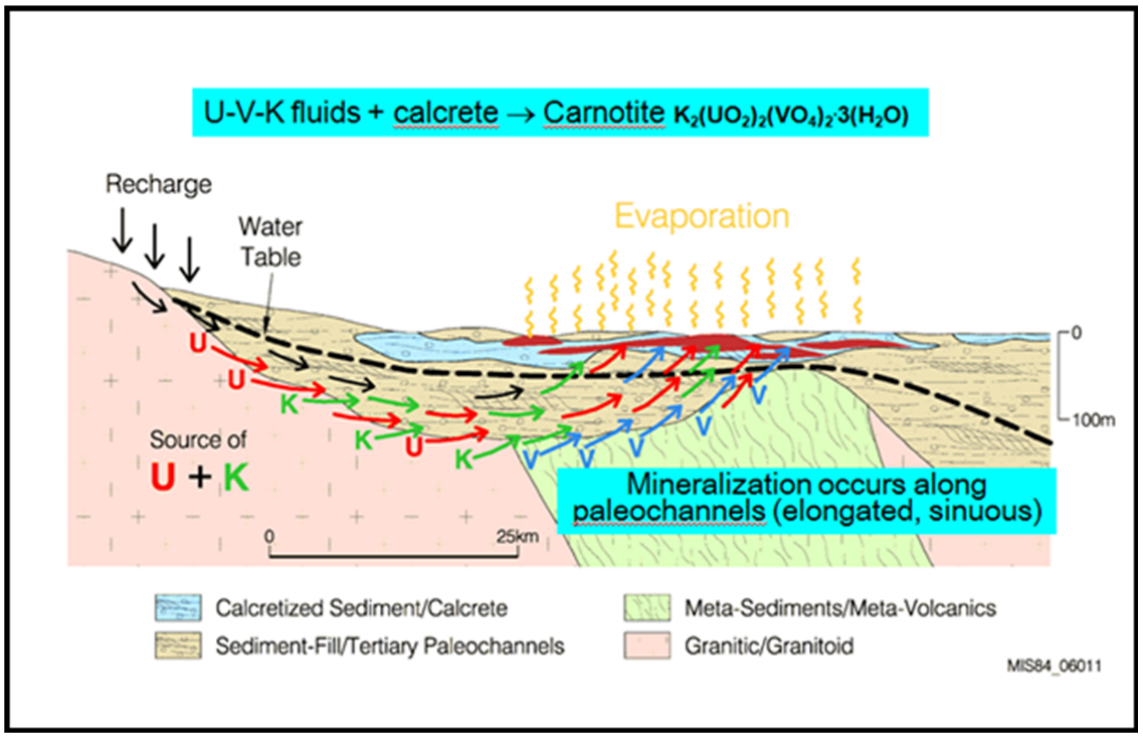


Figure 8-1: Genetic Model for the Formation of Surficial Uranium Deposits, modified from Kyser and Cuney, 2009, after Mann and Deutscher, 1978 and Arakel, 1988

Table 8-1: Resource examples from Surficial Uranium Deposits

Deposit	Country	Deposit Type	Thickness of mineralisation (m)	Resource			
				Category	Ore Tonnage (Millions)	Average Grade U_3O_8 (ppm)	Resource (Million Pounds U_3O_8)
Langer Heinrich	Namibia	Calcrete, hard rock	Up to 50m thick	Measured & Indicated	56.4	600	72.4
				Inferred	70.7	600	91.6
Lake Maitland	Western Australia	Calcrete, hard rock	Average 1.7m. Located below water table	Indicated	28.7	376	23.8
				Inferred	3.6	274	2.2
Trekkopje	Namibia	Calcrete, hard rock	8-10m thick, 80% of mineralisation shallower than 30m	Measured & Indicated	61.0	140	18.4
				Inferred	502.0	130	139.2
Tubas Red Sand	Namibia	Caliche, free digging	Up to 9.5m thick	Measured & Indicated	3.2	168	1.2
				Inferred	10.7	158	3.7

Note: These deposits are not owned by U3O8 Corp. and are shown for information purposes only. Comparisons of U3O8 Corp's uranium resource and exploration targets with these uranium deposits are conceptual in nature, and have not been independently verified by U3O8 Corp. and information regarding these deposits are drawn from publicly available information. There is no certainty that further exploration of U3O8 Corp's uranium resource or other targets will result in the delineation of a similar mineral resource.

9 EXPLORATION

9.1 Responsibility for Exploration

All of the exploration undertaken by U3O8 Corp. has been by appropriately qualified technical staff employed by, or whom have consulting contracts with U3O8 Corp. Subsequent to the initial resource estimate made for Laguna Salada (Coffey Mining, 2011), exploration has been undertaken elsewhere in the Laguna Salada district with discoveries having been made in the La Susana area located on the southern extension of the Laguna Salada Deposit, and the La Rosada area, located some 45km to the northeast of the Laguna Salada resource area. Details of the exploration undertaken in the Laguna Salada resource area are reported in detail in Coffey Mining (2011) – a summary of that work is provided here for completeness.

9.2 Reconnaissance Exploration

Mega commenced reconnaissance exploration of the Laguna Salada Project in 2007 with the aim of ground-truthing anomalies detected in a 1978 airborne radiometric survey undertaken by CNEA as described in Section 6. Having confirmed that airborne radiometric anomalies corresponded with mineralisation in the gravels, early stage exploration on the Laguna Salada Project concentrated on mapping outcropping uranium-bearing gravels and the enclosing strata. In parallel with the geological mapping, a ground radiometric survey was undertaken on a 100m square grid, results of which confirmed an extensive radiometric anomaly located on the two mesas in the Guanaco and Lago Seco areas, which together constitute the Laguna Salada Deposit (Figure 9-1). Initial exploratory pitting and trenching confirmed that mineralisation was widespread and required further investigation.

RC drilling was undertaken on a trial basis by Mega, but was abandoned in favour of trenching and pitting as a more effective and practical means of exploring and sampling the unconsolidated gravel as discussed in Section 10.

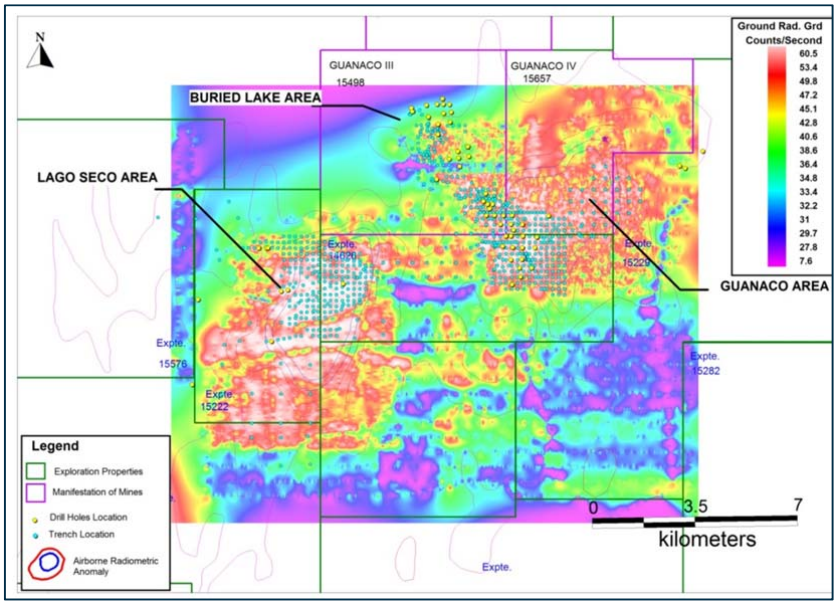


Figure 9-1: Map showing the location of Pits and Trenches on gridded ground Radiometric Data with Concession Boundaries shown

9.3 Follow-up Exploration

9.3.1 Exploration Methodology

As outlined in Sections 6 and 10, 57 RC bore holes were drilled in the Laguna Salada Project area (Figure 9-1). However, due to the fine-grained nature of the mineralisation, and the propensity for this mineralisation to be blown out of the gravel due to the high air pressure used in RC drilling, geochemical sampling of this material proved unreliable. In addition, recovery was poor; therefore, RC drilling for geochemical sampling was abandoned as the primary exploration tool. Be that as it may, the RC drilling did serve an important purpose in demonstrating continuity of mineralisation between holes through radiometric logging with a Mount Sopris down-hole spectrometer. Diamond drilling was also not feasible due to the unconsolidated nature of the gravel, and consequently, pitting and trenching became the principal exploration tool at Laguna Salada.

Trenching was initially done at a nominal 1km grid spacing during reconnaissance exploration, and this was reduced through nominal 400m spacing to a nominal 200m square grid over areas of interest. The grid spacing was further reduced to 100m and 50m in some areas in order to confirm the continuity of mineralisation, its location within the stratigraphy, as well as determine variation in uranium and vanadium grade within the mineralised layer.

9.3.2 Guanaco Area

Having established continuity of mineralisation between trenches spaced at 100m intervals in test areas of the Guanaco target, routine exploration trenching was undertaken on a nominal 400m by 400m spacing to establish the full extent of mineralisation within and beyond the initial ground radiometric anomaly. Airborne and ground radiometric anomalies were used as a starting point for exploration because most of these anomalies marked areas in which the mineralised layer was exposed from beneath a shallow layer of barren gravel, sand and/or soil that masked the surface expression of the mineralisation elsewhere.

An area of approximately 40km² was covered by 400m by 400m grid trenching at Guanaco (Figure 9-1). Mineralised areas defined by this initial pitting were infilled to a 200m by 200m trench spacing. Some regions of the Guanaco area have trenching spaced at 100m square spacing while additional trenching was done at a spacing of 50m along some profiles to confirm the inferred continuity of mineralisation between adjacent wide-spaced trenches in the western parts of Guanaco sector. Trenches were completed to a depth of 2.5m to 4m in the Guanaco area. Figure 9-2 illustrates the distribution of uranium mineralisation identified in the trenching program through a plot of the product of grade with thickness of the mineralised layer found in each trench at Guanaco.

East-west orientated vertical sections through the Guanaco area show that consistent mineralisation between adjacent trenches can be interpreted as forming a flat to shallowly undulating layer of mineralisation located between surface and a maximum depth of 3m, and that there is continuity of this layer for up to 3,000m along east-west – and north-south – orientated sections (Figure 9-3).

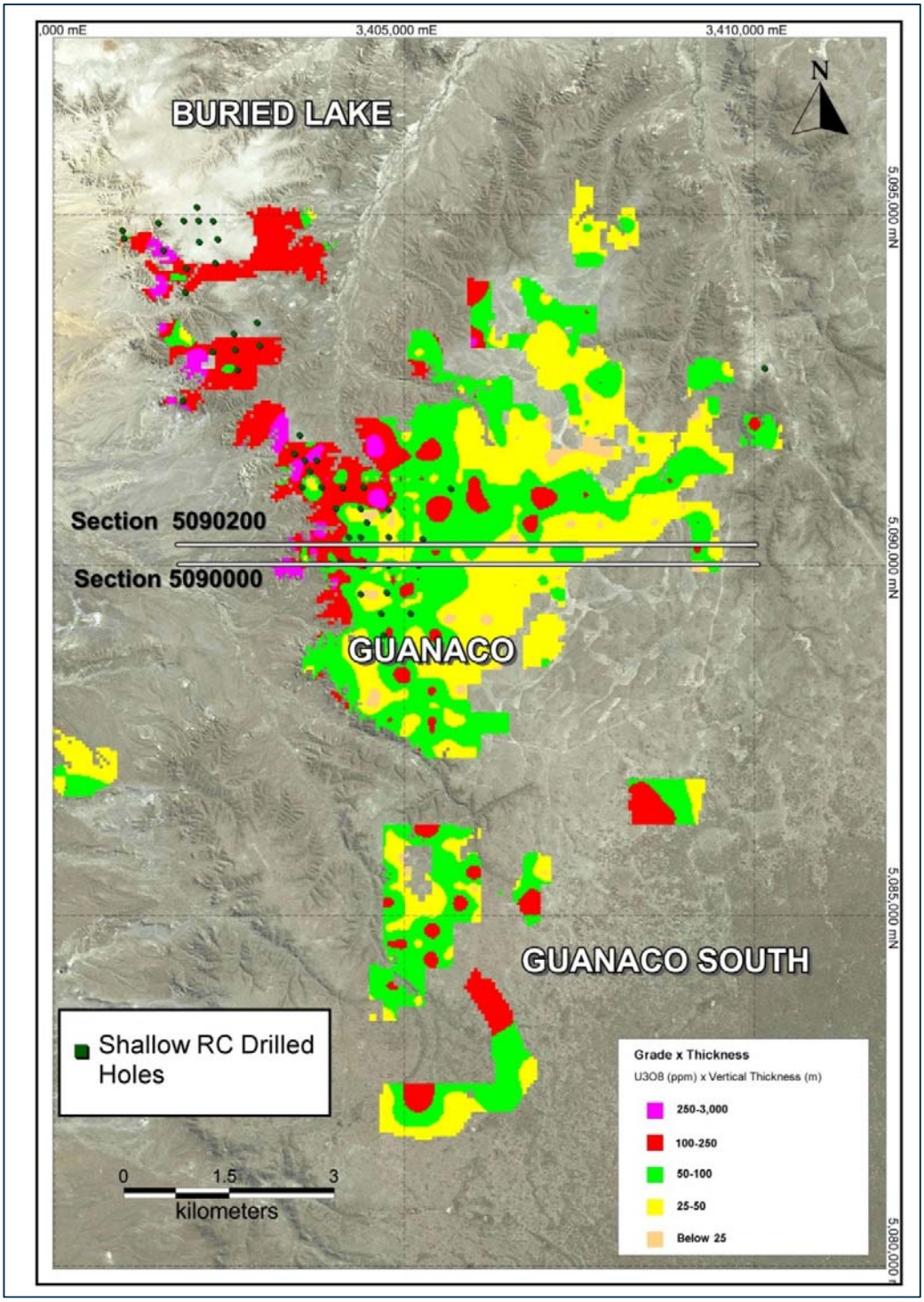


Figure 9-2: Uranium grade-thickness Distribution Map of the Guanaco Sector of the Laguna Salada Project

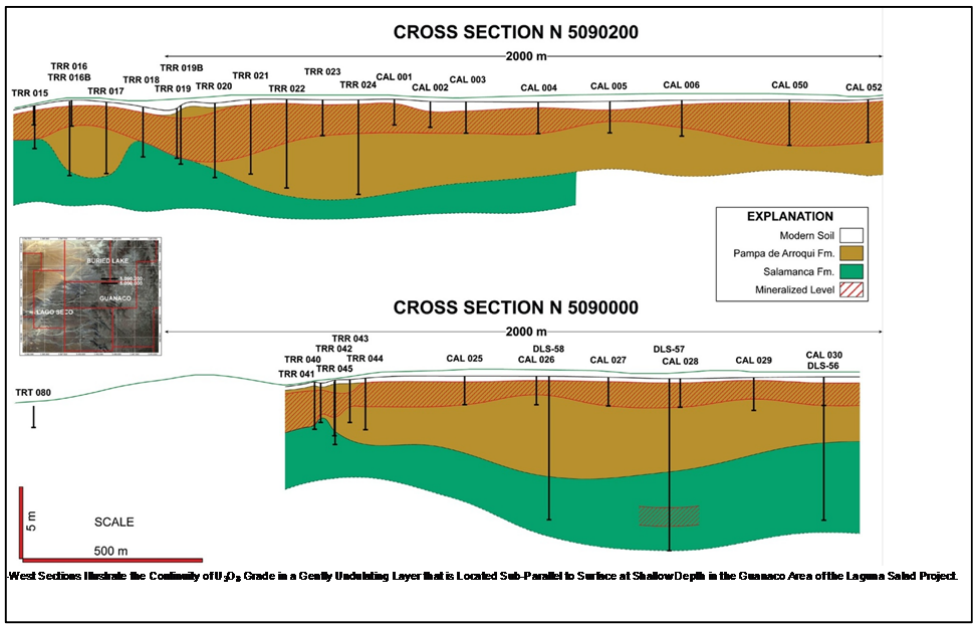


Figure 9-3: Vertical Cross Sections through the Guanaco area showing Lithology and the tabular nature of the Mineralised Zone revealed by trenching and drilling.
The location of the section lines is shown in Figure 9-2.

9.3.3 Lago Seco Area

An area of approximately 25km² was trenched at a nominal 400m square spacing at Lago Seco and mineralised areas identified with that trenching were infilled to a nominal 200m square grid with more detailed trenching being done at a tighter spacing to confirm continuity of mineralisation. A total of 400 trenches were dug in the Lago Seco Area were dug to depths varying from 2m to 3m. Figure 9-4 shows uranium distribution using grade-thickness values from each pit. Uranium mineralisation distribution in plan view at Lago Seco indicates a northeast and northwest orientated influence on mineralisation (Figure 9-4).

Vertical profiles through the Lago Seco area (Figure 9-5) are similar to those of the Guanaco area, showing consistent mineralisation between adjacent trenches that can be interpreted as a flat to gently undulating layer of mineralisation located from within 20cm of surface to a maximum depth of 3m. Mineralisation exposed in adjacent trenches suggests continuity up to 4,000m along east-west – and 3,500m in north-south – orientated sections (Figure 9-5).

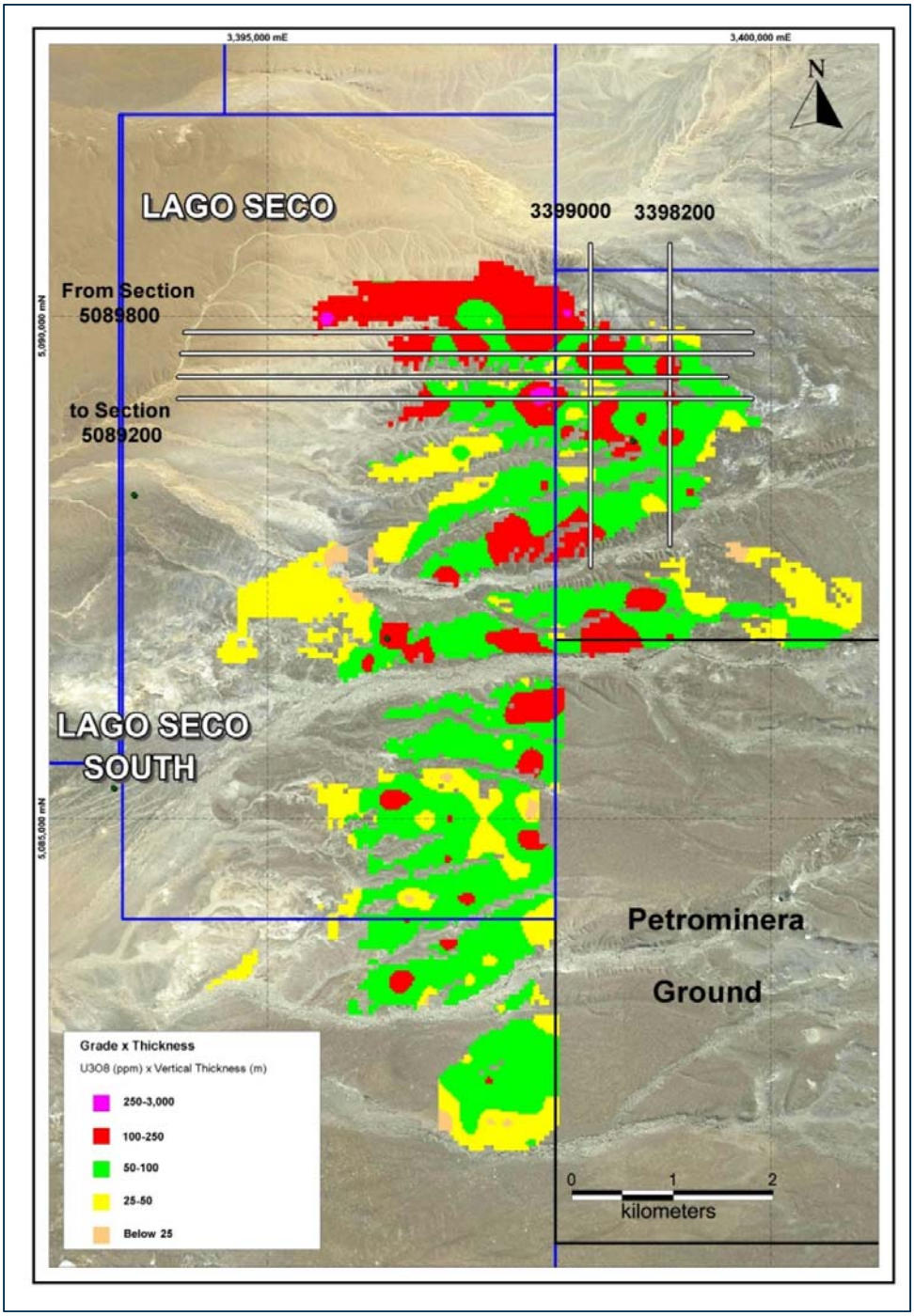


Figure 9-4: Uranium grade-thickness values obtained from pits and trenches in the Lago Seco area defining the distribution of mineralisation

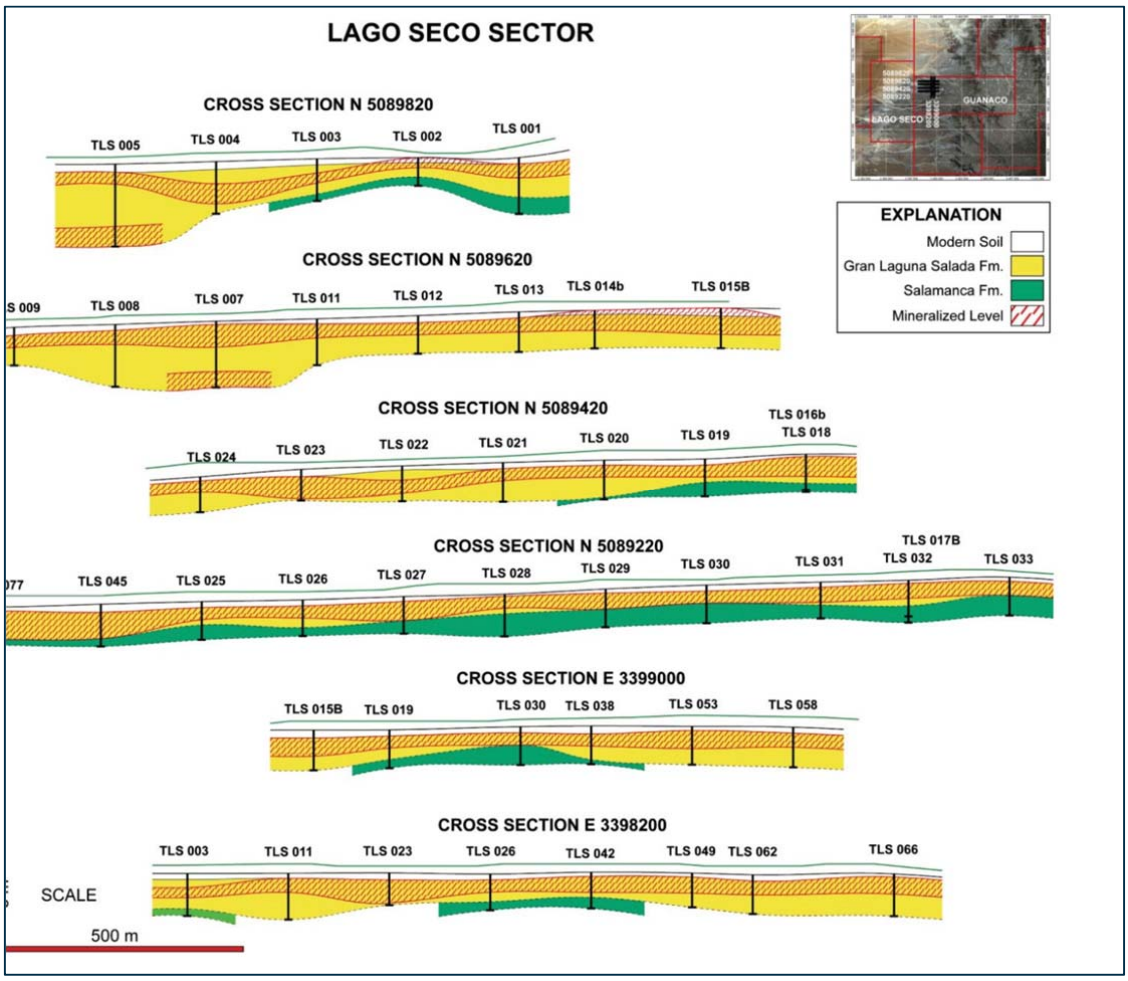


Figure 9-5: Stacked sections showing the distribution of Quaternary gravel over mudstones of the Tertiary Salamanca Formation and the distribution of mineralisation as revealed by trenching in the Lago Seco area of the Laguna Salada Project

9.3.4 Buried Lake Area

Uranium-vanadium mineralisation in the Buried Lake area differs from that of the Guanaco and Lago Seco targets in that it is associated with the unconformity between the Quaternary gravels with the underlying Tertiary Salamanca Formation. Trenching near the margin of the Eastern Mesa, where the unconformity outcrops, or is within a few metres of surface, shows that mineralisation occurs in a laterally continuous, undulating, tabular zone that spans the unconformity – the upper part of the mineralised layer typically lying within the gravel unit and its lower boundary within the mudstones and sandstones of the Salamanca Formation. Trenches on the slopes of the edges of the mesa (Figure 9-6) indicate that mineralisation is laterally continuous over approximately 3km in a roughly northwest-southeast profile.

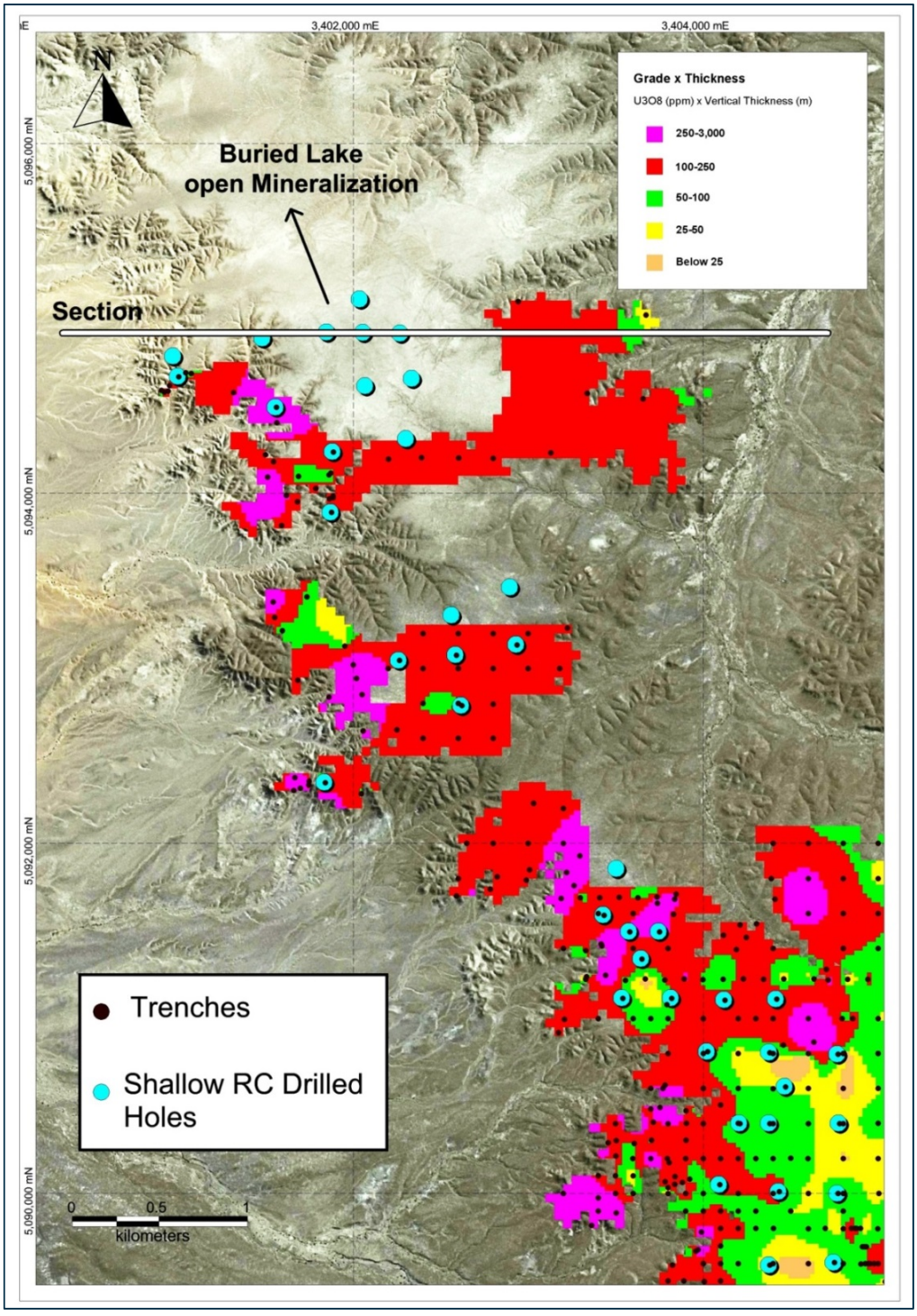


Figure 9-6: Uranium grade-thickness distribution map of the Buried Lake Sector of the Laguna Salada Project

The location of the vertical profile shown in Figure 9-7 is shown for reference.

The extent of the unconformity-related mineralised layer beneath the interior of the mesa was provisionally tested with a series of RC drill holes, DLS-71, DLS-72, DLS-73 and DLS-28 (Figure 9-7). Radiometric logs from these holes confirmed the presence of a mineralised layer 0.5m to 1.2m thick at depths varying from 5m to 10m below surface with grades estimated to be between 100ppm and 500ppm eU_3O_8 (U_3O_8 equivalent). These data suggest that the unconformity-related mineralisation in the Buried Lake area occurs as a sub-horizontal layer that extends at least 800m laterally beneath the mesa (Figure 9-7) (Figure 9-6).

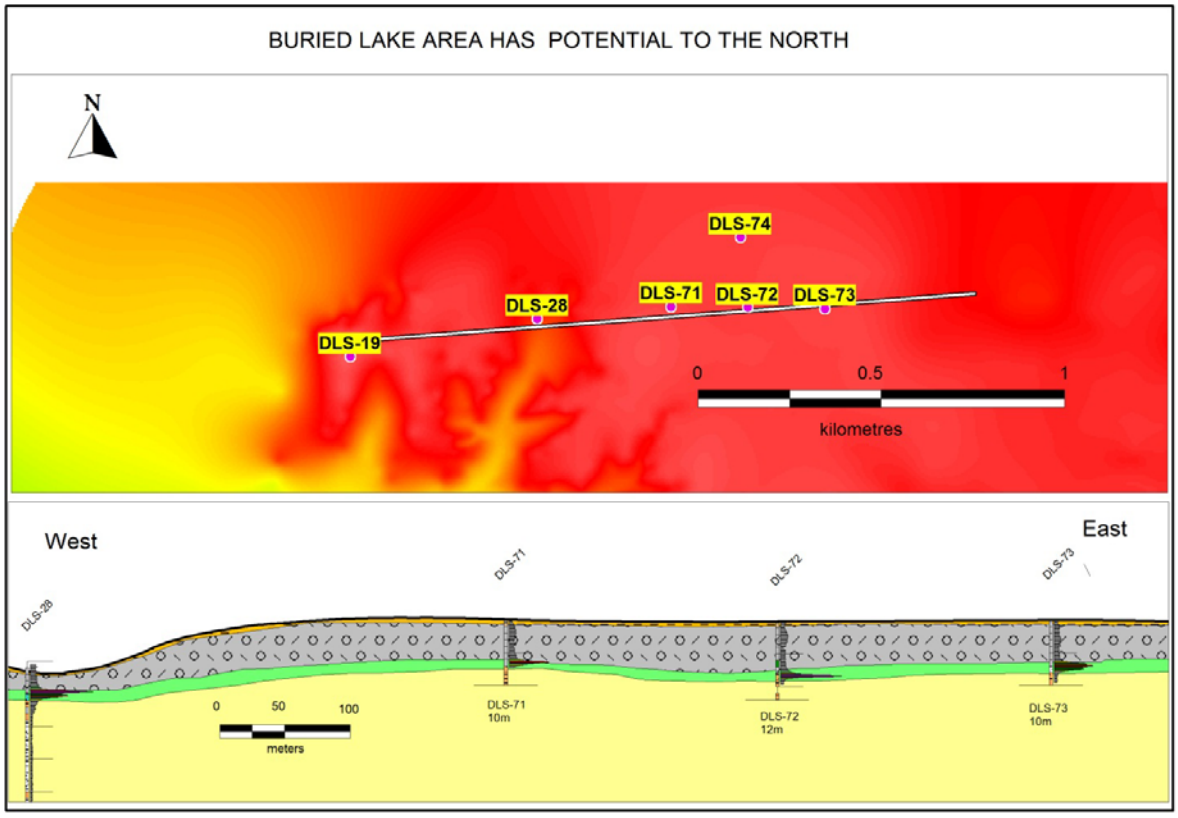


Figure 9-7: Section of Buried Lake mineralised drilled holes showed possible continuity of mineralisation that has not been included in the resource area

9.4 Regional Exploration

Additional regional exploration work surrounding the Laguna Salada Deposit has defined two areas of consistent mineralisation in the La Susana area that adjoins the Laguna Salada resource area on the south, and is interpreted as an extension of the deposit, and the La Rosada area, a distinct centre of mineralisation about 45km to the northeast (Figure 9-8).

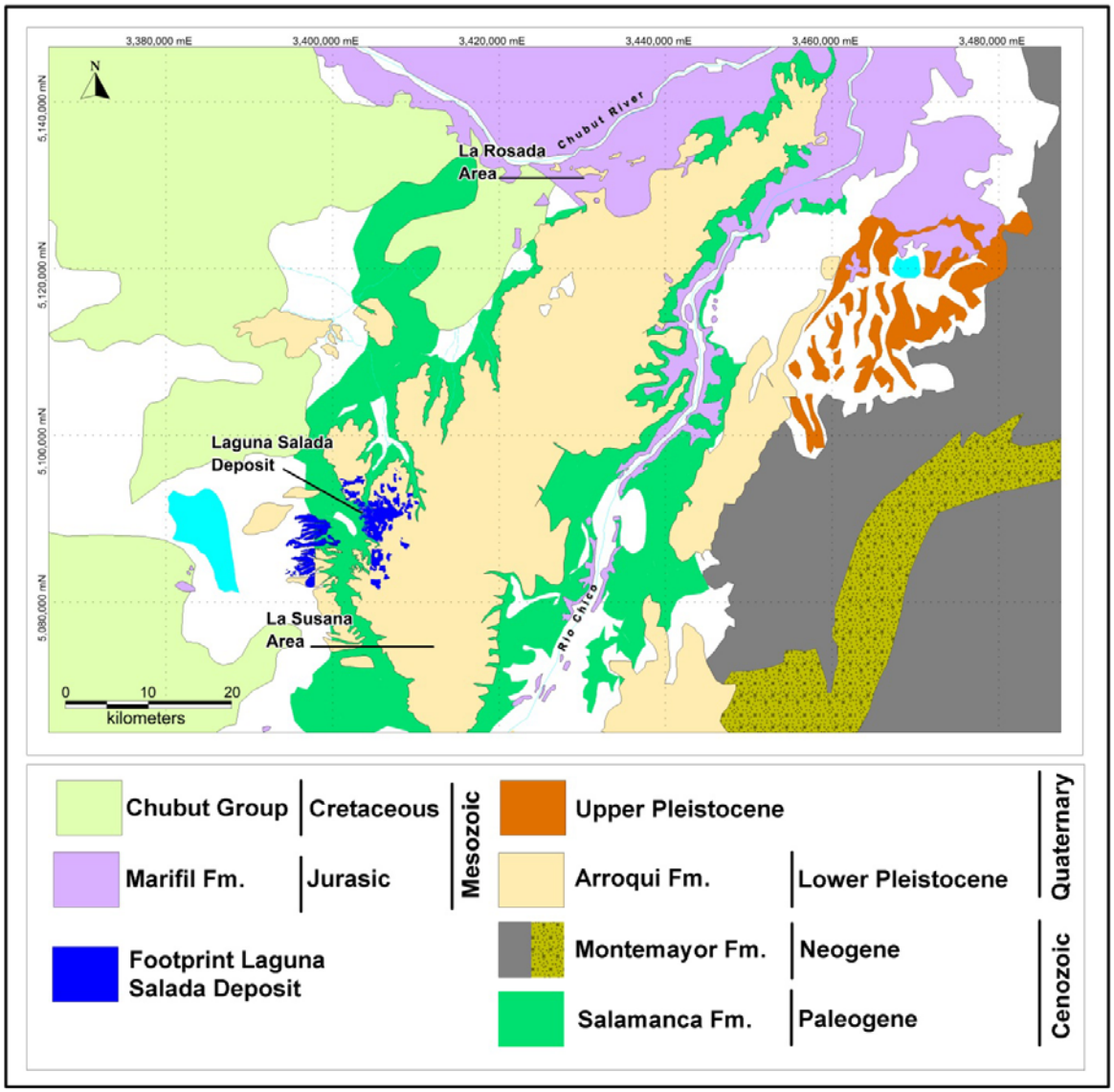


Figure 9-8: Regional Geological Map showing the distribution of the Salamanca and Pampa de Arroqui formations with the location of the Laguna Salada Deposit and the La Rosada and La Susana areas

9.4.1 La Susana

Mineralisation at La Susana can be traced southwards along the edge of the mesa in which the Laguna Salada resource lies, and therefore, is interpreted as an extension of the deposit. The slope at the edge of the mesa is where the mineralised layer, which is capped by barren gravel, sand and/or soil on the top of the mesa, comes to surface. Mineralisation at La Susana has been traced along the western and eastern edges of the mesa, some 10km to 15km apart (Figure 9-9). The mineralised layer at La Susana lies at an average depth of 0.5m below surface and is, on average, 0.5m thick. The extent to which the 100 km^2 interior of the mesa is mineralised needs to be established through an extensive program of pitting and trenching using a similar procedure to that applied elsewhere at Laguna Salada, commencing with a 1,000m square grid followed by infill pitting.

Vertical channel samples defined an average grade of 78ppm uranium (U_3O_8) and 290ppm vanadium (V_2O_5) from the mineralised gravel layer at La Susana (Table 9-1).

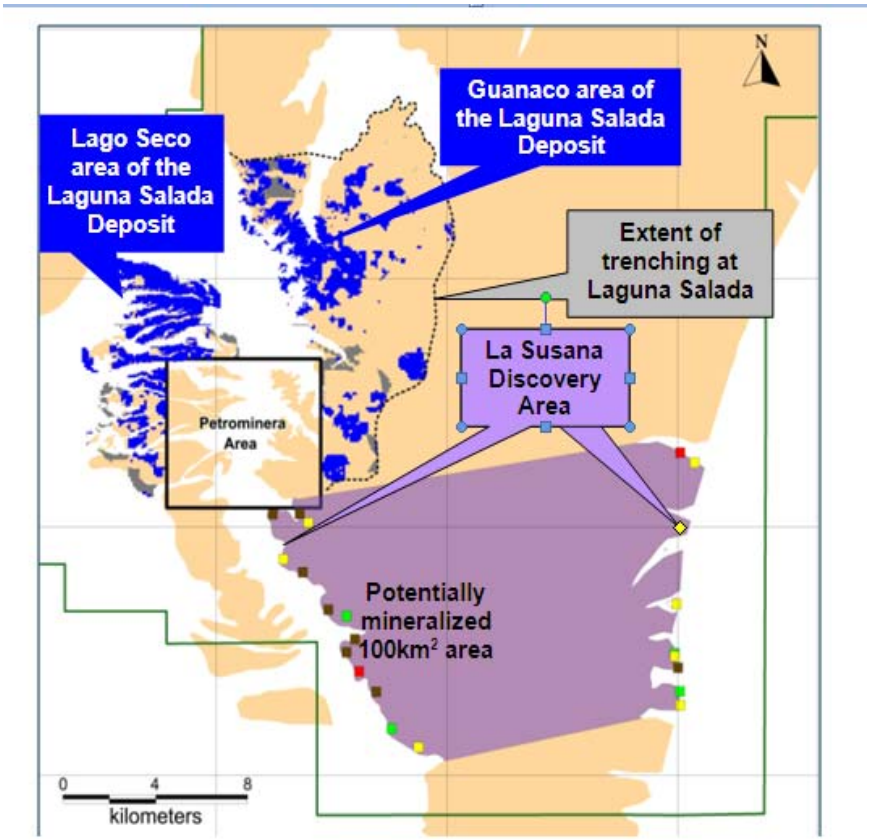


Figure 9-9: Map of the Quaternary gravel units in the Laguna Salada area showing the location of the sampling that defines the La Susana area relative to the Laguna Salada resource

Table 9-1: Assay results from channel sampling of the mineralised gravel at La Susana

Sample Number	Width	Uranium	Vanadium
		U_3O_8	V_2O_5
		ppm	ppm
8720	1.0	296	369
8721	0.8	13	156
8722	0.5	10	146
8789	0.7	213	360
20467	0.3	18	123
20468	0.3	43	260
20469	0.5	21	250
20471	0.5	100	288
20473	0.6	147	397
20474	0.2	39	364
20475	0.5	35	315
20478	0.3	69	155
20479	0.4	37	160
20480	0.5	20	229
20481	0.6	13	176
21251	0.5	121	222
21252	0.5	15	146
21254	0.3	76	823
21255	0.5	108	353
21256	0.6	27	185
21257	0.6	105	206
21258	0.5	87	213
21260	0.2	129	376
21261	0.3	79	218
21262	0.3	45	179
21263	0.5	27	195
21265	0.8	266	425
21266	0.5	27	206
Weighted Average	**0.5**	**78**	**268**

9.4.2 La Rosada

La Rosada is a mineralised area located in relict Quaternary terraces overlying Jurassic rhyolitic volcanic sequences located immediately northwest of the main mesa (Figure 9-10).

Vertical channel samples through the gravel have a weighted average grade of 1,500ppm uranium (U_3O_8) and 780ppm vanadium (V_2O_5) from a layer of gravel about 0.7m thick that lies at an average depth of 0.3m below surface (Table 9-2). This average grade is from two areas of gravel, totalling 3.2km^2 in extent. The highest grade encountered in the gravel at La Rosada was 11,780ppm (1.1%) U_3O_8 and 5,168ppm (0.5%) V_2O_5 in a 0.4m thick horizontal layer. The La Rosada area contains the highest uranium-vanadium grades found to date in the Laguna Salada district.

Mineralisation may continue in the gravels beneath the sand cover to the south of the La Rosada discovery (Figure 9-10) – and exploration is planned for that area.

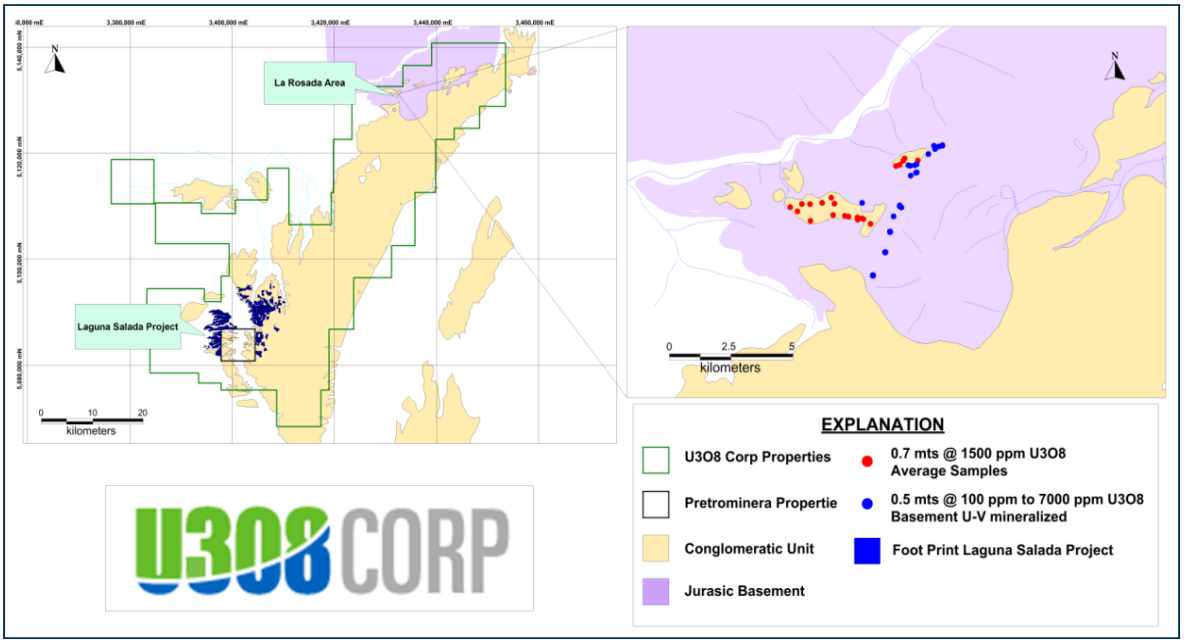


Figure 9-10: Map showing the location of the sample points that define La Rosada relative to the Laguna Salada resource

A different style of mineralisation is encountered in the basement at La Rosada with carnotite occurring in fractures in the volcanic sequence. This mineralisation may have been a source for uranium that has precipitated in caliches in the Quaternary gravels, but further work is required to establish the extent to which basement mineralisation is a target in its own right either as individual mineralised structures or, at appropriate vein density, as a bulk mineable target. Grades from the initial exploration of the basement style mineralisation are listed in Table 9-3.

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Table 9-2: Assay results from vertical channel samples through the mineralised layer at La Rosada

	Sample Number	Intercept (m)			Uranium	Vanadium
		From	To	Width	U_3O_8	V_2O_5
					ppm	ppm
HIGH GRADE CALICHE	**21129**	0.0	0.7	0.7	1,253	623
	21274	0.3	0.8	0.5	184	532
	21277	0.5	1.1	0.6	766	386
	21278	0.5	1.0	0.5	1,289	552
	21279	0.3	1.2	0.9	2,483	860
	21280	0.6	1.0	0.4	11,780	5168
	21281	0.3	0.6	0.3	122	177
	21283	0.0	0.5	0.5	1,222	482
	21284	0.4	1.2	0.8	485	245
	21285	0.3	0.9	0.6	1,174	421
	21286	0.4	1.2	0.8	259	171
	21287	0.2	1.0	0.8	426	223
	21288	0.2	1.7	1.5	2,455	793
	21291	0.2	1.3	1.1	101	293
Weighted Average				**0.7**	**1,500**	**780**

Table 9-3: Assay results from channel sampling of basement-style mineralisation at La Rosada

	Sample Number	Sample Length (m)	Uranium	Vanadium
			U_3O_8	V_2O_5
			ppm	ppm
BASEMENT	8769	0.3	598	277
	21135	0.7	133	102
	8778	0.2	173	96
	8787	0.3	157	162
	21131	0.6	913	377
	21134	0.9	861	439
	21138	0.2	1,562	734
	8772	0.1	7,933	2644
	8780	0.4	1,730	623
	21127	0.6	97	289
	21139	0.4	199	278
	21272	0.3	48	364
	21275	0.4	195	262
	21290	0.6	99	253
	23012	0.6	200	444
	23014	0.7	116	218
	23029	0.6	129	337
	23035	0.6	217	191

10 DRILLING

As outlined in Section 6, Mega drilled 57 RC bore holes for 1,561m in Laguna Salada in 2008. This drilling was undertaken by Degestron Drill S.A. After this initial drill campaign, a decision was taken to abandon conventional drilling as not being an efficient and cost-effective exploration tool for the Laguna Salada Deposit for the following reasons:

- Due to the extremely fine-grained nature of the mineralisation as discussed in Section 13.2.4, it was suspected that the high air pressures used in RC drilling preferentially removed fine material and associated mineralisation from the gravel, leading to chemical assays that were anomalously low-grade;
- RC bore holes do provide a means of using a down-hole Mount Sopris spectrometer to estimate uranium grade. However, the accuracy of uranium grade estimates was brought into question by observed discrepancies in radioactivity relative to chemical assay brought about by variable uranium disequilibrium over the project area; and
- Diamond drilling does not provide an alternative option because of the unconsolidated nature of the gravel.

After review of the Laguna Salada Project in preparation for the initial resource estimate, Coffey Mining stated: "*Pitting and trenching was deemed to be the most practical and viable means of sampling at Laguna Salada. These methods have the additional advantage of allowing direct observation of the form and continuity of mineralisation at the scale of the pit or trench wall*." (Coffey Mining, 2011, Item 12.1).

In accordance with the recommendations made by Coffey Mining (2011), a vibrosonic drill rig will be tested in the Laguna Salada area in the next exploration campaign as a means of relatively passively recovering a core of unconsolidated gravel into a plastic sheath for logging, sampling and chemical assay. The fact that the drilling process does not use compressed air, and recovers a large diameter (six inch) "core", should provide a representative sample in terms of retained fines and sample volume. It is hoped that vibrosonic drilling will provide an efficient means of augmenting continuous channel sampling from exploration trenching and pitting in future exploration and resource estimates that may be justified in the Laguna Salada district.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 Responsibility for Sampling and Sample Security

All sampling on the Laguna Salada Project used in the initial resource estimate was done by a team of exploration personnel initially employed, or contracted, by Mega. After the acquisition of Mega's assets by U3O8 Corp., this same team continued exploration sampling of the Laguna Salada Project for U3O8 Corp. All sampling in exploration of the Laguna Salada district has been done according to the sampling procedures that were reviewed by Coffey Mining (2011), and subsequent exploration has incorporated associated recommendations.

Handling of the samples, including homogenization, quartering, screening, bagging and numbering, was done by employees and contractors working for Mega and subsequently U3O8 Corp.

Field samples were transported U3O8 Corp's vehicles to the base camp where they were stored in a covered, locked shed. Samples were then transported to the preparation facility in Mendoza Province by an independent, commercial transport company, or by company personnel in pick-up trucks. Coffey Mining reported that "*Coffey Mining considers that the level of sample security is appropriate for the level of project*," and that "*Security measures implemented to ensure the integrity of the samples are considered by Coffey Mining to be adequate relative to the low security risk of the project area,*" *(*Coffey Mining, 2011*).*

11.2 Sample Spacing

Trenches and pits were spaced on 400m and 200m square grids for the maiden resource estimate, with additional trenching and pitting done at 50m to 100m spacing to confirm continuity of mineralisation that was inferred from the wider-spaced sampling. Coffey Mining (2011) reviewed the pit and trench spacing and concluded that the spacing of 400m was adequately tight for Inferred resources to be estimated, and that 200m spacing was adequate for classification of resources to the Indicated category.

Continuous channel sampling of pit and trench walls was undertaken using a methodology that allowed geological and mineralisation contacts to be honoured and is fully described in Coffey Mining (2011). Individual samples that constituted continuous channel samples typically cover a stratigraphic interval of 0.5m to 1m in length.

11.3 Data Capture

The location of each vertical channel sample profile was measured with a differential GPS and its X and Y co-ordinates recorded in the Gauss Kruger geographic system. The altitude of the top of each pit or trench was recorded relative to mean sea level with the differential GPS. The depth below surface of each sample interval was then measured with a tape, its altitude range calculated, and the corresponding sample number recorded. Coffey Mining (2011) noted, in terms of database integrity that "*No material errors were found*" and expressed a high degree of confidence in the database integrity.

11.4 Sample Method

Details of the sample procedure changed as the understanding of the nature of the mineralisation evolved as described by Coffey (2011):

- During reconnaissance exploration of the property prior to September 2008, pits were dug by hand and the sample intervals established by logging the distribution of yellow uranium-vanadium minerals and radioactivity measurement. Continuous channel samples were taken down a vertical wall of each pit or trench. Sampling commenced at the top of the mineralised zone – the overburden was not sampled.
- In September 2008, the methodology was changed in order to speed up sampling and to obtain a larger and potentially more representative sample from the trenches using a mechanical backhoe. In this case, the individual units that were to be sampled separately were marked and the operator of the back-actor guided as to the limits of each sample interval.
- After observing that the majority of the mineralisation was located in the matrix of the gravel, a screened sample was taken in addition to a whole sample. The field processing of these sample duplicates is described below and in further detail in Coffey Mining (2011).
- Only screened samples were taken from continuous channel samples from the trench walls during the period from May 2009 to April, 2010.
- In May 2010, following recommendations made during the site visit made by Coffey Mining's personnel, the sample procedure was simplified with the excavator being used to cut the trench and the continuous channel samples being taken by hand from the sidewall. Each sample was homogenised and split in order to provide a whole sample and a screened duplicate. A complete channel sample profile was taken from surface to the floor of the trench, whereas prior to this, sampling started at the top of the mineralised zone, even if this was at some depth below surface. The logic of taking a sample profile from surface, even if low levels of radioactivity indicated that the upper layers exposed in a trench were poorly mineralised, was to determine the grade of the overburden in case economic factors changed to the extent that this low-grade cover could be processed.

Coffey Mining (2011) concluded, after revision of the sample procedure, that "*Trenching was undertaken in a diligent manner*," that logging of the trenches had "*Standard nomenclature applied with recording and apparent high quality*."

11.5 Area Sampled and Number of Samples

A total of 2,146 pits were excavated with results taken into account for the maiden resource estimate on the Laguna Salada Project (Coffey Mining, 2011). Exploration trenching, at a nominal 400m by 400m spacing, was completed over a region of 15km by 20km, while infill trenching, on a nominal 200m by 200m square grid, was undertaken in the mineralised areas defined by the wider-spaced trenching (Figure 11-1). Some areas underwent more detailed trenching to confirm continuity of mineralisation. Of the 2,146 pits that were excavated:

- 1,343 had only whole samples taken;
- 309 had only screened samples taken; and
- 494 had duplicate whole and screened samples taken.

11.6 Estimation of Grade of Screened Samples

Approximately 10% of the trenches for which only screened samples had originally been taken were also re-opened and had whole gravel samples (unscreened) taken. In addition, duplicate screened and whole-samples were taken from exploration trenching on a 400m by 400m grid from May 2010, so as to increase the size of the database of duplicate screened and whole samples. Comparison of the uranium and vanadium grade of the whole sample relative to the screened sample allowed a regression line to be calculated for each element from the data. Application of this regression formula allowed the grade of the original, unscreened gravel to be calculated from the grade of the screened samples.

Coffey Mining (2011) considered the use of the grades of uranium and vanadium calculated from the regression formula to be appropriate for use in resource estimation.

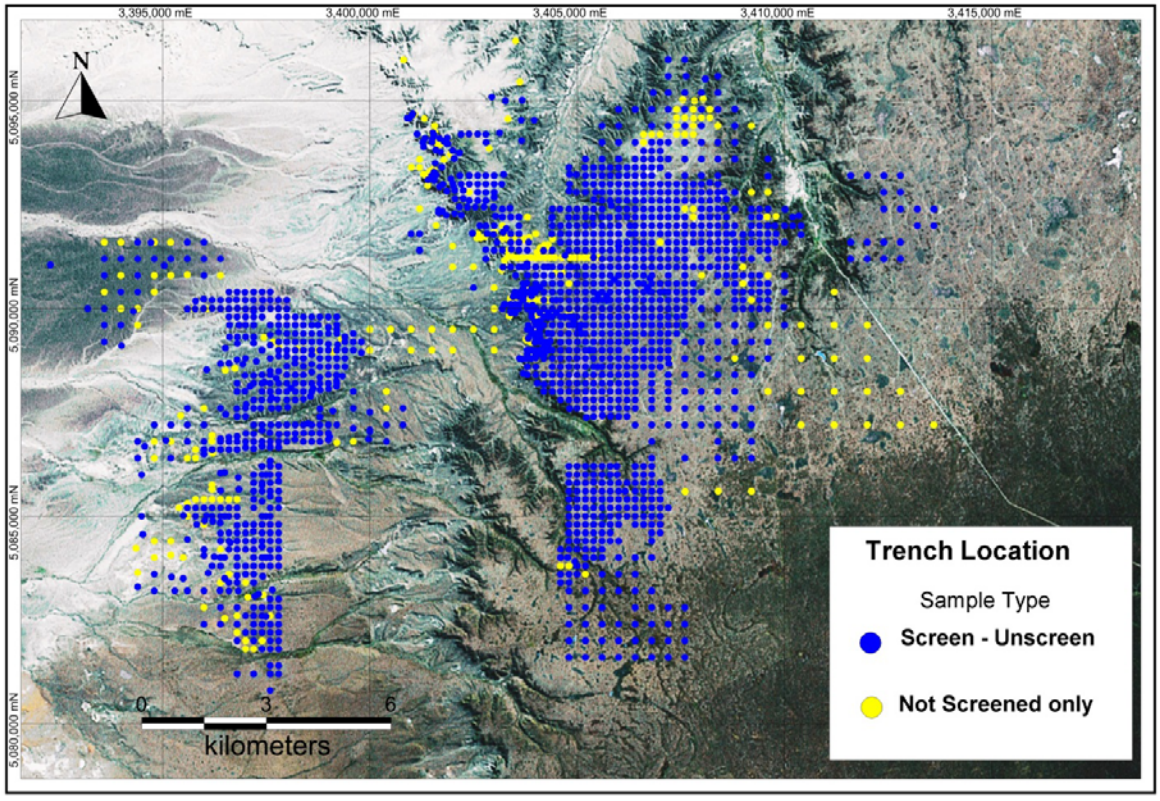


Figure 11-1: Plan showing the location of the trenches and pits at Laguna Salada coloured according to the sample method used

11.7 Sample Quality

Coffey Mining (2011) noted that pitting and trenching involves an inherent risk of sample bias. Potential sample bias relates to the difficulty of cutting a channel sample to a constant width and depth in gravelly material without larger clasts being plucked out of the pit wall; thereby, constituting a higher proportion of the sample than they represent *in situ*. Hence, sample quality, and the extent to which a sample is representative of the *in situ* material, is dependent on two principal factors:

- The inherent heterogeneity of the gravel; and
- The diligence and experience of the samplers.

In order to minimise sample bias and to ensure that samples are representative, U3O8 Corp. personnel were given additional on-site training by Coffey Mining during the site visit in 2010. Sampling was carried out by well-trained and experienced technicians under the constant guidance of an experienced U3O8 Corp. geologist.

Inherent heterogeneity of the mineralisation was quantified using four types of duplicate samples taken from disperse sample sites throughout the project area, as follows:

- Pulp duplicates: defining heterogeneity at the scale of the grain size to which the sample was milled – in this case to 150 mesh (nominal 106µm).
- 10 mesh duplicates: comparison of grade between duplicates of this type shows the variation in grade on the 2mm grain size to which the sample was crushed.
- Duplicate trench wall samples: decimetre-scale heterogeneity was estimated by taking duplicate samples from adjacent channel sample profiles in the side-wall of trenches.
- Duplicate trench samples: metre-scale heterogeneity was estimated by taking duplicate samples in the opposite walls of trenches.

Coffey Mining (2011) noted that the results of the various types of duplicate samples indicate high levels of repeatability for the pulp and duplicate channel samples, while duplicate samples from opposite walls of pits and trenches defined a higher level of variation, consistent with the nature of the deposit.

11.8 Opinion as to the Adequacy of Sampling Procedures

Coffey Mining (2011) noted: "*It is the opinion of Coffey Mining that the sampling was undertaken in accordance with acceptable industry standards and best practices. Coffey Mining notes that the site personnel exhibited a high-level of diligence to their task during the 2010 site visit.*

It is recommended that whole-samples be the standard sampling approach, with duplicated screened samples taken to allow for an estimation of the beneficiation effect of screening."

11.9 Assay

11.9.1 Laboratory Processing and Assay

Samples taken between July 2007 and June 2008 were prepared and analysed by Alex Stewart Assayers Argentina S.A. ("Alex Stewart Assayers"). The samples were dried, jaw crushed to -10 mesh (nominal 2mm grain size), riffle split and pulverised with a ring and puck to -140 mesh (nominal 106µm grain size). A split of the -140 mesh pulp was analysed using Inductively Coupled Plasma Atomic Emission Spectrometry ("ICP-AES") or Inductively Coupled Plasma Mass Spectrometry ("ICP-MS"). Digestion was by aqua regia in the early samples while later sample preparation utilised four-acid digestion.

Samples taken after June 2008 were submitted for preparation at ALS Chemex in Mendoza City, Argentina. On receipt by the laboratory, samples were bar coded and weighed. The samples were then dried and crushed to minimum 75% passing through a 2mm sieve. The sample was then passed through a riffle splitter and a 250 gram ("g") sub-sample was pulverised using a ring and puck to 85% of the sample material having a grain size of less than 75µm. These 75µm sample pulps were sent to the ALS Chemex analytical facility in Lima, Peru, or Vancouver, Canada, for analysis. Samples were analysed by ICP-AES after four-acid digestion.

Coffey Mining (2011) noted, in terms of quality of assay data that, "*Good internal laboratory and external quality control data [are] available for the majority of the chemical assaying*".

11.10 Laboratory Certifications

Alex Stewart Assayers are part of the Stewart Group, which has preparation and analytical facilities in many parts of the world and has been in operation for 30 years. Its Canadian laboratories are fully accredited to ISO 9001-2000 and are currently working towards ISO 17025 accreditation.

ALS Chemex is a global diversified testing services organization. Its Mendoza laboratory, where samples were prepared for analysis, has been in operation since 2001. The Vancouver and Lima laboratories in which the assay work was performed, have ISO 9001-2000 and ISO 17025 accreditation.

11.11 Summary of Composite Values and Estimated True Widths

The mineralised horizon was established to be tabular and horizontal in all of the trenches and pits that have been excavated in the Laguna Salada Project area to date; therefore, vertical sample profiles provide a true thickness of overburden and of the mineralised layers. Section 14 of the resource estimate (Coffey Mining, 2011), states that the mineralisation at Laguna Salada ranges from 0.2m to 1.5m in true thickness, with an average of 0.9m.

12 DATA VERIFICATION

12.1 Duplicate Sampling of Trenches

A total of 17 independent samples were taken by Mr Neil Inwood of Coffey Mining during the field visit from trenches TRR-15 and TRR-114 in the Guanaco area as reported in Coffey Mining (2011) (Figure 12-1).

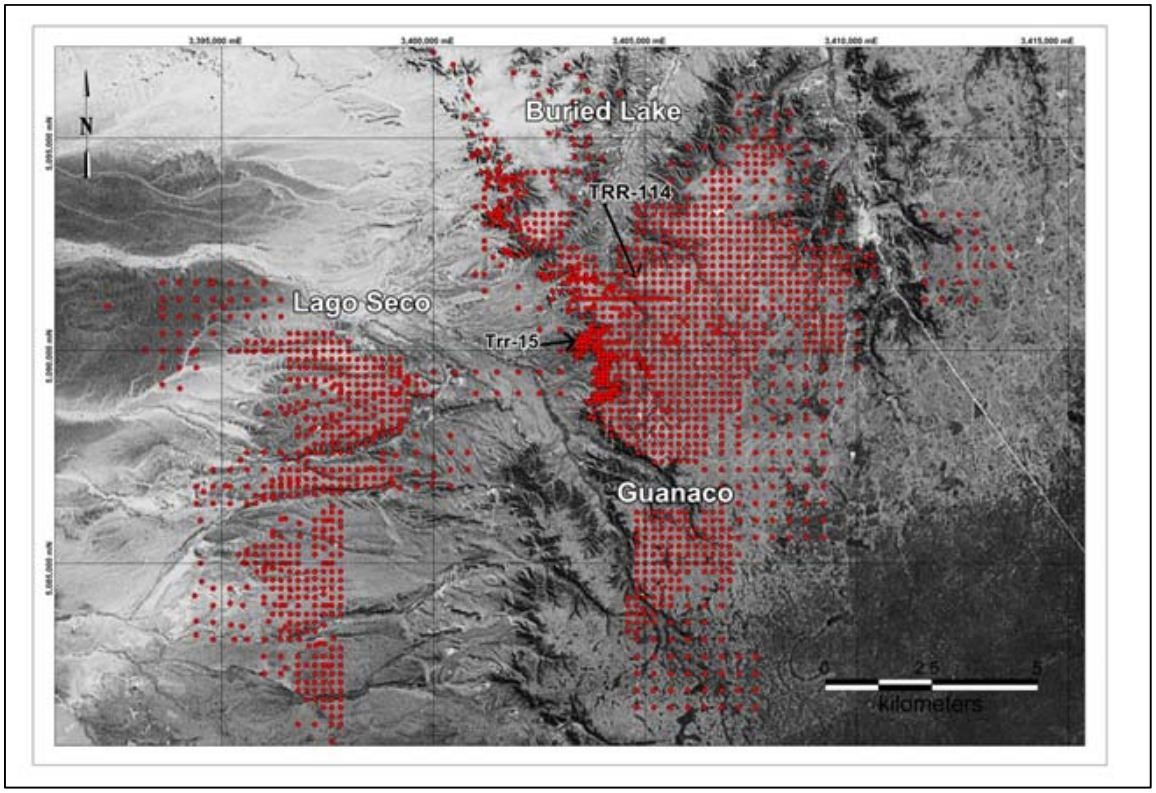


Figure 12-1: Satellite image of the central part of the Laguna Salada Project showing the location of trenches TR-114 and TR-15 from which independent samples were taken by Coffey Mining (2011)

Two sample profiles were sampled from each trench – one taken from each side of the trench (labelled "A" and "B" in Table 12-1). A 30cm wide continuous vertical channel sample sequence was collected from surface to the floor of the trench. Samples were ideally 1m long, but the actual sample length varied in order to honour geological contacts.

The sampling method differed from the original method used by U3O8 Corp. where the top 1m to 1.5m of the trench was sampled using a backhoe bucket and the lower part of the trench was panel chip sampled. These samples would then be homogenised by rolling on a plastic sheet, coned and then quartered to obtain the final sample for assay.

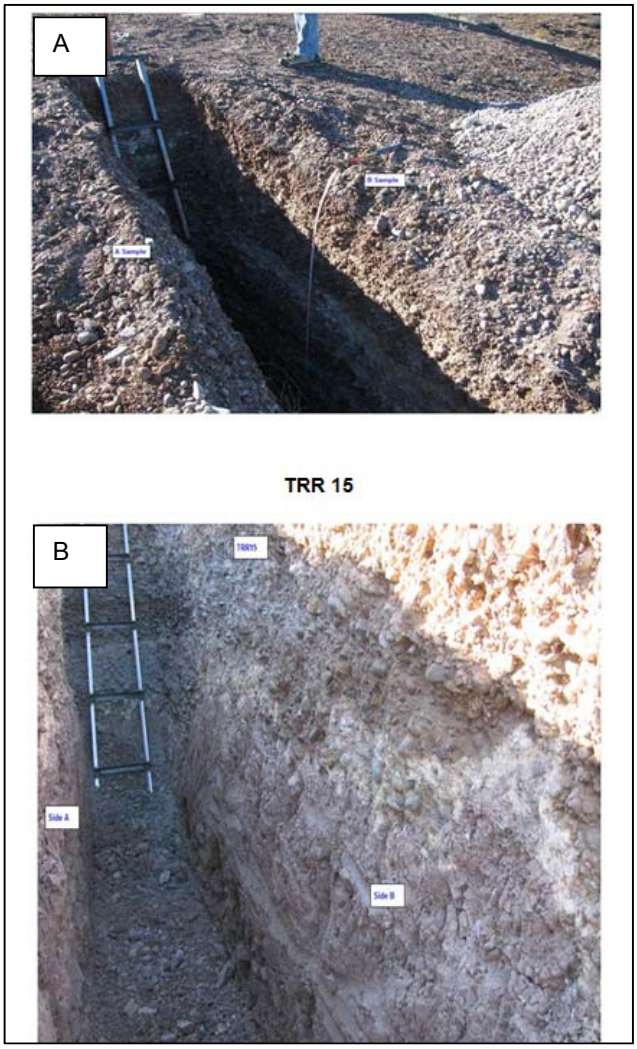


Figure 12-2: Trenches used for independent sampling by Coffey Mining (2011)

Once the independent samples were collected and tagged, they were secured with numbered tamper-proof security tags. A chain of custody was maintained during shipment to ALS Chemex laboratories in Mendoza City, Argentina. Samples were analysed in ALS Chemex's assay facility in Lima, Peru, using method ME-MS61, a hot, four-acid digestion. Uranium analyses for the independent and original samples are provided in Figure 12-2. Original assays from trench TRR-114 were of screened fines from which the grade of the original gravel was estimated using the regression curve discussed in Section 11.

Table 12-1 Independent sampling data for the Laguna Salada Project (Coffey Mining, 2011)

Independently Sampled Trenches – Sampled 15/5/2010 (whole sample)							
Trench #	**From**	**To**	**Length**	**Lithology**	**Sample ID**	**Sample ID**	**U_3O_8 ppm**
TRR114B	0	1	1	Cong & Soil	2958	2958	8
	1	2	1	Cong.	2959	2959	43
	2	3	1	Cong.	2960	2960	35
	3	3.8	0.8	Cong.	2961	2961	11
TRR114A	0	1	1	Cong & Soil	2962	2962	9
	1	2	1	Cong.	2963	2963	153
	2	3	1	Cong.	2964	2964	69
	3	3.8	0.8	Cong.	2965	2965	23
TRR115B	0	1.4	1.4	Cong & Soil	2966	2966	3
	1.4	1.8	0.4	Cong Unconformity	2967	2967	4
	1.8	2.05	0.25	Mineralisation	2968	2968	270
	2.05	2.5	0.45	Clay	2969	2969	56
TRR115A	0	1	1	Cong & Soil	2970	2970	5
	1	1.5	0.5	Cong Unconformity	2971	2971	4
	1.5	1.74	0.24	Mineralisation	2972	2972	166
	1.74	2.14	0.4	Clay	2973	2973	66
	2.14	2.5	0.36	Clay	2974	2974	11

Original Assays				
Hole ID	**Depth From**	**Depth To**	**Length**	**U_30_8ppm**
TRR-114	1	1.8	0.8	25.9
TRR-114	1.8	2.6	0.8	22.4
TRR-114	1.8	2.6	0.8	437.4
TRR-114	2.6	3.5	0.9	239.3
ns_Trr-15	1.55	2	0.45	218
ns_Trr-15b	1.8	2.35	0.55	436

* weighted by mass proportion

12.2 Data Verification

Coffey Mining (2011) conducted a number of data validation routines to verify the robustness of the resource database and concluded that: "*The verification checks did not highlight any material issues with the database and the resulting data was considered appropriate for the use in the following resource estimate study*".

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Prior Test Work

Initial test work on the beneficiation and metallurgical characteristics of the Laguna Salada gravels was undertaken by a previous exploration company, Mega, in 2009. A summary of this work is provided in the prior NI 43-101 report on the property (Coffey Mining, 2011).

13.2 Current Test Work

13.2.1 Background

A metallurgical test work program was initiated in October 2010 and was conducted by SGS Lakefield ("SGS") in Ontario, Canada, under the direction of Mr John Goode, P.Eng. The objective of the program was to provide a first-pass determination of the metallurgical characteristics of the gravels in the two principal areas of the Laguna Salada Project, namely Guanaco and Lago Seco.

This initial work was followed up with size characterisation, hydrocyclone concentration and filtration studies at the University of San Juan ("UNSJ") in Argentina with input from Mr Goode. Mr Goode did not visit the laboratory in San Juan, but did review video footage of the filtration tests and offer guidance by way of frequent discussion and by e-mail correspondence. Assay of the various size fractions generated by the characterisation studies was done by SGS at its assay facility in Lima, Peru, and leach tests on selected size fractions were undertaken at the laboratories of the Saskatchewan Research Council ("SRC") in Saskatoon, Canada.

13.2.2 Representativeness of Samples

As discussed in detail in Section 7 and below in this Section, there is a significant difference in the nature and composition of gravels in the Guanaco area relative to those in the Lago Seco sector of the resource area. Consequently, samples for metallurgical testing were taken from each area individually so that their metallurgical characteristics could be determined separately.

Metallurgical tests were undertaken on six composite samples from 16 pits that are widely distributed through the Guanaco resource area (Table 13-1 and Figure 13-1). These composite samples include material with uranium and vanadium grades similar to the average grade of the resource, as well as low-grade material that was tested to ensure that its metallurgical characteristics do not vary significantly from those of the average-grade samples (Table 13-3). Two of the composite samples were processed at SGS's facility in Ontario, Canada, while the other four samples were processed at UNSJ in San Juan Province of Argentina.

Six composite samples from 15 pits widely distributed through the Lago Seco sector of the Laguna Salada resource area underwent metallurgical test work (Figure 13-1 and Table 13-2). One of these samples was processed at SGS's facility in Ontario and five at UNSJ in Argentina. The composite samples included material that has a grade similar to the average grade of the Lago Seco resource, whereas one is a low-grade sample of which the test results were intended to confirm that metallurgical characteristics of these gravels do not differ significantly from those from average grade areas. The processing of this sample was also designed to confirm that material that has anomalously high gypsum has similar beneficiation and leach characteristics to gravel with average gypsum values.

Samples of several tens of kilograms were used due to the heterogeneous nature of the gravel. Heterogeneity affects two components of the gravel in two principal ways:

- There is an "inverse nugget" effect due to uranium being concentrated in the fine fraction as well as encrusted, to some extent, on the surface of the clasts, so variation in clast content or clast size in the gravel changes the ratio of mineralised fines to unmineralised clasts from sample to sample. Hence, it is extremely difficult to establish an average uranium grade for a sample based on the analysis of a single aliquot. For this reason, the head grade of each sub-sample is calculated for each test to determine beneficiation and leach efficiency; and
- There is a true nugget effect with gypsum which occurs as large crystal aggregates up to 3cm in diameter. Irrespective of how well the sample is homogenised, the number of gypsum aggregates in a specific sub-sample is likely to skew the gypsum grade.

The samples used in the metallurgical test work described in this Section 13 are considered to be representative of the styles of mineralisation in the Guanaco and Lago Seco areas of the Laguna Salada Project on the basis of the following points:

- Care was taken during the selection of the pits for metallurgical test material that the gravel and associated mineralisation, which is generally visible as a yellow dusting within the gravel, is typical of each of the Guanaco and Lago Seco areas;
- The pits and trenches that were selected for sampling for metallurgical test work are widely distributed throughout the resource area; and
- Roughly average grade material was used for the test work and results from those samples were corroborated by samples of significantly lower grade in each of the Guanaco and Lago Seco areas to ensure common metallurgical characteristics between average-and low-grade material.

13.2.3 Nature of the Samples

The samples used in the metallurgical test work were taken from the mineralised layer in the gravel using a mechanical shovel (back actor) according to the procedure described in Chapter 11 for geochemical sampling. Material excavated by the back actor was piled on a tarp, coned and segmented, with material for the metallurgical tests being taken at the same time as samples for geochemical analysis. Sample material was inserted into heavy duty polythene bags, numbered and stored. At the request of the courier company, the material in the polythene bags was reorganised so that each bag did not exceed 2kg in weight for shipment to Canada. Samples shipped to the UNSJ were transported in enclosed freight vehicles in large polythene bags with a capacity of approximately 20 litre ("L").

Table 13-1: Details of the Location of Samples used in the Metallurgical Tests on the Guanaco sector of the Laguna Salada Project

Laboratory	Composite Sample #		Metallurgical Test #	Pit Number	Location (Gauss Kreuger Coordinates)		Depth	
	Sample # Used in this Report	Lab Sample #			Easting (m)	Northing (m)	From (m)	To (m)
SGS Lakefield	G1	October 2010 Guanaco	G1-1, G1-2, G1-3	CAL-012	3,404,200	5,090,401	0.3	1.2
				CAL-132	3,405,600	5,090,400	0.7	1.2
				TRR-054	3,403,800	5,091,400	1.4	2.3
	G2	Guan 035-113-170	G2-1,G 2-2	CAL-035	3,404,400	5,089,800	0.4	1.1
				CAL-113	3,406,402	5,090,399	0.4	2.2
				CAL-170	3,405,600	5,089,200	2.5	3
UNSJ/SRC	G3	CCAL-II-2013	G3-1	CAL-002	3,404,500	5,090,202	0.7	1.7
		CCAL-2013	G3-2	CAL-051	3,405,719	5,090,305	0.2	1.3
		CCAL-III-2013	G3-3	CAL-073	3,404,000	5,091,000	1.1	2.1
	G4	CCAL-IV-2013	G4-1	CAL-096	3,407,598	5,091,598	0.3	1.4
				CAL-132	3,405,600	5,090,400	0.4	1.6
				CAL-183	3,405,600	5,089,800	0.3	1.3
	G7	CCAL-VII-2013	G7-1 to G7-5	CAL-170	3,405,600	5,089,200	0.6	1.3
				CAL-183	3,405,600	5,089,800	0.3	1.3
	G8	CCAL-VIII-2013	G8-1, G8-2, G8-3	CAL-008	3,405,000	5,090,400	0.3	1.3
				CAL-036	3,404,200	5,089,800	0.8	1.5
	G8 G9	CCAL-VIII-2013 CCAL-VII-2013 &14951	G8-1, G8-2, G8-3 Guanaco gypsum dissolution test	TRR-039	3,403,971	5,089,678	0.3	1.5
				TRR-054	3,403,800	5,091,400	1.4	2.3
				TRR-957	3,405,000	5,091,600	0.3	1.1
				CAL-021	3,404,800	5,090,800	0.1	1.1

Table 13-2: Details of the Location of Samples used in the Metallurgical Tests on the Lago Seco sector of the Laguna Salada Project

Laboratory	Composite Sample #		Metallurgical Test #	Pit Number	Location (Gauss Kreuger Coordinates)		Depth	
	Sample # Used in this Report	Lab Sample #			Easting (m)	Northing (m)	From (m)	To (m)
SGS Lakefield	LS1	October 2010 Lago Seco	LS1-1, LS1-2, LS1-3	TLS-002	3,398,400	5,089,800	0	0.5
				TLS-064	3,397,740	5,088,320	0.2	1.1
				TLS-196	3,395,991	5,090,000	1.2	2.2
UNSJ/SRC	LS3	CTLS-2013-H & CTLS-2013	LS3-1	TLS-031	3,399,226	5,089,129	0.25	1
			LS3-2	TLS-037	3,399,200	5,089,000	0.3	1
			LS3-3	TLS-073	3,398,101	5,088,089	0.4	1.6
			LS3-4	TLS-114	3,397,800	5,088,490	0.3	1
			LS3-5	TLS-115	3,398,000	5,088,615	0.3	0.9
			LS3-6					
			LS3-7					
	LS4	CTL-I-2013	LS4-2	TLS-031	3,399,226	5,089,129	0.25	1
				TLS-073	3,398,101	5,088,089	0.4	1.6
				TLS-116	3,399,000	5,088,400	0.3	1
	LS5	CTLS-III-2013	LS5-1	TLS-114	3,397,800	5,088,490	0.3	1
				TLS-445	3,395,800	5,085,200	0.3	1.3
	LS7	CTLS-IV-2013	LS7-1 to	TLS-471	3,396,800	5,084,600	0.5	1.5
			LS7-5	TLS-486	3,396,800	5,084.20	1.4	2.4
	LS8	CTLS-V-2013	LS8-1 and LS8-2	TLS-439	3,396,400	5,085,400.0	0.9	1.3
				TLS-031	3,399,226	5,089,129	0.2	1.5
				TLS-32	3,399,400	5,089,200	0.2	0.8
SRC	LS9	14952 & CTLS-IV-2013	Lago Seco gypsum dissolution test	TLS-497	3,397,400	5,083,800	0.7	2.2

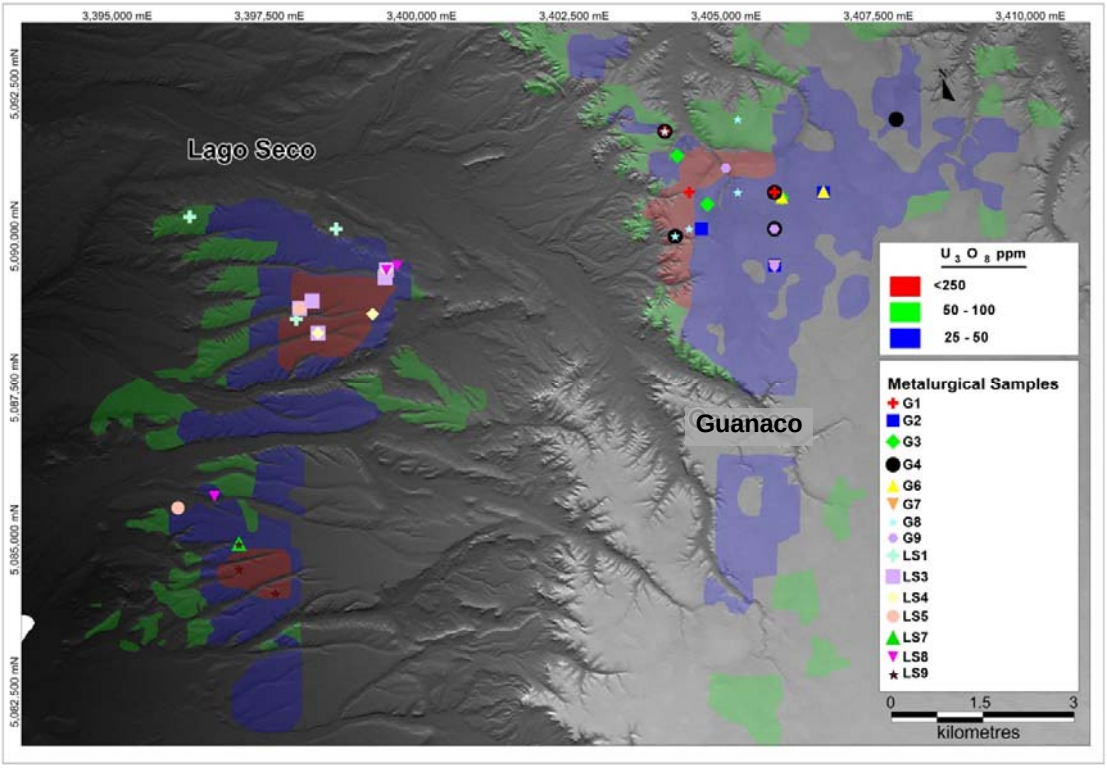


Figure 13-1: Map of the Laguna Salada area showing the location of the pits from which samples for metallurgical testing were taken relative to uranium grade-thickness

13.2.4 Mineralogy of the Composite Samples

Assay data from all of the pits that have been sampled in the Laguna Salada area show a wide scatter in the uranium-vanadium ratio which suggests that vanadium occurs in minerals other than associated with uranium. The principal uranium-vanadium mineral identified is carnotite (SGS Lakefield, 2012). Carnotite has a uranium-vanadium ratio of ~5 (Figure 13-2). The scatter in data points in assays for uranium and vanadium from Laguna Salada is due to the presence of other vanadium-bearing minerals that have a lower uranium content such as magnetite, titano-magnetite and ilmenite.

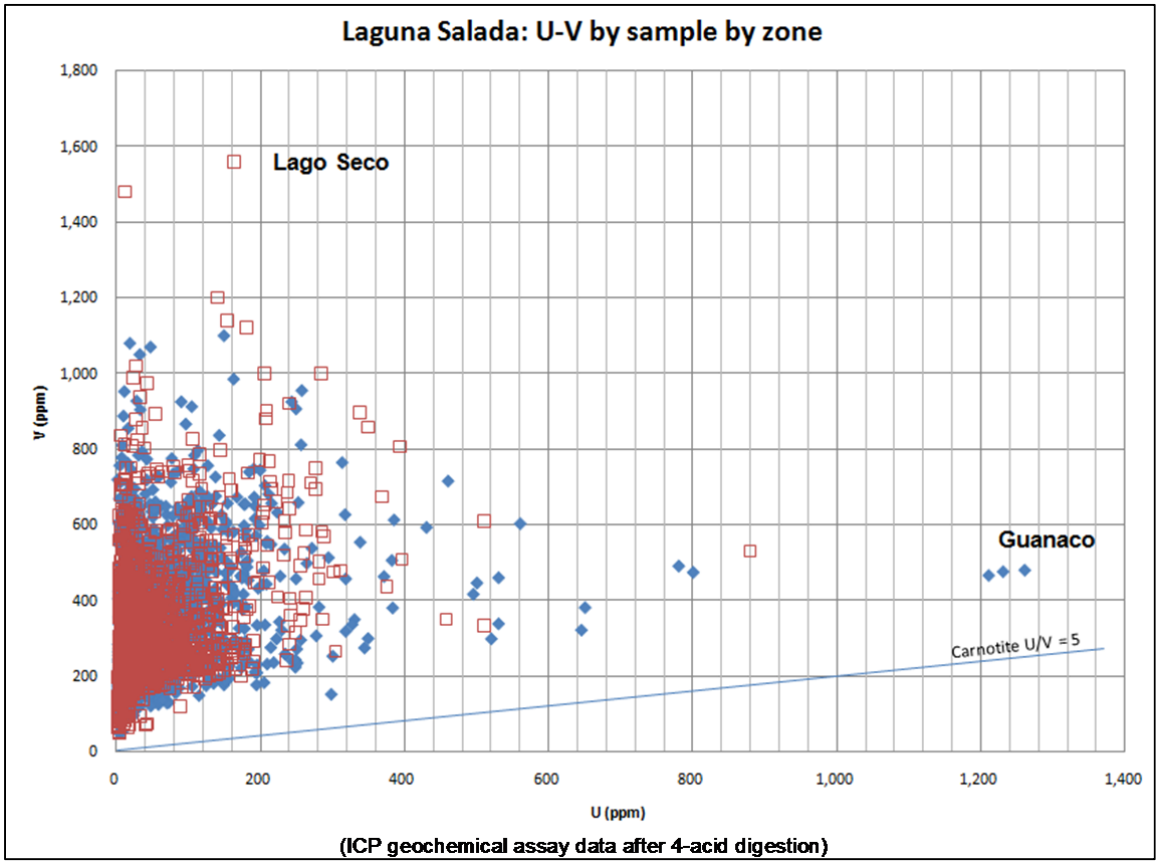


Figure 13-2: Plot of all uranium versus vanadium for all pits from Guanaco & Lago Seco

SEM (Scanning Electron Microscopy) work shows that uranium-bearing minerals are uniformly very fine grained, averaging approximately 5µm at both Guanaco and Lago Seco (Figure 13-3; NOMOS, pers 96alci, 2013).

Mineralogical data from the fine fraction (<150µm) of the samples investigated by SGS shows that feldspar, clay and quartz constitute 80% of the material (Table 13-3). It is noteworthy that the <150µm fine fraction from Lago Seco has a gypsum content approximately 10 times higher than the same fraction of Guanaco sample studied. Lago Seco fines also have approximately three times the calcite content of Guanaco fines. These minerals are of interest because they influence the economics of extraction of uranium and vanadium since gypsum consumes alkaline reagents and carbonate consumes acid.

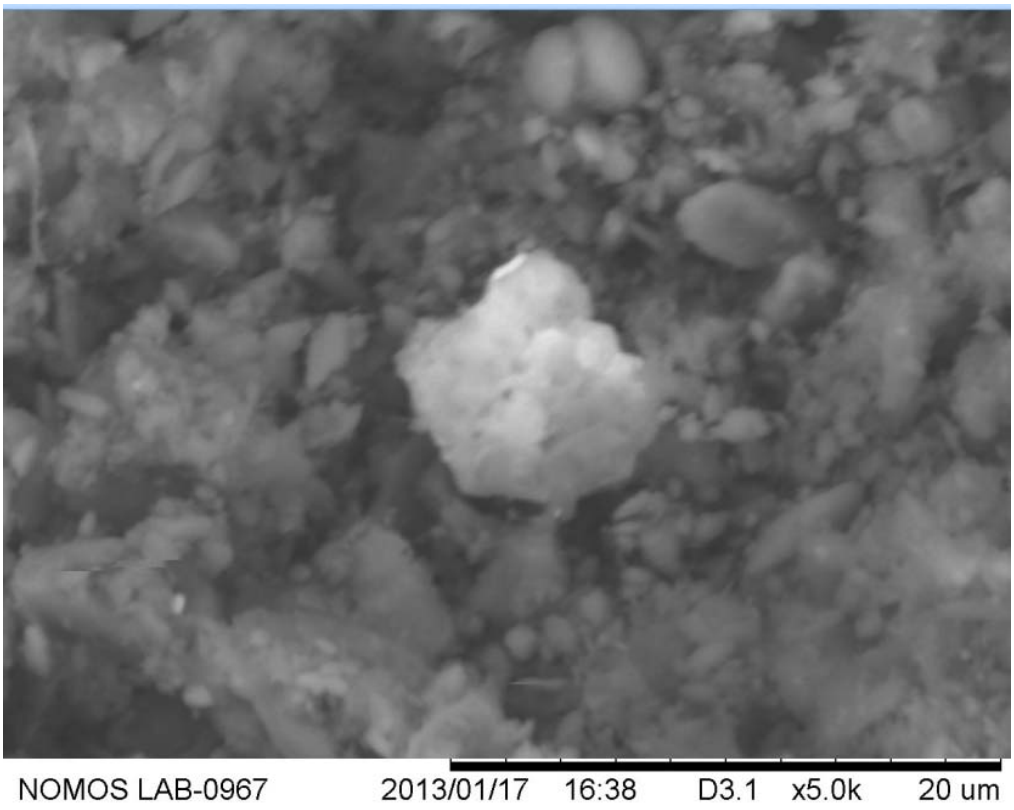


Figure 13-3: SEM image of a uranium-bearing mineral from the Guanaco area of the property showing the very small grain size characteristic of these minerals

The scale bar is 20µm.

Table 13-3: Mineralogy of <150µm Fines from the G1 and LS1 Composite Samples from Guanaco and Lago Seco Respectively (SGS, 2011)

Sample	Units	Guanaco	Lago Seco
Average particle size	µm	23.17	15.94
Uranium- Minerals	mass %	0.03	0.04
Vanadium-Bearing Minerals	mass %	0.05	0.11
Ce-V Bearing Minerals	mass %	0.00	0.00
Fe-Oxides	mass %	0.73	0.58
Ilmenite	mass %	1.34	1.15
Sphene	mass %	3.37	4.30
Zircon	mass %	0.06	0.13
Plagioclase	mass %	43.67	29.99
K-Feldspar	mass %	4.70	3.13
Quartz	mass %	16.25	22.64
Micas/Clays	mass %	20.15	9.94
Epidote	mass %	2.81	15.05
Amphibole/Pyroxene	mass %	2.20	2.22
Chlorite	mass %	0.24	0.09
Fe-Silicates	mass %	-	-
Calcite	mass %	3.83	9.03
Other-Carbonates	mass %	0.07	0.05
Fluorite	mass %	0.24	0.58
Apatite	mass %	0.06	0.13
Gypsum	mass %	0.05	0.67
Serpentine	mass %	0.00	0.00
Sulphides	mass %	0.07	0.05
Talc	mass %	0.01	0.01
Ce Mineral	mass %	-	-
REE	mass %	0.06	0.07
Other	mass %	0.01	0.01
Total	**mass %**	**100.00**	**100.00**

13.2.5 Head Grade

Head analyses are difficult to determine precisely for such low grade uranium in heterogeneous, pebbly material as discussed in Section 13.2.2 above. Hence, a head grade is established for each sub-sample using the assays from each fraction in each test to more precisely establish the average grade of each sample, and assays are listed in Table 13-4 and Table 13-5.

Assays of the various fractions were undertaken by splitting off a sub-sample, pulverising that material and undertaking 30-element ICP-MS or ICP-OES analysis after strong acid digestion. These standard assay procedures were carried out by SGS on site.

In addition to the standard assays done by SGS, analyses on specific samples for sulphur were by Dionex, sulphide by Leco and chlorine by XRF. Low level uranium and vanadium assays required for the initial work undertaken at SGS was done by NAA (Neutron Activation Analysis) at Becquerel Laboratories in Ontario, Canada. Material from beneficiation test work completed at UNSJ was sent to SGS's laboratory in Lima, Peru, for multi-element analysis by ICP-MS and for sulphur and sulphate by Leco. Leach tests conducted by SRC were analysed on site in Saskatchewan.

Table 13-4: Head Grade Analyses of Composite Samples and Sub-samples from the Guanaco Sector of the Laguna Salada Deposit

Prep Lab	Composite Sample #	Test #	Lab Test #	Beneficiation	Met Test Lab	Leach Test #	Sample Mass (kg)	(U_3O_8 ppm)	(V_2O_5 ppm)	Gypsum (%)
SGS	G1	G1-1	October 2010 Guanaco	Screen	SGS	Tests 6, 8, 23, 27, 28, 57	6.2	50.4	499	0.27
		G1-2					6.0	54.5	498	-
		G1-3					38.8	70.2	461	-
	G2	G2-N1	Guan 035-113-170	Screen	SGS	Tests 76, 77, 78, 79, 80, 81, 82, 83, 84	24.3	54.7	519	-
		G2-N2					24.3	39.4	492	-
USJ	G3	G3-1	CCAL-II-2013	Screen		-	22.7	31.2	462	1.2
		G3-2	CCAL-2013	HC over flow	SRC	CCAL-I-2013	72.6	41.0	439	0.6
		G3-3	CCAL-III-2013	HC over flow		CCAL-III	42.2	23.9	358	0.3
	G4	G4-2	CCAL-IV-2013	HC over flow		CCAL-IV	93.0	35.7	415	2.8
	G7	G7-1	CCAL-VII-2013	Screen		CCAL-VII-2013	4.9	7.3	245	2.4
		G7-2				-	5.1	34.1	290	4.1
		G7-3				-	5.0	51.6	388	4.2
		G7-4				-	5.2	30.1	301	2.4
		G7-5				-	5.0	47.9	428	3.9
	G8	G8-1	CCAL-VIII-2013			-	41.4	70.1	376	1.5
		G8-2		HC over flow	SRC	CCAL-VIII-A	36.7	63.0	374	1.5
		G8-3				-	33.5	71.1	297	1.9
SRC	G9						64.4	40.9	597	9.5

Note: HC signifies hydrocyclone.

Table 13-5: Head Grade Analyses of Composite Samples and Sub-samples from the Lago Seco Sector of the Laguna Salada Deposit

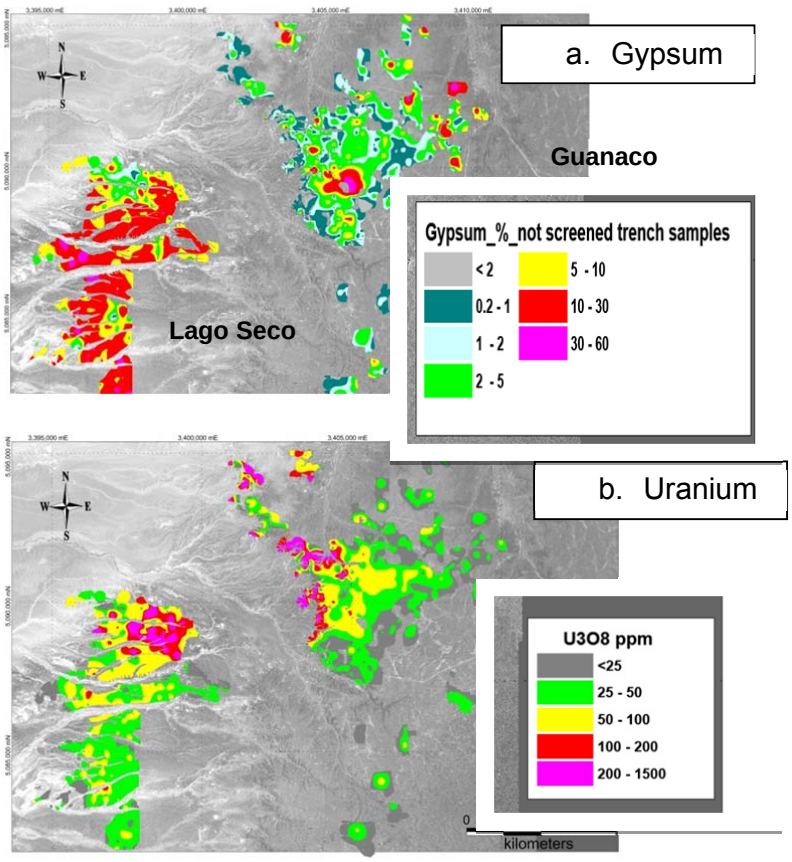
Prep Lab	Composite Sample #	Test #	Lab Test #	Benef-iciation	Met Test Lab	Met Test #	Sample Mass (kg)	(U_3O_8 ppm)	(V_2O_5 ppm)	Gypsum (%)
SGS	LS1	LS1-1	October 2010 Lago Seco	Screen	SGS	Tests 7, 9, 15, 31, 58, 59	4.48	123	567	1.9
		LS1-2					3.56	161	553	
		LS1-3					25.7	166	533	
USJ	LS3	LS3					280	55.13	679	6.78
		LS3-1		Screen			2.42	73.7	390	28.4
		LS3-2		HC over flow			4.01	94.2	810	19.3
		LS3-3	CTLS-H-2013	Screen	SRC	CTLS	30.05	57.4	611	9.2
		LS3-4	CTL-I-2013	Screen			2.00	68.5	617	6.7
		LS3-5	CTLS-H-2013 / Test B				40.97	60.3	618	8.1
				HC over flow	SRC	CHB-CTL-2013	3.77	379	2,001	9.7
				HC under flow		THB-CTL-2013	1.94	115	792	42.1
		LS3-6	CTLS-2013				23.89	49.2	568	6.7
				HC over flow	SRC	AD Fino	1.3	408	2,145	4.4
				HC under flow		AD Cola	10.2	30	394	4.4
		LS3-7	CTLS-2013				23.89	75.3	693	5.3
				HC over flow	SRC	CH	2.74	319	1,883	2.6
				HC under flow		TH	7.46	7.6	246	12.6
	LS4	LS4-1	CTL-I-2013				30.6	65.9	763	7.0
				HC over flow	SRC	CH-CTL-2013-1-F	3,31	420	2,839	4.0
	LS5	LS5-1	CTLS-III-2013				44.9	68.5	828	16.3
				HC over flow	SRC	CH-CTLS-III-2013	5.72	440	2,908	12.4
	LS7	LS7-1	CTLS-IV-2013	Screen		-	4.7	44.8	337	11.8
		LS7-2				-	4.9	39.3	312	11.9
		LS7-3				-	4.7	48.1	367	10.9
		LS7-4				-	4.9	49.5	350	11.5
		LS7-5				-	4.8	51.0	378	11.4
	LS8	LS8-1	CTLS-V-2013	HC over flow	SRC	-	30.9	86	545	6.2
		LS8-2		HC over flow		-	31.4	96	558	4.8
SRC	LS9						49.0	81	467	8.2

13.4 Management of Gypsum

13.4.1 Gypsum Grade and Distribution

Due to the consumption of alkaline leach reagents by sulphate, gypsum grade and distribution is an important factor in evaluating the economics of the Laguna Salada Project. Logging of pit and trench walls shows that Lago Seco has a higher gypsum content than Guanaco. In addition, since each sample from each pit underwent multi-element ICP assay, and assuming that all sulphur is associated with the sulphate in gypsum, an estimate of grade distribution of gypsum can be made over the property (Figure 13-4). Based on this assumption, the average gypsum grade of Guanaco is 3.2% and Lago Seco is 12.7%. Approximately 47% of the Lago Seco area has a grade of <10% gypsum at an arithmetic average grade of 4.7% and the remaining 53% has an average arithmetic grade of 18%. In contrast, approximately 88% of the Guanaco area has a gypsum content <10%, at an average grade of 1.6% gypsum. The remaining 12% of the Guanaco area has an average gypsum grade of 15%. Since the distribution of uranium is independent of gypsum, mining can be planned to optimise uranium grade while minimising gypsum grade.

Figure 13-4: Map of a. Estimated Gypsum Distribution and b. Uranium Assay Distribution in the Laguna Salada Deposit



13.4.2 Dissolution of Gypsum from Fines

Due to the fine-grained nature and associated reactivity of gypsum, especially at Guanaco, tests were undertaken to establish the extent to which water could be used as a means of dissolving gypsum from the fines, thereby achieving beneficiation of the leach feed. Published data (Bock, 1961) shows that saline water has a higher capacity to dissolve gypsum than fresh water, and this was tested with water made up to approximate the measured composition of fresh and saline groundwater from the Project area. Fresh water samples are from the Rio Chico basin and the saline water from the Laguna Salada Lake located within the Laguna Salada Project area (Table 13-6).

Table 13-6: Analyses of Water from the Laguna Salada Project used in Test Work on Gypsum Solubility

	Type	Fresh Shallow groundwater				SALINE
	SGS Client ID	Sample C	Sample E	Sample F	Average	LAGO SECO-01
	SGS ID	LI12-22101.0003	LI12-22101.0005	LI12-22101.0006	shallow groundwater	LI12-22809.0001
Conductivity	uS/cm	1,489	1,804	3,770	2,354	45,600
As	µg/L	0.005	0.003	0.002	0.003	0.07
B	µg/L	<0.1	<0.1	0.29	0.29	0.32
Ca	µg/L	63	119	135	106	469
Cu	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
K	µg/L	5.34	6.01	8.64	6.66	52.7
Na	µg/L	235	233	650	373	14,000
Pb	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Mg	µg/L	22.4	29	33.7	28.4	56.9
pH		7.75	7.23	7.18	7.4	7.37
Se	µg/L	<0.0006	0.0011	0.0019	0.0	<0.0002
Alkalinity	µg/L $CaCO_3$	181.3	161.4	135.5	159.4	230.3
Bicarbonates	µg/L $CaCO_3$	181.3	161.4	135.5	159.4	230.3
Carbonates	µg/L $CaCO_3$	<1	<1	<1	<1	<1
Cl	µg/L	245.5	304.4	675.1	408.3	14,531
Hardness	µg/L $CaCO_3$	240.7	411.9	538.8	397.1	1,702
F	µg/L	0.95	0.79	1.96	1.2	7.86
TDS	µg/L					38,828
Sulphates	µg/L	213.9	304.2	811.9	443.3	10,374
V	µg/L	<2	<2	<2	<2	
C (calculated)	µg/L	21.76	19.37	16.26	19.13	27.64
S (calculated)	µg/L	71	101	271	147.7	3,458

Results of the test work undertaken at ambient temperature and with a liquid to solids ratio of 40:1 show that sulphate dissolution from the fines into the filtrate is rapid: there is little difference in the percentage sulphate uptake in the 10 minute and two hour leaches performed on fines from both Guanaco and Lago Seco (Table 13-7). The sulphate content of saline water used to leach Guanaco fines was 1.23% versus 0.26% for fresh water. Saline water therefore dissolved almost five times the amount of sulphate that fresh water dissolved. Test results for the Lago Seco fines were similar with the average sulphate content of saline water fresh water being 1.17% and that of fresh water 0.2%. Hence, at Lago Seco, saline water dissolved almost six times the amount of sulphate that fresh water dissolved. These results suggest that approximately 4m^3 of fresh water will dissolve 1% sulphate in fines, whereas approximately 1m^3 of saline water is required to dissolve 1% sulphate in fines. In the Metsim modelling of this sulphate leach step process design performed by Tenova, more conservative dissolution numbers are used.

Table 13-7: Results of Test Work on Guanaco (G9) and Lago Seco Fines (LS9) to Measure the Dissolution of Sulphate from the Fines by the Water (from Zhang, 2014)

Test	Residue				Filtrate				Dissolution	
	Mass (g)		Ca	SO_4	Volume	Mass	Ca	SO_4	Ca	SO_4
	Wet	Dry	(%)	(%)	(L)	(g)	(%)	(%)	(%)	(%)
Guanaco										
10 mins in fresh water	20.44	8.55	11.00	0.03	400	397.59	0.09	0.25	28.80	99.70
10 mins in saline water	19.96	9.26	10.29	0.54	400	399.82	0.14	1.27	33.43	94.54
2 hrs in fresh water	19.61	8.64	11.71	0.03	380	379.91	0.09	0.26	24.18	99.70
2 hrs in saline water	20.87	9.36	10.86	1.32	350	372.20	0.11	1.19	29.73	86.66
Average for fresh water								0.26		
Average for saline water								1.23		
Lago Seco										
10 mins in fresh water	21.83	8.13	7.29	5.40	400	398.80	0.07	0.20	32.95	59.29
10 mins in saline water	23.15	8.61	7.14	8.19	400	395.36	0.11	1.16	34.26	38.25
2 hrs in fresh water	22.01	8.50	7.57	5.13	380	377.41	0.70	0.20	30.32	61.32
2 hrs in saline water	23.43	9.36	7.71	9.60	350	373.76	0.10	1.17	29.00	27.62
Average for fresh water								0.20		
Average for saline water								1.17		
Feed Assay	Calcium		Suphate							
Guanaco	13.2%		8.3%							
Lago Seco	9.2%		11.3%							

13.4.3 Sulphate Control with Membranes

Given the rapid rate at which gypsum in fines from Guanaco and Lago Seco has been shown to dissolve in saline water, dissolution by saline water could provide a means of reducing the sulphate content of the fines to reduce reagent consumption during the subsequent alkaline leaching of uranium and vanadium. The filter cake from the gypsum dissolution step would need washing to prevent calcium dissolved in the interstitial water from entering the leach circuit.

Although there are no absolute criteria, pressure driven membranes are generally classified into four main categories on the basis of their pore size (or molecular weight cut-off ("MWCO"), which is the approximate molecular weight solute, measured in Dalton ("Da"), that is 90% retained by the membrane) as indicated in Table 13-8.

Table 13-8: Summary of Membrane Characteristics related to the Size of Rejection

Type	Aperture Size	Typical Use
Microfiltration (MF)	0.1 to 1µm	Rejection of bacteria, Cryptosporidium, Giardia cysts, red blood cells
Ultrafiltration (UF)	0.01 to 0.1µ micron (1 to 300kDa)	Rejection of proteins, viruses, colloidal silica
Nanofiltration (NF)	0.001µm to 0.01µnm (200 to 1,000Da)	Effectively remove divalent ions up to 99% but monovalent ions between 30 to 70% with low rejection of acids
Reverse osmosis (RO)	<0.001µm (50 to 200Da)	Effectively rejects rejects all aqueous salts and acids 99+%

As nanofiltration rejects divalent ions such as sulphate while transmitting most monovalent ions, it may have application for the removal of sulphate while maintaining the salinity of water used to leach gypsum from the fines. This would reduce the sulphate content of the fines to reduce alkaline reagent consumption in the subsequent uranium and vanadium leach step.

The flowsheet proposed in this PEA uses beneficiation by scrubbing and screening to eliminate much of the gypsum followed by the dissolution of residual gypsum using saline groundwater (available locally), the removal of sulphate from solution by membrane separation, and recirculation of the saline water back to gypsum leach. Sulphate removal could be achieved while minimising water use in a circuit in which the fines would be leached with saline water, followed by sulphate removal from the then gypsum-saturated water, before the water, stripped of its calcium and sulphate, is recycled through the circuit again.

Membrane technology has been used extensively in seawater desalination plants, with over 17,000 units operating in 150 countries (International Desalination Association, 2013). Although industrial applications such as acid and caustic recovery, etc. are also significant, its application in the mining industry has been somewhat slower, but is now gaining momentum. Some applications in metallurgical processing plants include Newmont Mining Corp's Yanacocha and Waihi gold mines, for copper and acid recovery by Freeport-McMoRan Inc., for acid recovery by Paladin Energy Ltd., with reverse osmosis at a mill site in Texas, for copper and iron sulphate rejection at AMD's Cananea de Mexico operation, potable water recovery from acid mine drainage by Anglo American Thermal Coal, refinery wastewater reclamation by ASARCO LLC in the USA, Sun Metals Corporation in Australia and from the Cobre Los Crucas Seville operation in Spain.

As membrane treatment involves the concentration of solutes, sparingly soluble salts such as calcium sulphate start precipitating and scaling/fouling occurs. Fouling reduces membrane performance and must be minimised for such systems to be economically viable. Calcium sulphate scaling can be minimised in a number of ways, including (van der Westhuysen, 2014):

- Seeding which provides growth sites (or nuclei) for calcium sulphate crystal growth as it starts to precipitate during membrane concentration to prevent scale formation on the membrane surface; and
- Membrane specification/configuration specifically designed to handle solids. In some cases, up to 25% solids loading is possible.

Resource Conservation Company in the USA developed the original concept of seeded reverse osmosis for treating calcium sulphate scaling waters in the 1970s.

This concept was successfully tested in the 1980s over a 5,000 hour test period at ERPM mine in South Africa (a later modification was tested for nearly 8,400 hour during the early 1990s). Both tests involved treatment of calcium sulphate scaling acidic mine waters to a potable standard using reverse osmosis membranes.

The proposed process has not yet been tested in an integrated flowsheet and would have to be tested in future programs of work.

13.4.4 Ettringite Process

The precipitation of ettringite, a hydrated calcium-aluminium sulphate that is insoluble in water, provides an alternative means of stripping the sulphate from the gypsum-saturated water that has been used to leach gypsum from the fines. Similar to the membrane process, sulphate removal could be achieved while minimising water usage through a circuit in which the fines would be leached with saline water and the then gypsum-saturated water removed, stripped of its calcium and sulphate and recycled through the circuit again, leaching additional gypsum with each pass. The calcium/sulphate-bearing solution could be treated with lime and aluminium hydroxide, from which ettringite precipitates as follows (Usinowicz *et al*., 2006):

$$3\ CaO + 3\ Ca^{2+} + 3\ SO4^{2-} + 2\ Al(OH)_3\ (s) + 28\ H_2O \leftrightarrow 3\ CaO \bullet 3\ CaSO_4 \bullet Al_2O_3\ (s) \bullet 31\ H_2O$$

Apart from the process marketed by Outotec, other commercial processes that use ettringite for sulphate control include the SAVMIN and CESR (Cost Effective Sulphur Removal) processes (Usinowicz *et al.,* 2006).

A conceptual flow sheet that shows the leaching of the fines with saline water to dissolve gypsum, followed by gypsum removal by the precipitation of ettringite is shown in Figure 13-5.

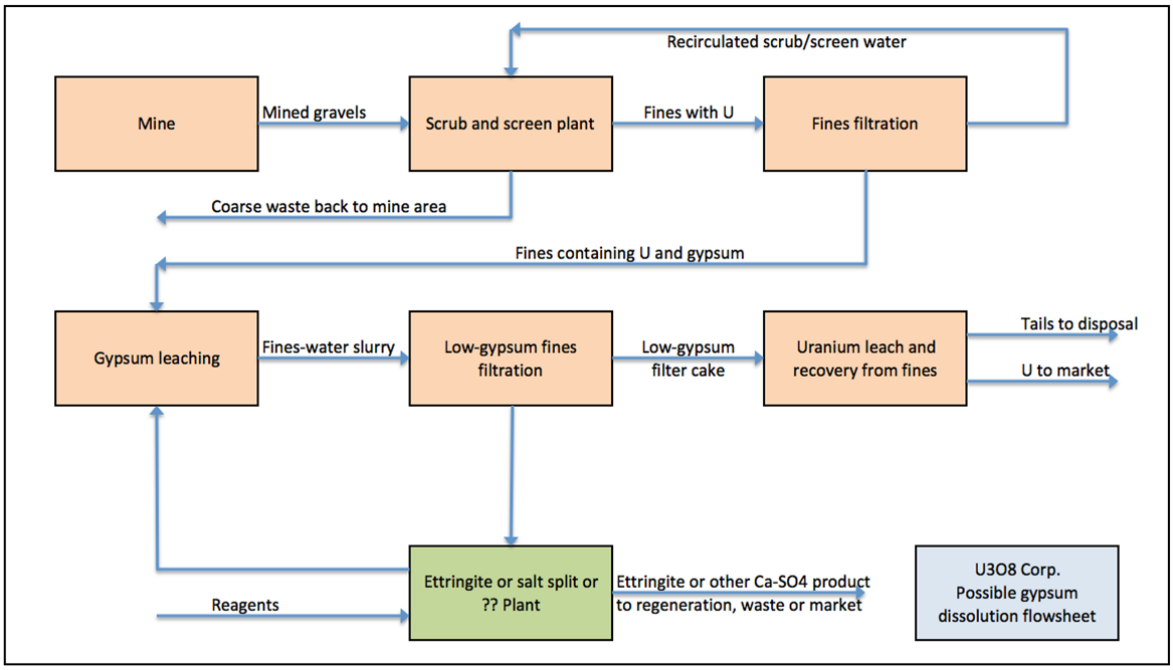


Figure 13-5: Conceptual process flow sheet for Laguna Salada gravels showing the location of a gypsum leach circuit in which gypsum is precipitated from the leach solution and water is recycled back to the gypsum leach

Potential improvements to the economics of the ettringite process include:

- The on-site generation of sodium aluminate from aluminium hydroxide powder and NaOH solution in a process that has been patented by Outotec (Martikainen, 2014); and/or
- Recovery of aluminium hydroxide reagent using acid according to the SAVMIN process.

The use of the ettringite process as an alternative to the membrane process would need to be tested in a future phase of work – as would the membrane process.

13.5 Guanaco Gravels

13.5.1 Sample Preparation

13.5.1.1 Composite G1

Composite G1 (SGS sample name "October 2010 Guanaco," Table 13-4): SGS received 28 sample bags containing ~2kg of gravel each from site in Argentina. Gravel from each sample bag was combined to form one large sample that was homogenised, coned and quartered. This sample has a head grade similar to the average grade of the Guanaco resource (Table 13-5). A summary of the beneficiation that each sample underwent is listed in Table 13-9.

- Test G1-1: Approximately one-eighth of Composite G1 was used for the initial dry screen size fraction characterisation without scrubbing. Sample mass was ~6kg. This sample was screened to 150µm;

- Test G1-2: Approximately one-eighth of Composite G1 was used for the initial wet screen size fraction characterisation after wet scrubbing for four hours in a 20L pail on a bottle roll table at 20%-30% solids, followed by wet screening to 150µm. Sample mass was ~6kg; and
- Test G1-3: The remainder of the G1 sample (mass ~39kg) was tumbled for one to two hours in a 20L pail on a bottle roll table at 20%-30% solids, followed by wet screening to 150µm.

13.5.1.2 Composite G2

Composite G2 (SGS sample name "Guan 035-113-170," Table 13-5) was made from a second shipment of gravel that was homogenised, cone and quartered by SGS. Sample G2 is low- to average grade compared with the average grade of the resource.

- Tests G2-N1 and G2-N2: Wet scrubbing of Guanaco composite G2 was undertaken in two batches of 24.3kg in tests G2-N1 and G2-N2. Water addition was minimised, resulting in a slurry density of 35% on a by-mass basis, to curtail the dissolution of water-soluble components such as gypsum. A cement mixer was used to scrub the gravel for 15 minutes. The discharge from the cement mixer was wet screened with additional water and the liquor was collected for sulphate and chloride assay to determine the extent to which these ions were dissolved from the feed.

13.5.1.3 Composite G3

Composite sample G3 was prepared at UNSJ in the same way as described for the samples at SGS. This sample has a lower than average grade in comparison to the average grade of the Guanaco resource. Composite G3 had a total mass of 138.6kg and the tests that were performed on this sample are as follows:

- Test G3-1 (UNSJ sample number "CCAL-II-2013"): A 22.7kg split from the Guanaco composite sample G3 was wet scrubbed for one hour in a cement mixer with 10L of water and was subsequently wet screened to a final grain size of 26µm with a further 25L of water. The processing of this sample is similar to the test work undertaken by SGS on samples G1 and G2, except that the work on composite G3 was to a finer grain size;

  Test G3-2 (UNSJ sample number "CCAL-2013"): A split of 72.6kg of composite G3 was wet scrubbed with 7L of water for one hour in a cement mixer and then wet screened through successive mesh sizes to 150µm. The <150µm material was fed into a hydrocyclone at a 2.5psi hydrostatic pressure. The overflow ultrafines were designated sample "CCAL-I-2013" for leach testing Table 13-9; and
- Test G3-3 (UNSJ sample number "CCAL-III-2013") had a starting mass of 42.2kg, was wet scrubbed for an hour in a cement mixer with 14L of water. The material was wet screened through successive screens to a final size of <150µm with 35L of water. The <150µm fraction was fed at a hydrostatic pressure of 1.5psi into the same hydrocyclone as was used for test G3-2. Test G3-3 involved feeding the underflow from the first cyclone into a second and the underflow from the second was fed into a third. The overflow ultrafine material from the third cyclone feed was designated sample "CCAL-III".

13.5.1.4 Composite G4

Composite G4 is a low-grade sample that was prepared at UNSJ using similar procedures to those described above. The raw gravel sample was split and underwent two tests as follows:

- Test G4-2 (UNSJ sample number "CCAL-IV-2013") included wet scrubbing and wet screening to 26µm of a 93kg sample. Fines from the size fractions <150µm were combined and mixed with water to make the 10% by weight feed for the same triple hydrocyclone system used in test G3-2 at a hydrostatic pressure of 1.5psi. There is a possibility that the drying of the fractions <150µm from which the hydrocylone feed was made, may have affected the physical characteristics of the fines. Overflow material from this sample were designated sample number "CCAL-IV".

13.5.1.5 Composite G7

Composite G7 (UNSJ sample number "CCAL-VII-2013") was a low- to average grade sample that was split and five sub-samples were individually wet screened to 26µm after wet scrubbing for different times as follows with 10L of water:

- Test G7-1: A five minute scrub time of 4.7kg of gravel;
- Test G7-2: A 15 minute scrub time of 4.9kg of gravel;
- Test G7-3: A 30 minute scrub time of 4.7kg of gravel;
- Test G7-4: A 45 minute scrub time of 4.9kg of gravel; and
- Test G7-5: An one hour scrub time of 4.8kg of gravel.

13.5.1.6 Composite G8

Composite G8 (UNSJ sample number "CCAL-VIII-2013") had a total weight of 154.5kg and was homogenised and quartered. Sub-samples G8-1 and G8-2 were wet scrubbed for 15 minutes in a cement mixer with 10L of water. G8-3 was wet scrubbed for 30 minutes. The composite was then wet screen to 75µm.

- Test G8-1: 41.4kg of gravel was scrubbed for 15 minutes with 10L of water;
- Test G8-2: 36.7kg of gravel was scrubbed for 15 minutes with 10L of water, screened to <75µm and the fines fed into a hydrocyclone at a pressure of 1.5psi; and
- Test G8-3: 33.5kg of gravel was scrubbed for 30 minutes with 10L of water.

13.5.1.7 Composite G9

Composite G9 was made from a combination of 27.8kg of CCAL-VII and 40kg of sample 14951 (Trench CAL-021), was mixed and submitted to wet scrubbing for 30 minutes at 75% solids in a smooth barrel by SRC. The gravel was wet screened to <75µm and used for water leach tests for gypsum.

Table 13-9: Summary of Beneficiation Test Work Completed on each sub-sample from the Guanaco sector of the Laguna Salada Deposit

Lab	Sub-Sample #	Sample Mass (kg)	Scrub			Screen		Hydrocyclone		
			Time	Equip-ment	% solids in scrub	Type	Final Grain Size (µm)	Feed Size (µm)	No of passes	Pressure (psi)
SGS	G1-1	6.24	None			Dry	150			
	G1-2	6.0	4 hrs	Pales on bottle-roll table	20%-30%	Wet	150			
	G1-3	38.8	1-2 hrs		20%-30%	Wet	150			
	G2-N1	24.3	15 min	Cement Mixer	35%	Wet	38			
	G2-N2	24.3	15 min		35%	Wet	150			
USJ	G3-1	22.7	1 hr	Cement Mixer	75%	Wet	26			
	G3-2	72.6	1 hr		75%	Wet	150	150	1	2.5
	G3-3	42.2	1 hr		75%	Wet	150	150	3	1.5
	G4-2	93.0	1 hr			Wet	150	150	3	1.5
	G7-1	4.9	5 min		50%	Wet	26			
	G7-2	5.1	15 min		50%	Wet	26			
	G7-3	5.0	30 min		50%	Wet	26			
	G7-4	5.2	45 min		50%	Wet	26			
	G7-5	5.0	1 hr		50%	Wet	26			
	G8-1	41.4	15 min		75%	Wet	75			
	G8-2	36.7	15 min		75%	Wet	75	75	3	1.5
	G8-3	33.5	30 min		75%	Wet	75			
SRC	G9	67.8	30 min	Smooth barrel	75%	Wet with gyps-sat water	75			

13.5.2 Beneficiation Test Work on Guanaco Gravels

13.5.2.1 Scrubbing and Screening

Test work was aimed at determining the distribution of uranium, vanadium and gypsum in various size fractions in response to scrub variables as follows:

- Dry versus wet scrubbing;
- Scrub time;
- Percentage solids in the scrub material;
- Smooth scrub vessel versus cement mixer that has fins that provide more lift in the scrubbing process – providing a means of assessing the effect of kinetic energy; and
- The use of fresh or gypsum-saturated water for the scrubbing and screening with the objective of minimising gypsum dissolution.

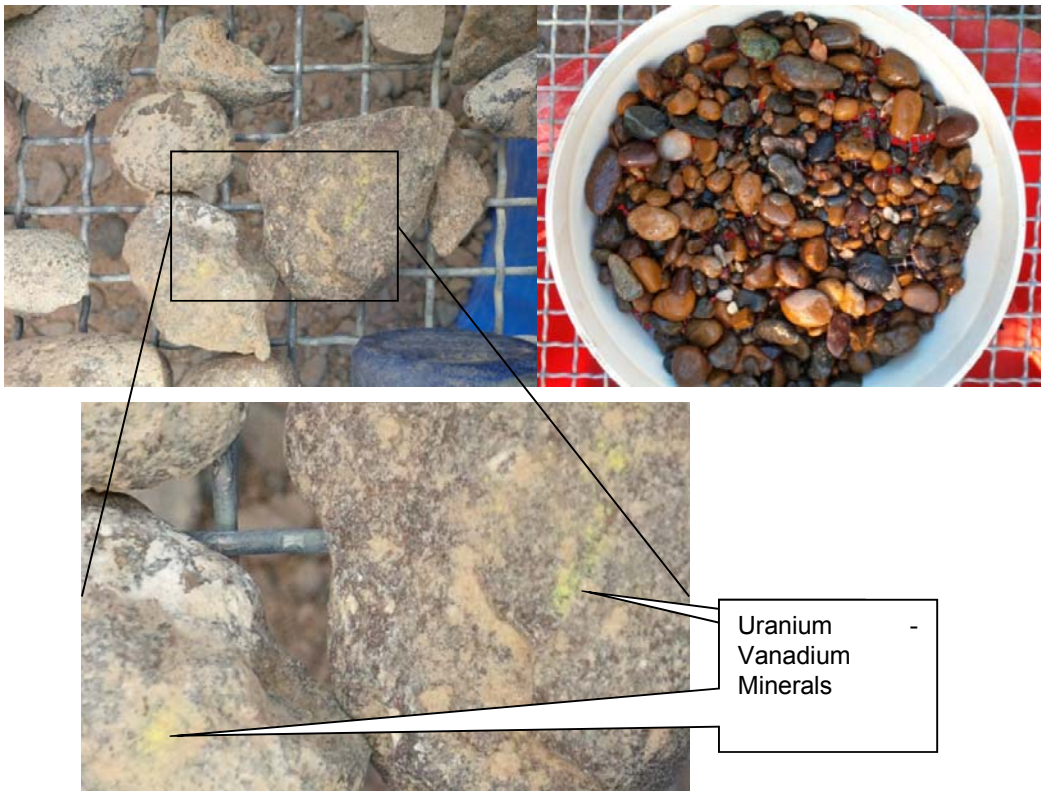
13.5.2.1.1 Dry versus wet scrubbing

Dry scrubbing is only partially successful in removing fine-grained carnotite from the surface of clasts and therefore a proportion of the adhered mineralisations remains with the coarse fraction instead of reporting to the fines (Figure 13-6). Wet screening, by contrast, is efficient at removing the fine, mineralisaed patina from the clasts. This is illustrated in Figure 13-7 and Table 13-10 in which, although the distribution of mass between the different size fractions is similar, the proportion of uranium reporting to the fines is significantly greater with wet screening.

Vanadium is more efficiently concentrated into the fines with wet screening than with dry, but to a lesser extent than uranium. This is due to the fact that vanadium occurs in two principal mineral forms: in fine-grained uranium-vanadium minerals that concentrate in the fines; and in coarser-grained iron-vanadium heavy minerals that report to the coarser fractions.

One positive feature of dry screening is that there is no dissolution of fine gypsum, but this advantage does not outweigh the uranium loss to the coarse fractions.

Figure 13-6: Photos showing clasts after dry scrubbing (left) and wet scrubbing (right) from Guanaco gravels. Note the fine dusting of yellow carnotite on the dry-scrubbed pebbles in comparison to the very clean pebbles that are free of carnotite after wet scrubbing



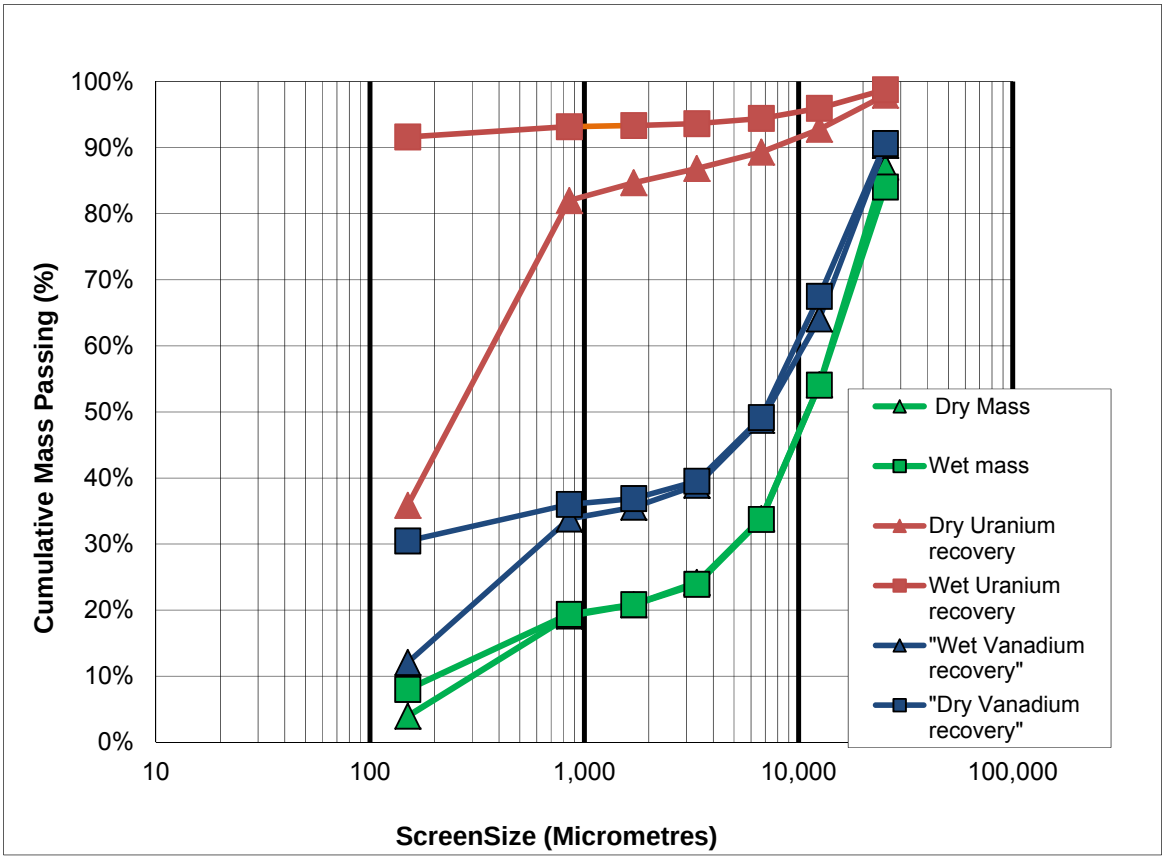


Figure 13-7: Distribution of percentage mass, uranium and vanadium with grain size showing the effect of dry versus wet scrubbing and screening (Tests G1-1 (dry) and G1-2 (wet))

Table 13-10: Particle Size and Uranium – Vanadium Distribution in the Guanaco Composite Sample G1 with Dry Screening and Wet Scrubbing & Screening

Screen Size (µm)	Mass (grams)	Mass		Uranium			Vanadium		
		% Distribut^{n}	% Cumulative Passing	Assay (ppm)	% Distribut^{n}	% Cumulative Passing	Assay (ppm)	% Distribut^{n}	% Cumulative Passing
Dry Screening									
25,400	806.1	12.9	87.1	8.0	2.1	97.9	373	9.7	90.3
12,500	2,054.6	32.9	54.1	7.9	5.2	92.8	398	26.3	64.1
6,700	1,264.0	20.3	33.9	8.6	3.5	89.3	378	15.4	48.7
3,350	603.1	9.7	24.2	13.0	2.5	86.8	507	9.8	38.9
1,700	209.4	3.4	20.8	32.1	2.1	84.7	494	3.3	35.6
850	106.4	1.7	19.1	79.9	2.7	82.0	516	1.8	33.8
150	945.8	15.2	4.0	153.3	46.1	35.9	715	21.7	12.1
-150	246.4	4.0	0.0	457.5	35.9	0.0	1,525	12.1	0.0
Total	**6,235.8**	**100.0**	**-**	**50.4**	**100.0**		**499**	**100**	
K80	**22,385**								
Wet Scrubbing & Screening									
25,400	951.7	16.0	84.0	4.2	1.2	98.8	293	9.4	90.6
12,500	1,787.1	30.0	54.0	5.1	2.8	96.0	384	23.1	67.5
6,700	1,210.2	20.3	33.7	4.1	1.5	94.4	450	18.3	49.2
3,350	586.4	9.8	23.9	4.4	0.8	93.6	487	9.6	39.5
1,700	182.3	3.1	20.8	5.1	0.3	93.3	426	2.6	39.9
850	88.4	1.5	19.4	6.2	0.2	93.2	298	0.9	36.0
150	676.2	11.3	8.0	7.5	1.6	91.6	243	5.5	30.5
-150	478.0	8.0	0	622.6	91.6	0.0	1,891	30.5	0.0
Total	**5,960.3**	**100.0**		**54.5**	**100.0**		**498**	**100.0**	
K80	**23,470**								

13.5.2.1.2 Wet Scrubbing and Screening

13.5.2.1.2.1 Objective

In addition to clastic clasts, the coarse fraction contains gypsum and calcite masses. Optimal screening would aim to break down the calcite masses so that the contained uranium is liberated, while the breakdown of gypsum nodules that contain minimal uranium, should be minimised so as to maximise gypsum rejection by screening. Optimal scrubbing therefore requires a balance between providing sufficient time and/or energy to break the calcite masses while minimising grinding of gypsum crystal masses. Hence, scrub time and energy are important variables.

Percentage solids, time and scrub energy (whether smooth pail or cement mixer was used) are the variables recorded in the distribution of mass, uranium, gypsum and vanadium against grain size in Figure 13-8 to Table 13-8.

13.5.2.1.2.2 Mass Distribution

Mass distribution after wet scrubbing under different conditions of time, percentage solids and type of scrub is similar in all composite samples with the -150µm fraction constituting 7%-20% of the sample mass and the -75µm fraction 5% to 15% (Table 13-8).

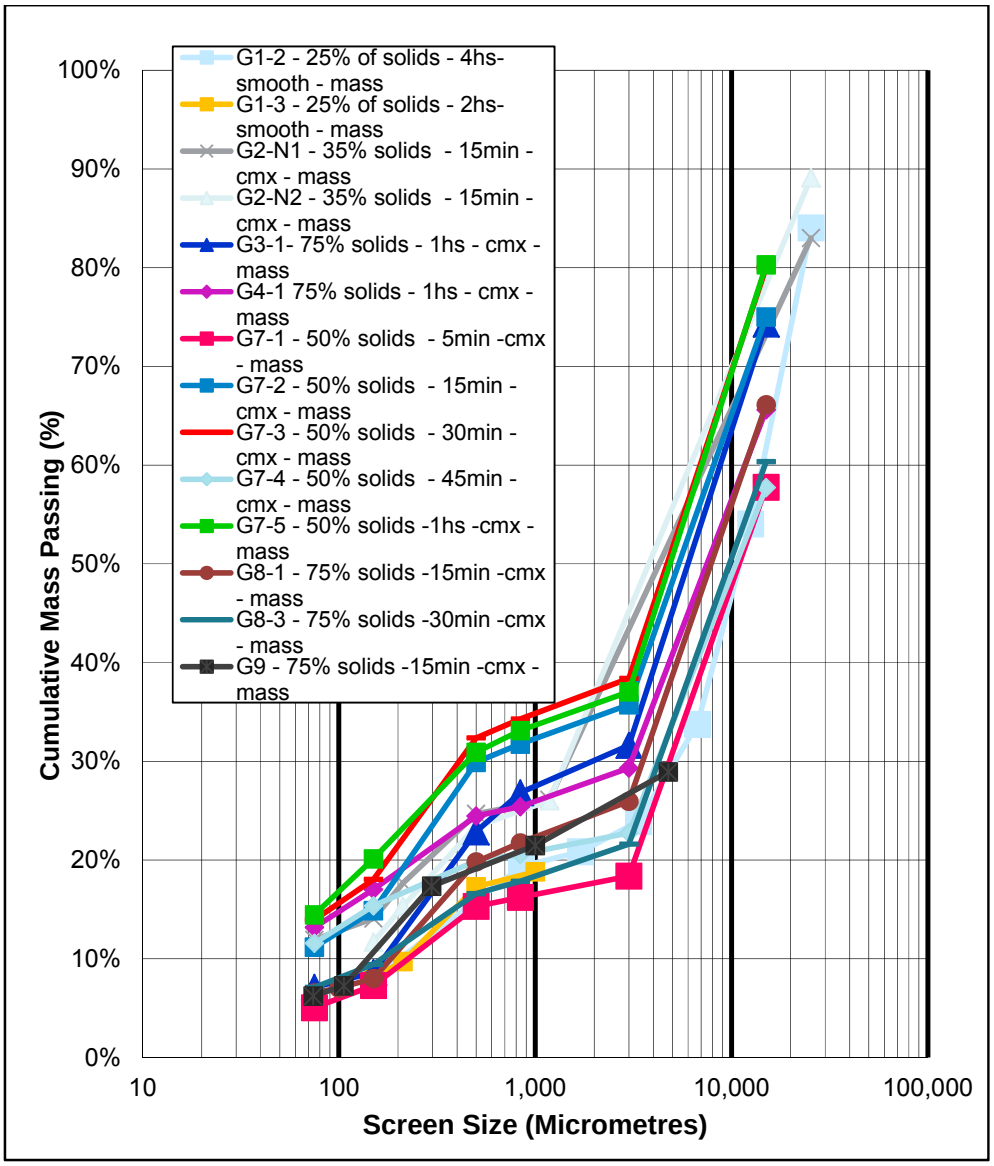


Figure 13-8: Mass Distribution versus Grain Size in Guanaco Gravels under different conditions of scrub time, percentage solids and type of scrub. (Scrub type is "cmx" for cement mixer or "smooth" for smooth pail on a bottle roll table)

Table 13-11: Summary of distribution of mass, uranium, vanadium and gypsum against grain size for beneficiation test work undertaken on Guanaco composite samples

Test	Scrub Time (mins)	% Solids	Scrub type	%of gravel reporting to the fine fraction	Uranium (U_3O_8)				Vanadium (V_2O_5)				Gypsum			
					%contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	%contained in the fraction	Grade of the gravel (%)	Grade of the fraction (%)	Up-grade factor
Screen Tests after 15 Minutes of Wet Scrubbing																
<150µm fraction																
G1-2	240	25	Smooth	8.0%	91.6%	54.5	623	11.4	30.5%	498	1,891	3.8				
G1-3	240	25	Smooth	8.2%	91.8%	70.2	789	11.2	31.9%	461	1,802	3.9				
G2-N1	15	35	CM	14.1%	89.6%	54.7	348	6.4	41.0%	519	1,510	2.9				
G2-N2	15	35	CM	11.7%	85.5%	39.4	288	7.3	35.2%	492	1,477	3.0				
G3-1	60	75	CM	8.6%	88.8%	31.2	322	10.3	30.8%	462	1,651	3.6	51.6%	1.2	7.1	6.0
G3-2	60	75	CM	7.4%	82.7%	41.0	456	11.1	26.1%	439	1,541	3.5	44.8%	0.7	4.0	6.0
G3-3	60	75	CM	9.8%	87.2%	23.9	358	15.0	23.6%	358	867	2.4	28.4%	0.3	0.9	2.9
G4-1	60	75	CM	17.0%	88.6%	39.3	205	5.2	47.1%	514	1,423	2.8	84.6%	1.7	8.3	5.0
G4-2	60	75	CM	14.4%	87.0%	35.7	216	6.1	32.4%	415	936	2.3	66.1%	0.7	3.0	4.6
G7-1	5	50	CM	7.3%	36.6%	7.3	37	5.0	3.9%	245	131	0.5	29.0%	2.4	9.7	4.0
G7-2	15	50	CM	14.9%	85.5%	34.1	196	5.7	42.9%	290	835	2.9	36.8%	4.1	10.1	2.5
G7-3	30	50	CM	18.0%	90.5%	51.6	259	5.0	48.9%	388	1,050	2.7	54.1%	4.2	12.5	3.0
G7-4	45	50	CM	15.4%	89.0%	30.1	175	5.8	43.3%	301	850	2.8	72.9%	2.4	11.5	4.7
G7-5	60	50	CM	20.1%	92.0%	47.9	219	4.6	46.6%	428	991	2.3	71.3%	3.9	13.7	3.5
G8-1	15	75	CM	7.0%	88.1%	70.1	877	12.5	28.2%	376	1,509	4.0	36.4%	1.5	7.6	5.2
G8-2	15	75	CM	8.0%	87.8%	62.9	690	11.0	29.9%	374	1,398	3.7	23.4%	2.4	4.3	1.8
G8-3	30	75	CM	9.4%	91.0%	71.1	686	9.6	32.3%	297	1,014	3.4	46.6%	1.9	9.3	4.9
Average of <150 µm fraction after 15 minute CM scrub at 50-75% solids																
G7-2, G8-1, G8-2				**10.0%**	**87.1%**			**9.7**	**33.7%**			**3.5**	**36.6%**			**3.2**

Table 13-11 continued: Summary of distribution of mass, uranium, vanadium and gypsum against grain size for beneficiation test work undertaken on Guanaco composite samples

Test	Scrub Time (mins)	% Solids	Scrub type	%of gravel reporting to the fine fraction	Uranium (U_3O_8)				Vanadium (V_2O_5)				Gypsum			
					%contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	%contained in the fraction	Grade of the gravel (%)	Grade of the fraction (%)	Up-grade factor
<75µm fraction																
G2-N1	15	35	CM	11.9%	88.7%	54.7	406	7.4	36.4%	519	1,583	3.1				
G3-1	60	75	CM	7.1%	88.1%	31.2	386	12.4	28.9%	462	1,877	4.1	44.1%	1.2	7.3	6.2
G4-1	60	75	CM	13.2%	86.9%	39.3	259	6.6	42.9%	514	1,673	3.3	70.0%	1.7	8.9	5.3
G7-1	5	50	CM	5.1%	35.6%	7.3	52	7.0	3.5%	245	172	0.7	12.2%	2.4	5.9	2.4
G7-2	15	50	CM	11.2%	82.3%	34.1	251	7.4	34.6%	290	898	3.1	19.3%	4.1	7.0	1.7
G7-3	30	50	CM	13.9%	88.6%	51.6	328	6.4	43.2%	388	1,202	3.1	31.4%	4.2	9.4	2.3
G7-4	45	50	CM	11.6%	87.2%	30.1	227	7.5	39.1%	301	1,015	3.4	50.8%	2.4	10.6	4.4
G7-5	60	50	CM	14.5%	89.4%	47.9	296	6.2	40.4%	428	1,197	2.8	40.1%	3.9	10.7	2.8
G8-1	15	75	CM	6.6%	87.2%	70.1	931	13.3	27.4%	376	1,572	4.2	31.2%	1.5	7.0	4.8
G8-2	15	75	CM	5.3%	84.4%	62.9	995	15.8	25.7%	374	1,805	4.8	8.7%	1.5	2.4	1.6
G8-3	30	75	CM	7.1%	89.3%	71.1	894	12.6	29.0%	297	1,210	4.1	36.8%	1.9	9.8	5.2
Average of <75 µm fraction after 15 minute CM scrub at 50-75% solids																
G7-2, G8-1, G8-2				**7.7%**	**84.6%**			**12.2**	**29.3%**			**4.0**	**25.2%**			**2.7**
Hydrocyclone Tests from <150µm Feed After One Hour of Wet Scrubbing - one pass																
G3-2	60			4.1%	63.0%	41.0	631	15.4	18.5%	439	1,974	4.5	34.9%	0.7	5.6	8.5
Hydrocyclone Tests from <150µm Feed After One Hour of Wet Scrubbing - three passes																
G3-3	60			5.3%	79.8%	23.9	358	15.0	18.6%	358	1,250	3.5	26.7%	0.3	1.6	5.0
G4-2	60			7.2%	67.3%	35.7	332	9.3	25.3%	415	1,458	3.5	22.4%	0.7	2.0	3.1
Average				**6.3%**	**73.5%**			**12.2**	**22.0%**			**3.5**	**24.5%**			**4.1**
Hydrocyclone Tests from <75µm Feed After One Hour of Wet Scrubbing - three passes																
G8-2	15			3.2%	65.7%	62.9	1,287	20.5	19.0%	374	2,219	5.9	6.2%	1.5	2.9	1.9
Average				**3.2%**	**65.7%**			**20.5**	**19.0%**			**5.9**	**6.2%**			**1.9**

13.5.2.1.2.3 Uranium Distribution

The following observations can be made from uranium distribution with grain size fraction in response to variable scrub conditions:

- A greater proportion of fines is generated with longer scrub times. This is illustrated by the G7 sample series in which poor uranium recoveries to the fines were achieved with a five minute scrub (G7-1), with uranium recoveries increasing very significantly in the 15 minute scrub (G7-2) and slightly more so with longer scrub times of 30 minute, 45 minute and 60 minute scrub times in tests (G7-3 to G7-5 respectively) (Figure 13-9);
- A shorter scrub time at lower percentage solids yields a similar uranium distribution to a longer scrub time at higher percentage solids. This is illustrated by G3-1 and G4-1 that were scrubbed for one hour at 75% solids achieving a uranium distribution similar to G7-3 and G7-4 in which 50% solids were scrubbed for 30 and 45 minutes respectively; and
- Long scrub times in smooth pails yields similar uranium extraction to the fines as shorter scrub times in a cement mixer in which fins provide lift that provides a higher kinetic energy. This is illustrated by G1-2 and G1-3 that were scrubbed for two to four hours in a smooth pail generating similar uranium recoveries to samples that were scrubbed for as little as 15 minutes in a cement mixer (G7-2). The higher kinetic energy in the scrub apparatus achieves acceptable uranium recovery to the fines in a shorter time than in lower energy apparatus.

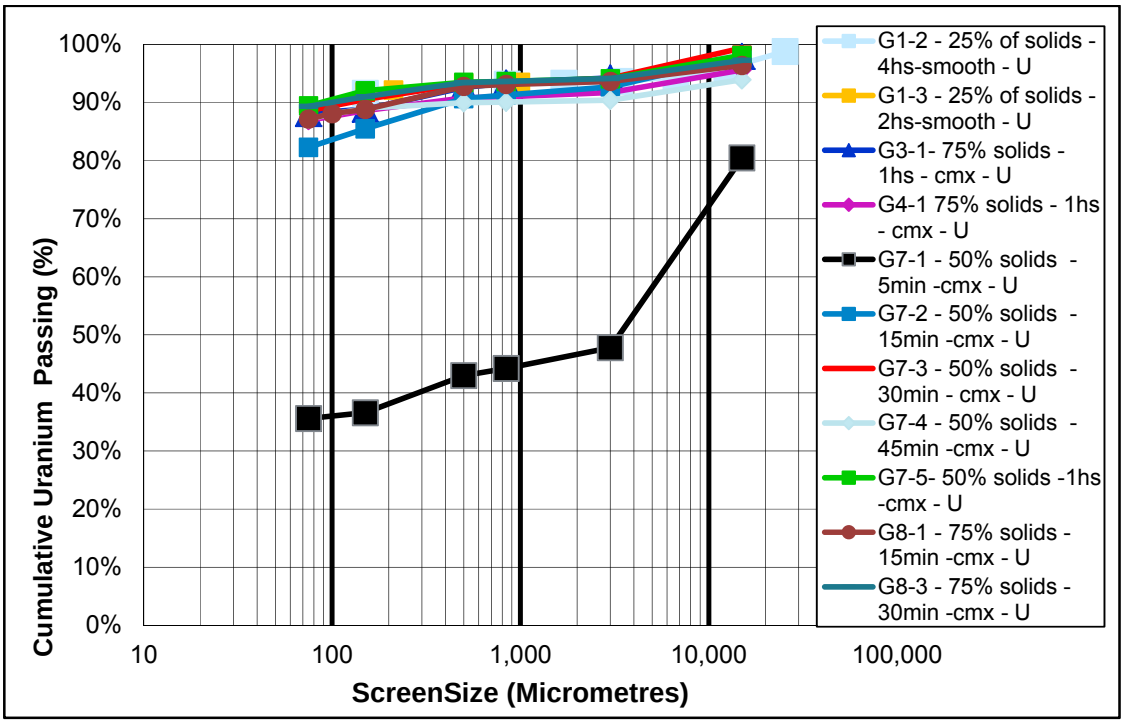


Figure 13-9: Uranium Distribution versus Grain Size Fraction for Guanaco Gravels under different conditions of Scrub Time, Percentage Solids and Type of Scrub

13.5.2.1.2.4 Gypsum Distribution

Due to the consumption of alkaline leach reagents by gypsum, the elimination of gypsum from the fine fractions through beneficiation is an important element of the test work. The following observations may be made from the gypsum distribution with grain size (Figure 13-10):

- Gypsum recovery to the fines is minimised by short scrub times. This is illustrated by the G7 series of tests in which the lowest recovery of gypsum was achieved with the five minute scrub (G7-1), increasing through the 15 minute scrub (G7-2), 30 minute scrub (G7-3) to a maximum gypsum content of the fines after scrub times of 45-60 minutes (G7-4 and G7-5 respectively). A similar result was obtained from G8-1 that was scrubbed for 15 minutes, yielding lower gypsum recovery than G8-3 that was scrubbed for 30 minutes;
- Gypsum recovery to the fines is lower for 50% solids than for 75% solids at fine grain sizes. This is an interesting feature of the data that is evident in both the 15 minute and 30 minute scrubs; that the proportion of gypsum reporting to the fine fraction is lower at larger grain sizes in the 75% solids than for the 50% solids. At finer grain sizes, the inverse is apparent with the lower percentage solids density material yielding a lower percentage of gypsum to the fines. This means that lower percentage solids is less efficient at eliminating gypsum at coarse grain sizes, but more efficient in finer-grained material, than higher percentage solids. The relationship at larger grain sizes is expected since a higher percentage solids should result in less gypsum milling resulting in larger gypsum crystals remaining intact and being retained by the coarser screens. The inverse relationship observed at the finest screen sizes is not understood at this time;
- Data from G3-1, the only test from which sulphate distribution data is available for a smooth roll scrub, suggests that a low kinetic energy scrub is favourable for gypsum elimination by screening than higher-energy scrub. This data is consistent with lower energy scrub probably minimising pulverisation of gypsum crystals; and
- Figure 13-10 shows that gypsum is being progressively eliminated by screening at finer mesh sizes, the grade of gypsum generally increases at finer grain size (Figure 13-11) because the mass of fines that contains the gypsum also decrease progressively at finer grain size as illustrated in Figure 13-8. The most effective gypsum elimination was with 15 minute scrub in a cement mixer at 75% solids (Figure 13-11).

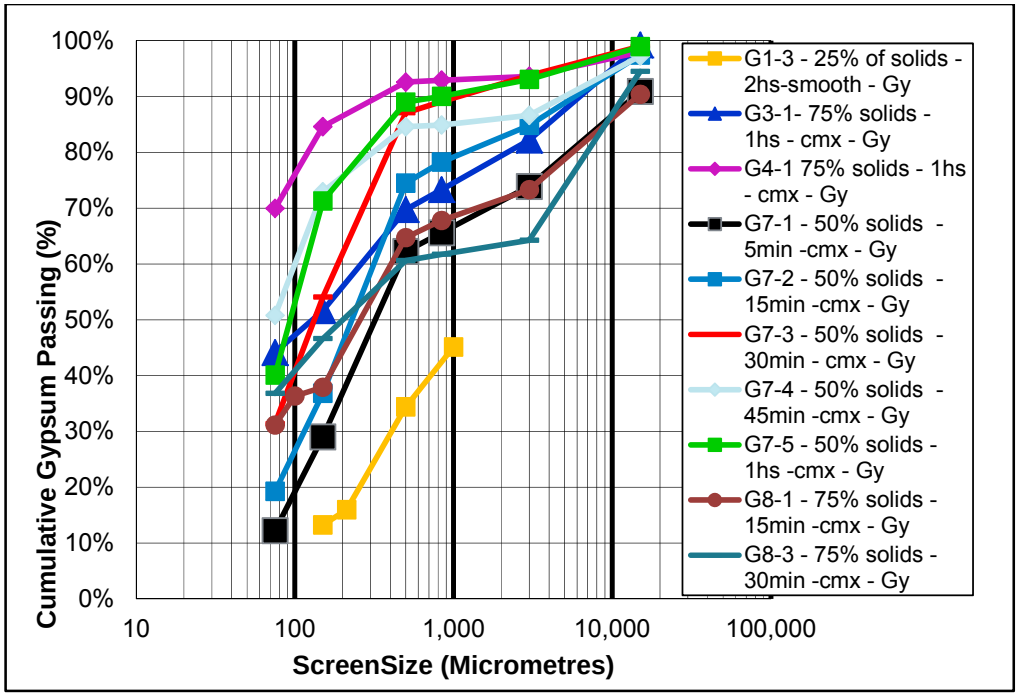


Figure 13-10: Gypsum Distribution versus Grain Size Fraction for Guanaco Gravels under different conditions of scrub time, percentage solids and scrub-type

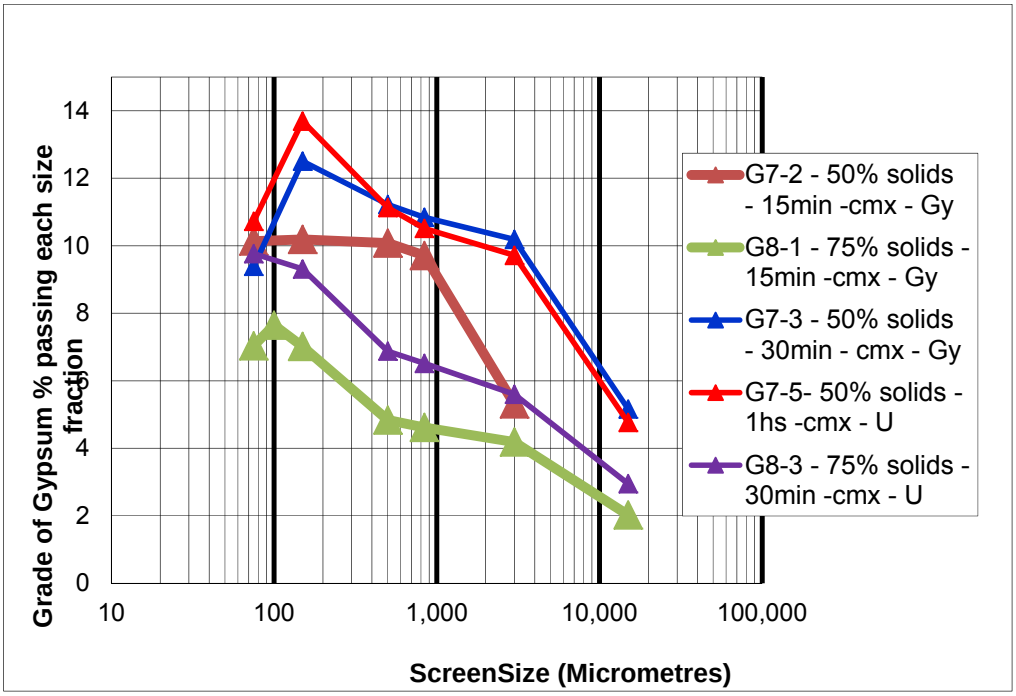


Figure 13-11: Gypsum grade of various grain sizes generated by wet scrubbing under various conditions followed by wet screening of Guanaco gravels

13.5.2.1.2.5 Vanadium Distribution

The following observations can be made from the distribution of vanadium with grain size (Figure 13-12):

- In stark contrast to uranium distribution, vanadium is largely concentrated in the relatively coarse fraction with 40% to 90% of the contained vanadium in the >3mm fraction. At grain sizes finer than 3mm, vanadium content of the fines decreases gradually with grain size. This feature of the vanadium distribution is consistent with vanadium occurring in hard, heavy minerals that are relatively coarse-grained as shown in mineralogical work by SGS (SGS, 2011);
- Scrub time is a factor, to a limited extent, in vanadium distribution with a five minute scrub yielding low vanadium recoveries to the fines (G7-1). At longer scrub times, however, there is little relationship with vanadium concentration in the fines. This is illustrated by G7-3 with a scrub time of 30 minutes having the highest percentage of vanadium reporting to the fine fraction, while tests done at longer scrub times have a lower percentage of vanadium reporting to the fines;
- Results of test work to date suggest that scrubbing at 50% solids generates the greatest proportion of vanadium reporting to the fines – more so than lower and higher percentage solids. This could be due to variation in the distribution of heavy minerals within the gravels; and
- Low energy smooth bottle roll generally resulted in less vanadium reporting to the fines than higher-energy cement mixing.

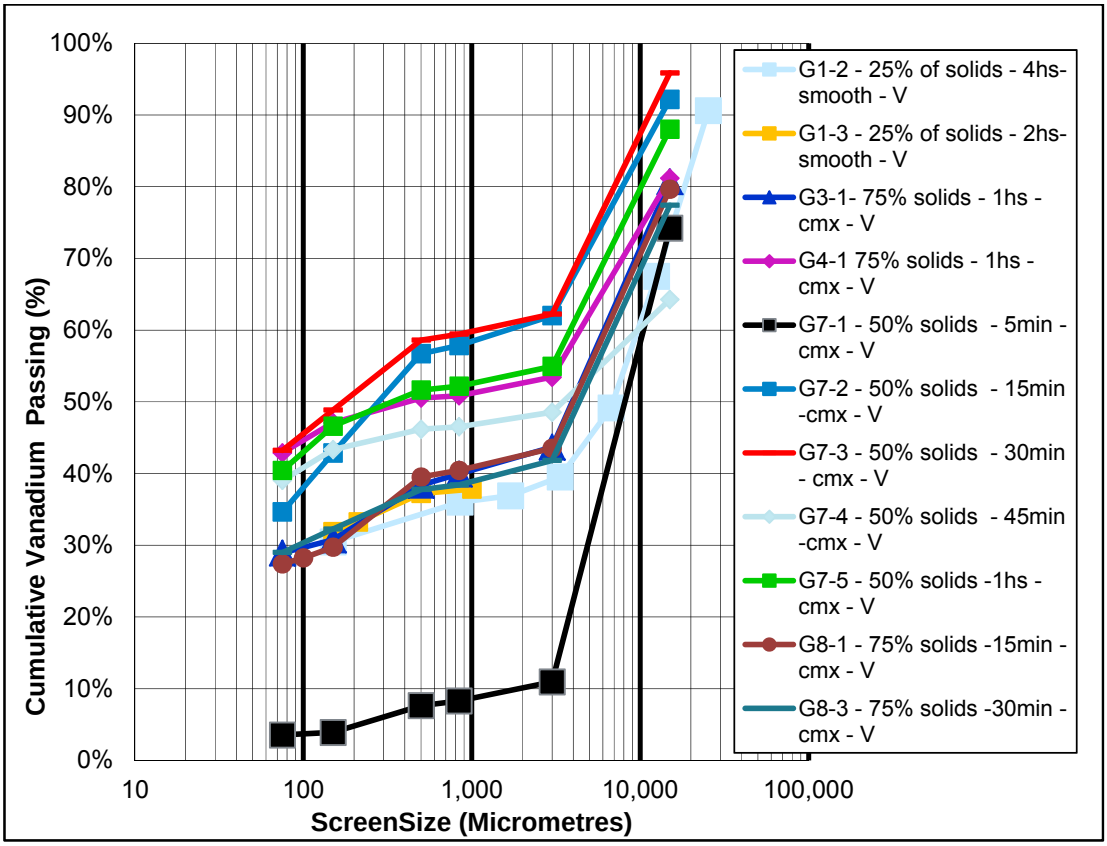


Figure 13-12: Vanadium Distribution versus Grain Size Fraction for Guanaco Gravels under different conditions of scrub time, percentage solids and type of scrub (cement mixer "cmx" or smooth pail on bottle roll table "smooth")

13.5.2.1.3 Hydrocyclone Test Work

13.5.2.1.4 Procedure

Given the extremely fine grain size of the observed uranium-vanadium minerals, and the concentration of these elements into the fine fractions by screening, the objective of the hydrocylone work was to concentrate the fine fraction even further into the ultrafine overflow while rejecting coarser-grained gypsum in the underflow fraction. Four samples of Guanaco gravel were scrubbed, screened and hydrocycloned at UNSJ. Details of the scrubbing and screening prior to hydrocyclone beneficiation are provided in Section 13.4.1.

13.5.2.2 Results

The samples selected for hydrocylone tests for composites G3-2, G3-3, G4-2 and G8-2 range in uranium grade from 24ppm to 63ppm, vanadium from 358ppm to 439ppm, and gypsum from 0.3% to 1.5% (Table 13-12). The feed for the hydrocyclone test work was <75µm fines that were generated by one hour of scrubbing, except for test 8-2, which was scrubbed for 30 minutes.

The following observations can be made from the hydrocyclone test work (Table 13-12):

- Multiple passes through a hydrocyclone generate superior metal recovery and lower gypsum than a single pass. This is illustrated by tests G3-2 and G3-3 in which the same composite sample passed through the hydrocyclone once in test G3-2 and three times in G3-3;
- The single pass through the hydrocyclone generated uranium recovery of 63% while the three passes through the hydrocyclone achieved 80% uranium recovery;
- Vanadium recovery was similar in the two tests at 18% in the single pass and 19% in the triple pass;
- Gypsum recovery in the single-pass test was 35%, while in the test in which feed passed through three hydrocyclones was 27%;
- A longer scrub time generates more overflow fines than shorter scrub times. This is illustrated by test G4-2 in which the gravel was scrubbed for an hour producing 7% of the gravel's mass in the overflow against test G8-2 that was scrubbed for 30 minutes generating 3% of the gravel's mass in overflow fines. The feed in both of these tests was <75µm fines;
- Economic factors will determine which of the beneficiation procedures between one hour scrub with 150µm feed to the hydrocyclone (G3-3 and G4-2) and a 15 minute scrub with a 75µm feed to the hydrocyclone (test G8-2) are superior;
- The one hour scrub with 150µm feed averages 6.3% of the gravel's mass reporting to the overflow with 73.5% of the uranium (with an enrichment factor of 12.2 times), 22% of the vanadium at an enrichment factor of 3.5 times and 24.5% of the gypsum at an enrichment factor of 4.1 times;

- The <75µm fraction of the gravel that was scrubbed for 15 minutes yielded an overflow from the hydrocyclone with 3.2% of the gravel's mass, 65.7% of its uranium, 19% of its vanadium and only 6% of its gypsum. However, the 6% gypsum recovery in test G8-2 probably is an over-estimation due to gypsum dissolution, and for that reason, gypsum data from test G8-2 are considered suspect until the test is repeated. Irrespective of the accuracy of the gypsum data, the fact that significantly less gypsum reported to the overflow after a short scrub time suggests that further test work should be done to determine the extent to which shorter scrub times lead to more efficient rejection of gypsum into the hydrocyclone underflow; and
- It is suspected that additional test work with different hydrocyclone designs would result in optimisation of uranium, and to a lesser extent vanadium, reporting to the overflow fines, with a lower proportion of the gravel's gypsum.

Table 13-12: Distribution of mass and grade of uranium, vanadium and gypsum reporting in the feed to the hydrocyclone, and in the overflow ultrafines and underflow fines in test work on Guanaco gravels

Composite Sample Details	Grain Size of Feed (µm)	Hydrocyclone Characteristics		Products	Mass of each Fraction (g)	% of Mass in each Fraction	Mass Split	Uranium Grade in Fraction (ppm)	% Recovery of Uranium to each Fraction	Upgrade Factor for Uranium	Vanadium Grade in Fraction (ppm)	% Recovery of Vanadium to each Fraction	Upgrade Factor for Vanadium	Gypsum Grade in Fraction (%)	% Recovery of Gypsum to each Fraction	Upgrade Factor for Gypsum
		Pressure (psi)	Number of Passes													
G3-2- 75% solids - 1hs - cmx - HC	150	2.5	1	Grade of Original Gravel				41			439			0.7		
				<150µm HC Feed	5,400	7.4%	100%	456	82.7%		1,541	44.8%		2.2	44.8%	
				Overflow	2,980	4.1%	55%	631	63.0%	15.4	1,974	18.5%	4.5	5.6	34.9%	8.5
				Underflow	2,420	3.3%	45%	242	19.7%		1,007	7.6%		1.96	9.9%	
G3-3- 75% solids - 1hs - cmx - HC	150	1.5	3	Grade of Original Gravel				24			358			0.3		
				<150µm HC Feed	4,127	9.8%	100%	213	87.2%		867	23.6%		0.7	28.4%	
				Overflow	2,247	5.3%	54%	358	79.8%	15.0	1,250	18.6%	3.5	1.6	26.7%	5.0
				Underflow	1,880	4.5%	46%	40	7.5%		409	5.1%		0.1	1.7%	
G4-2- 75% solids - 1hs - cmx - HC	150	1.5	3	Grade of Original Gravel				36			415			0.7		
				<150µm HC Feed	13,372	14.4%	100%	216	87.0%		936	32.4%		3.0	66.1%	
				Overflow	6,712	7.2%	50%	332	67.3%	9.3	1,458	25.3%	3.5	2.0	22.4%	3.1
				Underflow	6,660	7.2%	50%	98	19.7%		409	7.1%		4.0	43.7%	
Average of Overflow of 3-pass Hydrocyclone Tests on 150µm feed						6.3%			73.5%	12.2		22.0%	3.5		24.5%	4.1
G8-2 - 75% solids -15min - cmx - HC	75	1.5	3	Grade of Original Gravel				63			374			1.5		
				<75µm HC Feed	1,960	5.3%	100%	995	84.4%		1,805	25.7%		2.4	8.7%	
				Overflow	1,180	3.2%	60%	1,287	65.7%	20.5	2,219	19.0%	5.9	2.9	6.2%	1.9
				Underflow	780	2.1%	40%	554	18.7%		1,180	6.7%		1.7	2.5%	

13.5.3 Leach Tests on Guanaco Fines

13.5.3.1 Alkaline Leach

A summary of the conditions under which initial alkaline leach test work was carried out at SGS, and subsequently by SRC, is provided in Table 13-13. Tests were done at reagent concentrations of 35–50g/L sodium carbonate (Na_2CO_3) and 15-20g/L sodium bicarbonate ($NaHCO_3$) at temperatures of 50° to 90°C at solids densities of 33% by mass.

Results show that uranium extraction by alkaline leaching rises steeply to a maximum at between two and four hours, before declining gradually and significantly over longer leach times (Table 13-14, Figure 13-13, 13-14). The declining extraction with time is probably caused by bicarbonate degrading to carbonate causing the re-precipitation of uranium.

A leach temperature of 50°C achieves average uranium extraction of 67% at six hours, increasing to 94% at 70°C, reaching a maximum of 97% at 80°C and then declining to 90% at 90°C (Figure 13-14). The average uranium extraction after four hours is 96% at 80°C.

Average vanadium extraction increases with temperature to a peak at 80°C (61% extraction) before decreasing slightly at 90°C (Table 13-14). Sulphate (gypsum) is essentially all leached from the fines after only two hours.

Sodium carbonate and sodium bicarbonate consumption averages 46kg and 8kg per tonne of leached fines respectively at a leach temperature of 80°C (Table 13-13). This reagent consumption increases at a lower temperature of 50°C to 61kg of sodium carbonate and 2.3kg of sodium bicarbonate per tonne of leached fines. This high alkaline reagent consumption is due to the relatively high gypsum content of the fines.

Alkaline leach results for the two samples that were prepared in the way that most closely approximates the optimal beneficiation method for Guanaco (G8-1 and G8-2) achieved an extraction of 96% for uranium and 71% for vanadium with a four hour leach at a temperature of 80°C. Associated reagent consumption was 41kg of sodium carbonate and 8.5kg of sodium bicarbonate per tonne of fines.

Table 13-13: Alkaline leach conditions used in test work on the fine fraction of Guanaco gravels

Lab	Sample #	Leach Test #	Grain size (µm)	Temp (°C)	% Solids	Na_2CO_3		$NaHCO_3$	
						Added (g/L)	Consum^n after 4 hours (kg/t)	Added (g/L)	Consum^n after 4 hours (kg/t)
SGS	G1-2	Test 8	<150	80	33	50	58	15	0
SGS	G2-1	Test 23	<150	90	33	50		20	
SGS	?	Test 27	<150	70	33	35		20	
SGS	?	Test 28	<150	90	33	35		20	
SGS	?	Test 57	<150	70	33	50		20	
SRC	G3-3	CCAL-III-2013	HC Overflow	50	40	50	63.4	20	-23.8
				80	40	50	22.6	20	8.4
SRC	G8-1	CCAL-VIII-A	<75	50	40	50	55	20	5.3
				80	40	50	48.4	20	15.4
SRC	G8-2	CCAL-VIII-C	HC Overflow	50	40	50	45.8	20	5.3
				80	40	50	34.2	20	1.6
SRC	G8	CCAL-VIII-D	<75	50	40	50	80.3	20	22.3
				80	40	50	65.5	20	13
Average reagent consumption at 50°C							61.1		2.3
Average reagent consumption at 70°C									
Average reagent consumption at 80°C							45.7		7.7
Average reagent consumption at 90°C									
Average reagent consumption of G8-1 & G8-2 at 80°C							41.3		8.5

Note: HC refers to hydrocyclone.

Table 13-14: Alkaline leach test results for the fine-grained fraction of Guanaco gravels

Lab	Sample #	Leach Test #	Temp	% Uranium Extraction at various leach times (hours)									% Vanadium Extraction at various leach times (hours)						% Sulphate Extraction at various leach times (hours)		
			(°C)	2	4	6	9	12	24	36	48	72	2	4	6	12	48	72	2	4	6
SGS	G1-2	Test 8	80							78		50						50			
SGS	G2-1	Test 23	90		94				92		85						59				
SGS	G2-1	Test 27	70	91		93	95	93								32					
SGS	G2-1	Test 28	90	90		90	92	87								53					
SGS	G2-1	Test 57	70	91		95	94	95								34					
SRC	G3-3	CCAL-III-2013	50	56	79	91							30	50	48				97	97	96
			80	98	99	99							55	57	51				97	97	97
SRC	G8-1	CCAL-VIII-A	50	41	51	59							57	44	49				100	100	100
			80	91	96	97							65	71	69				98	100	100
SRC	G8-2	CCAL-VIII-C	50	41	48	54							51	40	48				99	99	99
			80	92	96	97							70	71	69				98	94	98
SRC	G8	CCAL-VIII-D	50	38	53	64							36	38	40				100	100	100
			80	88	94	93							44	47	47				100	100	100
Average extraction with 90° C leach				90	94	90	92	87	92		85					53	59				
Average extraction with 80° C leach				92	96	97				78		50	58	61	59				98	97	99
Average extraction with 70° C leach				91		94	94	94								33					
Average extraction with 50° C leach				44	58	67							44	43	46				99	99	99
Average extraction for G8-1 & G8-2 at 80° C				92	96	97							67	71	69				98	97	99

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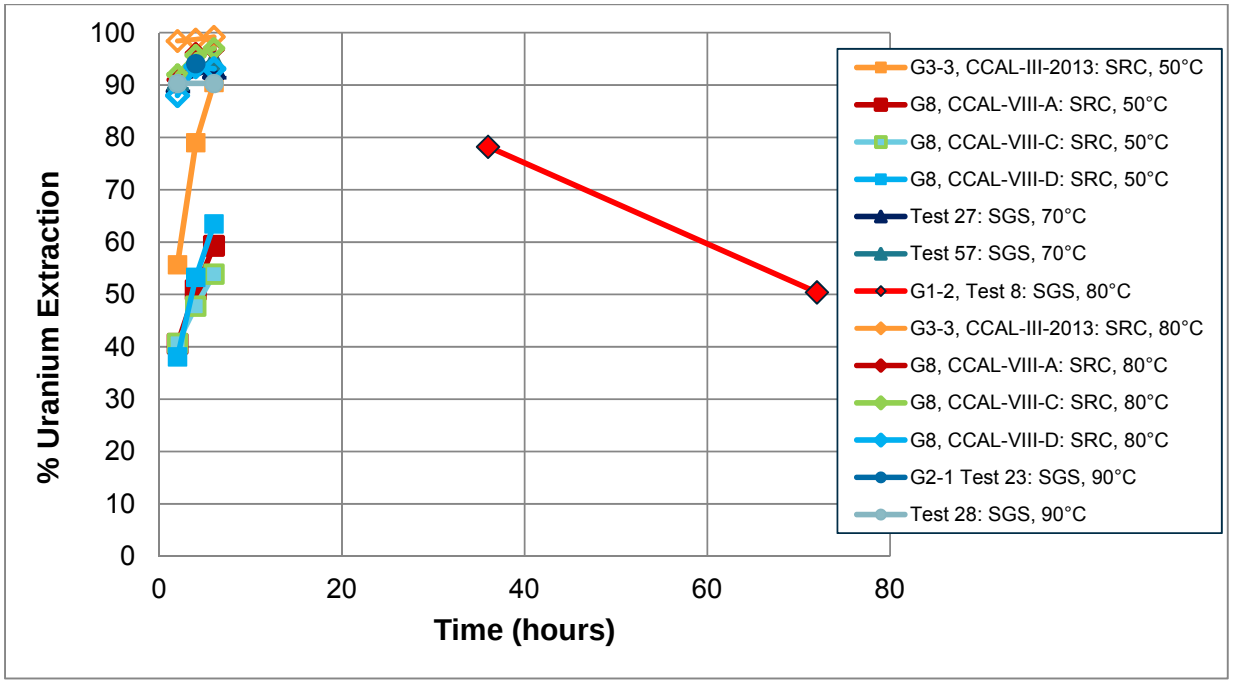


Figure 13-13: Uranium extraction with alkaline leach time for the fine fraction of Guanaco gravel samples

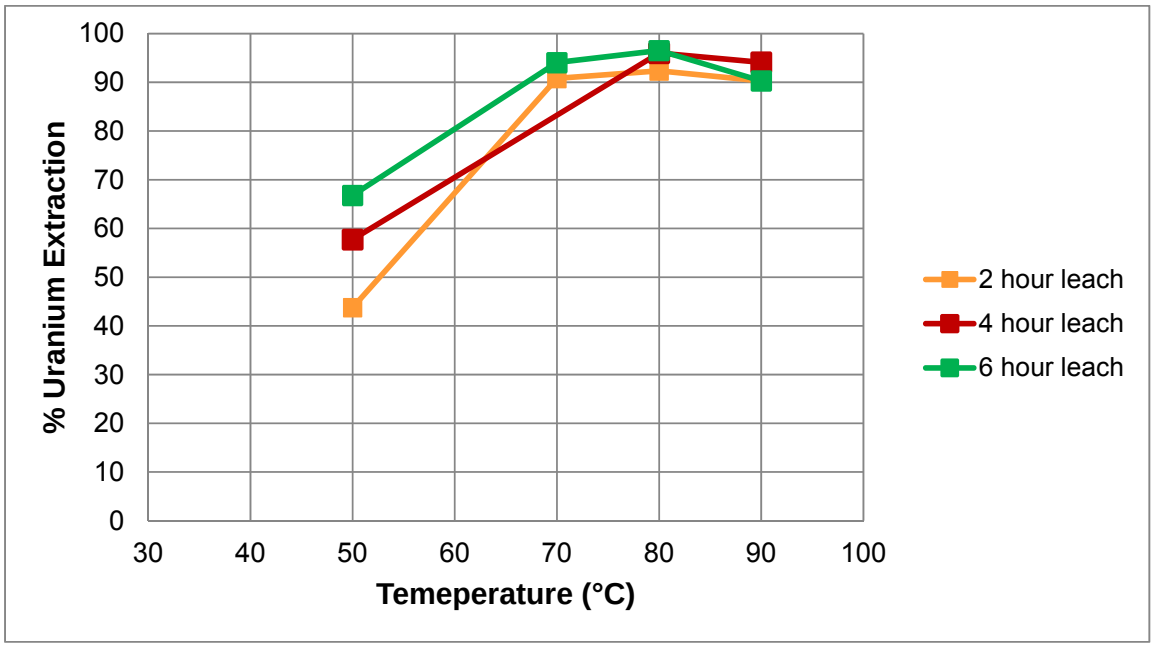


Figure 13-14: Uranium extraction with alkaline leach time and temperature for the fine fraction of Guanaco gravels

13.5.3.2 Acid Leach

A sample of 150g of <150µm fines from wet screening of composite sample G1 (test G1-2) was leached at a slurry density of 33% solids by weight with sulphuric acid by SGS at a pH of about 1.2 and temperature of 50°C for 72 hours with a target ORP of 500mV. 46.1g (equivalent to 295kg/t) of sulphuric acid was used in the test.

Uranium extraction was constant at 74.2% at 36 and 72 hours. The completion of uranium leaching by 36 hours suggests that shorter leach times may lead to reduced acid consumption.

Vanadium extraction was 85.5% at 72 hours.

Acid consumption is estimated to be 148kg/t of leach feed.

13.6 Lago Seco Gravels

13.6.1 Sample Preparation

13.6.1.1 Composite LS1 (SGS sample name "October 2010 Lago Seco" Table 13-4)

Composite LS1 was prepared from gravel that was excavated in the field, packaged in 2kg polythene sample bags and shipped to SGS's facility in Ontario where the sample bags were emptied, the material mixed and homogenized, and then split into subsamples for testing. Composite LS1 was used in the following tests (Table 13-15):

- Test LS1-1: Approximately one-eighth of the LS1 composite was used in a dry screen test of approximately 4.5kg of gravel on various screens down to 150µm;
- Test LS1-2: Approximately 3.6kg of gravel underwent wet scrubbing for four hours in 20L pails on a bottle roll table at 20%-30% solids, followed by wet screening to 150µm for comparison with test LS1-1; and
- Test LS1-3: The remainder of the material (~26kg) was wet scrubbed for four hours in 20L pails on a bottle roll table at 20%-30% solids, followed by wet screening to 150µm.

13.6.1.2 Composite LS3 (UNSJ sample "CTLS-H-2013)

Composite samples LS3, LS4, LS5, LS6 and LS8 were prepared at UNSJ. Sample LS3 had a mass of 280kg of average grade material and was used in the following tests:

- Test LS3-1 used a 2.4kg sample of gravel that underwent a grain size characterisation test by dry screening down to 75µm;
- Test LS3-2 was on 4.0kg of gravel that was dry screened to 850µm and the 850µm material (1.9kg) was fed into a into a pneumatic separator consisting of three cyclones;
- Test LS3-3 was a grain size characterisation test in which a 30kg sample of gravel was dry screened to 3mm followed by wet screening to a final screen size of 26µm. The <26µm fraction underwent alkaline and acid leach tests at SRC as sample number "CTLS";
- Test LS3-4 was a grain size characterisation test of a 2kg sample of gravel. The sample was dry screened to 3mm and the <3mm material (1.06kg) was wet screened to a final screen size of 75µm;

- Test LS3-5 (UNSJ sample "Test B") involved the dry screening of a 40.97kg sample to 3mm followed by wet screening of the 22.1kg <3mm fraction to 150µm. The <150µm fraction was fed into a hydrocyclone at a pressure of 2.3psi. The overflow from the first cyclone constituted the feed for a second cyclone and that from the second was fed into a third cyclone. The overflow from the third pass through the cyclones constituted sample CHB-CTL-2013 and the underflow THB-CTL-2013;
- Test LS3-6 (UNSJ sample number "CTLS-2013") included the dry screening of a 23.9kg sample to 3mm. The <3mm fines had a mass of 11.5kg, which were fed into a deslimer that generated an overflow mass of ~1.3kg and an underflow of ~10.2kg. The overflow from the deslimer constituted sample "AD Fino" that underwent alkaline leach at SRC; and
- In test LS3-7, the underflow from the deslimer in test LS3-6 (10.2kg) was used as the feed to a hydrocyclone at a pressure of 5psi and the overflow material from the hydrocyclone constituted the "CH" sample (675g) that was alkaline leached at SRC. The underflow from the hydrocyclone constituted the "TH" sample that was alkaline leached at SRC.

13.6.1.3 Composite LS4 (UNSJ sample number "CTL-I-2013")

Composite LS4 had a mass of 87.7kg that was screened at 15mm resulting in 28.1kg in the oversized material and 59.6kg in the <15mm material.

- Test LS4-1 was run on 31kg from the <15mm fraction of sample LS4, which was wet screened to 75µm that constituted the feed for a hydrocyclone. The cyclone used was of relatively low efficiency and hence the overflow from the first run was passed through the hydrocyclone again. The hydrocyclone overflow was sample CH-CTL-2013-1 and the underflow, sample TH_CTL-2013-I. The feed pressure for the hydrocyclone was 1.5psi.

13.6.1.4 Composite LS5 (UNSJ sample number "CTLS-III-2013")

- Test LS5-1 had a high gypsum content of 16.3% by mass. 44.9kg of gravel was wet screened to 75µm that constituted the feed for a hydrocyclone pair, from which the overflow was sample CH-CTLS-III-2013 and the underflow sample TH-CTLS-III-2013. The hydrocyclone operated at a pressure of 10psi.

13.6.1.5 Composite LS7

Composite LS7 (UNSJ sample number "CTLS-IV-2013") was split into five sub-samples that were wet scrubbed for different lengths of time in a cement mixer with 10L of water and subsequently screened to 26µm.

- Test LS7-1: 4.7kg of gravel was scrubbed for five minutes;
- Test LS7-2 : 4.9kg of gravel was scrubbed for 15 minutes;
- Test LS7-3: 4.7kg of gravel was scrubbed for 30 minutes;
- Test LS7-4: 4.9kg of gravel was scrubbed for 45 minutes; and
- Test LS7-5: 4.8kg of gravel was scrubbed for one hour.

13.6.1.6 Composite LS8

Composite LS8 (UNSJ sample number "CTLS-V-2013") was split into two sub-samples that were processed as follows:

- Test LS8-1: A 30.88kg sub-sample was scrubbed in a cement mixer for five minutes with 12L of water and wet screened to 75µm with 17L of water. The <75µm fines constituted the feed to a hydrocyclone that operated at a pressure of 1.5psi. The overflow fraction was run through the system three times; and
- Test LS8-2: A 31.42kg sub-sample was dry screened at 15mm and the >15mm fraction was wet scrubbed for one minute with 5L of water to liberate fines that were adhered to the pebbles. The <15mm fraction was wet scrubbed for five minutes with 12L of water and the fines from both scrubbing streams combined and wet screened to <75µm. The <75µm fraction was fed into a hydrocyclone that operated at a pressure of 1.5psi. The overflow fraction was run through the hydrocyclone three times.

13.6.1.7 Composite LS9

Composite LS9 had a mass of 42kg and underwent a five minute scrub in a smooth barrel at 75% solids. The <75µm fraction was used for gypsum leach tests with fresh and saline water by SRC.

13.6.2 Beneficiation Test Work on Lago Seco Gravels

13.6.2.1 Scrubbing and Screening

13.6.2.1.1 Dry versus wet scrubbing

Dry screening is not particularly effective in removing fine material that is adhered to clasts within Lago Seco gravels, whereas wet scrubbing results in the fines being completely washed from the surface of the coarser material (Figure **13-15**). This comprehensive cleaning of the pebbles with wet scrubbing and screening is reflected in the higher proportion of fines generated with wet scrubbing in comparison with dry. Scrub and screen data for dry scrubbing and screening (test LS1-1) show that the <150µm fraction contains 9.2% of the gravel's mass compared with 23.3% when wet screened (test LS1-2, Figure 13-16).

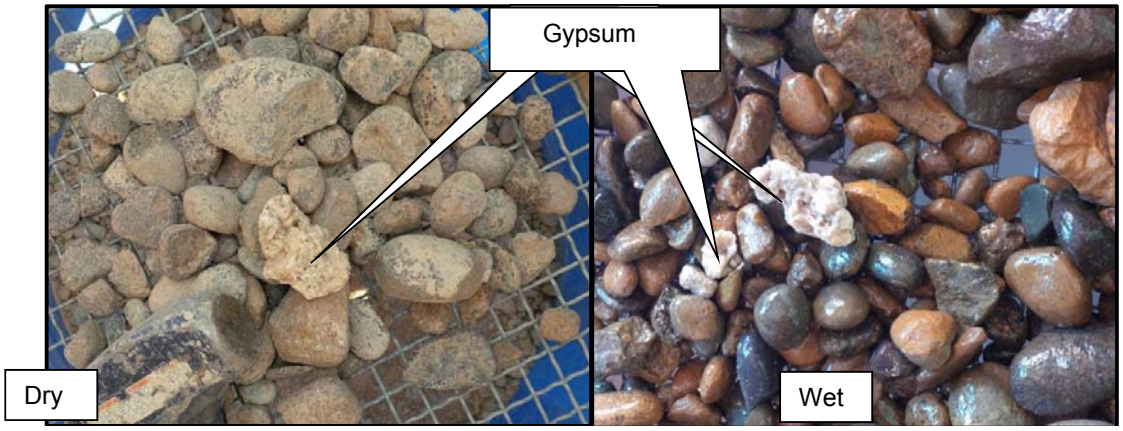


Figure 13-15**: Photos showing clasts after dry scrubbing (left) and wet scrubbing (right) of Lago Seco gravels. The gypsum nodule in the dry-screened fraction has decreased somewhat in size and broken into several fragments after wet screening. The mesh size is 15mm**

Table 13-15: Summary of beneficiation test work undertaken on gravel samples from the Lago Seco Sector of the Laguna Salada Deposit

Lab	Test #	Sample Mass (kg)	Scrub			Screen		Hydrocyclone		
			Time	Equip-ment	% Solids in scrub	Type	Final Grain Size (µm)	Feed Size (µm)	No of passes	Pressure (psi)
SGS	LS1-1	4.48	None			Dry	150			
	LS1-2	3.56	4 hrs	Pales on bottle-roll table	20%-30%	Wet	150			
	LS1-3	25.7	4 hrs		20%-30%	Wet	150			
UNSJ	LS3-1	2.42	None			Dry	75			
	LS3-2	4.01	None			Dry	850	850	3	5
	LS3-3	30.0	None			Dry	3,000			
	<3mm fraction	16.9				Wet	26			
	LS3-4	2.0	None			Dry	3,000			
	<3mm fraction	1.06				Wet	75			
	LS3-5	40.97	None			Dry	3,000			
	<3mm fraction	22.1				Wet	150	150	3	2.3
	LS3-6	23.89	None			Dry	3,000			
	<3mm fraction	11.5						3,000	Deslimer	
	LS3-7	10.2	None			None		Under-flow from Deslimer in LS3-6	1	5
	LS4	87.7	None			Dry	15,000			
	LS4-1	30.6 of <15mm	None			Wet	75	75	2	1.5
	LS5-1	44.9	None			Wet	75	75	2	10
	LS7-1	4.7	5 min	Cement Mixer	50%	Wet	26			
	LS7-2	4.9	15 min		50%	Wet	26			
	LS7-3	4.7	30 min		50%	Wet	26			
	LS7-4	4.9	45 min		50%	Wet	26			
	LS7-5	4.8	60 min		50%	Wet	26			
	LS8-1	30.9	5 min		75%	Wet	75	75	3	1.5
	LS8-2	31.4			75%	Dry	15,000			
	>15mm fraction	7.1	1 min		75%	Wet	75	75	3	1.5
	<15mm fraction	24.3	5 min		75%					
	LS9	42	5 min	Smooth barrel	75%	Wet	75	-	-	-

Wet screening resulted in 96.6% of the gravel's uranium concentrating in the <850µm fraction, compared with 70.7% for the dry screen process (Figure 13-16). At a finer screen size of 150µm, the efficiency of wet over dry screening is more apparent with wet screening resulting in 96.2% of the uranium being concentrated in the fines compared with 20.4% with dry screening. The head grade of 162ppm U_3O_8 in the gravel increased to 668ppm U_3O_8 with wet screening to the <150µm fraction, a concentration of 4.1 times. Dry screening resulted in a doubling of the head grade from 123ppm U_3O_8 to 272ppm U_3O_8 in the <150µm fraction (Table 13-16).

Wet screening resulted in 55% of the vanadium passing 850µm compared with 41.1% for dry screening. 50.5% of the contained vanadium passes 150µm with wet screening and 11.5% with dry screening (Figure 13-17). Wet screening resulted in the sample's head grade of 553ppm V_2O_5 increasing to 1,201ppm V_2O_5 in the <150µm, a concentration factor of 2.2 times. Dry scrubbing and screening, in contrast, resulted in the sample's head grade of 567pp V_2O_5 increasing to 705ppm V_2O_5 in the fine fraction, a concentration factor of 1.2 times.

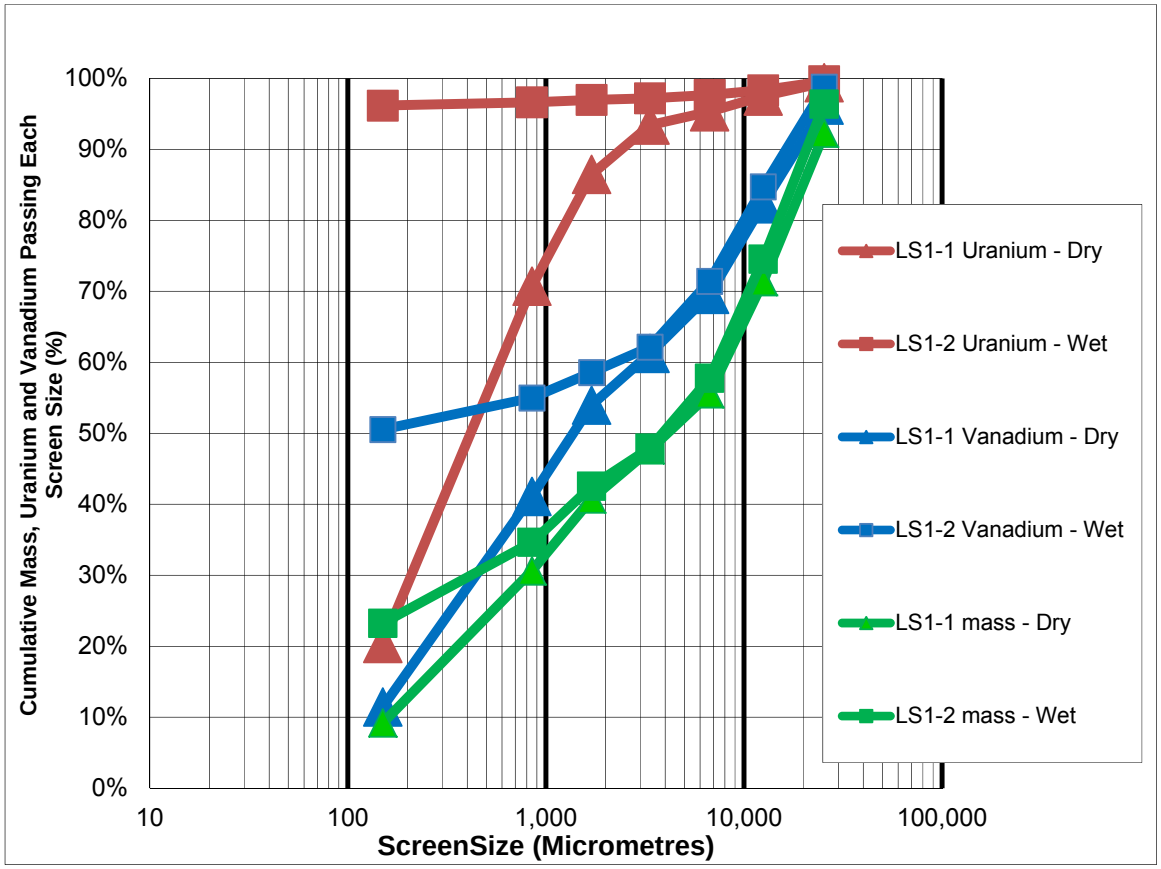


Figure 13-16: Distribution of mass, uranium and vanadium with grain size in dry (LS1-1) and wet screened (LS1-2) samples from Lago Seco

Since sulphate was not analysed in these samples, gypsum distribution data are not available. However, Figure 13-15 shows a gypsum crystal aggregate on a 15mm mesh before and after scrubbing. The smaller size of the gypsum clot after wet screening shows that more gypsum has spalled off the mass during wet scrubbing and screening than with dry. Hence, wet scrubbing is likely to result in a higher proportion of the gravel's contained gypsum reporting to the fine fractions.

Table 13-16: Grain Size and Associated Uranium and Vanadium Distribution in Dry and Wet Screening of Lago Seco Composite Sample LS1

Lab	Test #	Size Fraction (µm)	Mass			U_3O_8			V_2O_5		
			Mass of Fraction (g)	Distribution in Each Fraction (%)	Cumulative % Passing Each Screen Size	Grade (ppm)	Distribution in Each Fraction (%)	Cumulative % Passing Each Fraction	Grade (ppm)	Distribution in Each Fraction (%)	Cumulative % Passing Each Fraction
SGS	LS1-1	25,400	346.4	7.7	7.7	9.7	0.6	99.4	277	3.8	96.2
		12,500	937.1	20.9	28.6	11.1	1.9	97.5	376	13.9	82.3
		6,700	708.4	15.8	44.4	17.2	2.2	95.3	458	12.8	69.6
		3,350	354.3	7.9	52.3	29.1	1.9	93.4	596	8.3	61.3
		1,700	310.1	6.9	59.2	123.8	7.0	86.5	598	7.3	54.0
		850	454.8	10.1	69.4	191.0	15.8	70.7	717	12.8	41.1
		150	960.6	21.4	90.8	288.9	50.3	20.4	785	29.7	11.5
		-150	413.0	9.2	100.0	272.3	20.4	0.0	705	11.5	0.0
		Total	**4,484.7**	**100.0**		**123.0**			**567**	**100.0**	
	K_{80}	17,125									
	LS1-2	25,400	129.0	3.6	3.6	17.9	0.4	99.6	187	1.2	98.8
		12,500	776.4	21.8	25.5	9.4	1.3	98.3	355	14.0	84.7
		6,700	596.3	16.8	42.2	6.4	0.7	97.7	439	13.3	71.4
		3,350	349.4	9.8	52.1	7.8	0.5	97.2	521	9.3	62.2
		1,700	191.3	5.4	57.4	7.1	0.2	97.0	369	3.6	58.6
		850	280.6	7.9	65.3	6.8	0.3	96.6	250	3.6	55.0
		150	405.5	11.4	76.7	6.5	0.5	96.2	216	4.5	50.5
		-150	826.8	23.3	100.0	667.6	96.2	0.0	1,201	50.5	0.0
		Total	**3,555.3**	**100.0**		**161.5**	**100.0**		**553**	**100.0**	
	K_{80}	15,196									

13.6.2.1.2 Wet Scrubbing and Screening

13.6.2.1.2.1 Objective

Gravels in the Lago Seco area generally contain a higher proportion of fines than the Guanaco gravels and therefore a more stringent beneficiation process is required to minimise the mass of material that undergoes leaching for the extraction of uranium and vanadium. Lago Seco gravels contain more gypsum, which is generally coarser-grained than at Guanaco.

As with the Guanaco gravels, the objective is to minimise the mass to be leached, maximise uranium and vanadium grades and minimise gypsum which consumes reagents used in the alkaline leach process. The principle variables investigated in the test work were percentage solids, scrub time and the kinetic energy of the scrub in terms of whether a smooth bottle roll or a cement mixer was used in the scrubbing process.

13.6.2.1.2.2 Mass Distribution

Mass distribution is influenced principally by:

- Scrub time: The longest scrub times tested (four hours) generated the highest percentage of fines (tests LS1-2 and LS1-3) while the shortest scrub times of five minutes generated the lowest percentage of fines (tests LS7-1 and LS8-1) (Figure 13-17 and Table 13-17); and

- Percentage solids: Test work shows that scrubbing at 50% to 75% solids generates the lowest proportion of fines, while low percentage solids (25% in test LS1-2) solids generate the highest proportion mass of fines (Table 13-17).

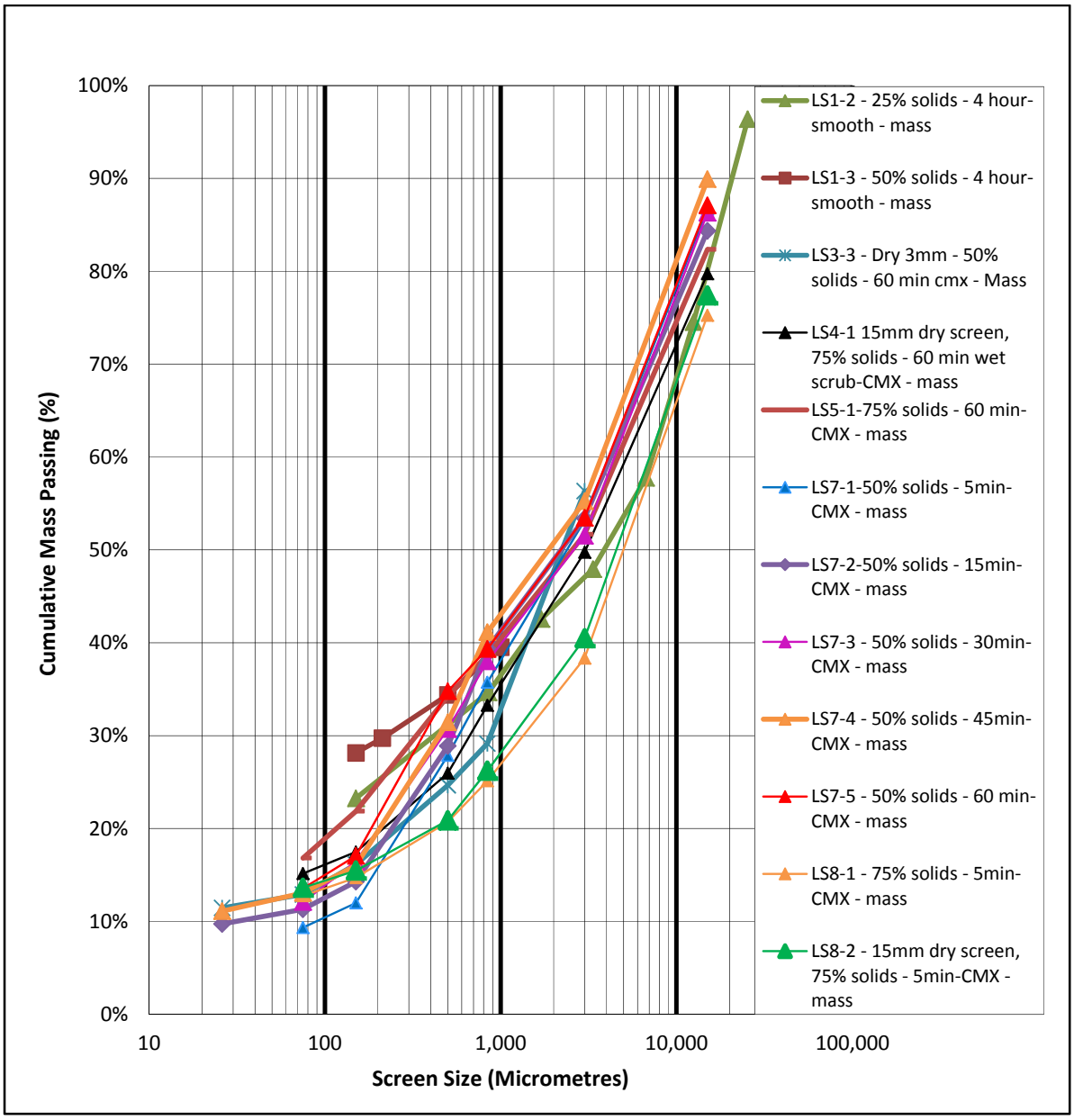


Figure 13-17: Mass Distribution versus Grain Size in Lago Seco Gravels under different conditions of scrub time, percentage solids and type of scrub. (Scrub type: cement mixer – "CMX"; smooth pale on a bottle roll table – "Smooth")

Table 13-17: Summary of Mass, Uranium, Vanadium and Gypsum Distribution in the <75µm and <150µm Fractions from wet screening of Lago Seco Gravels

Test	Scrub Time (mins)	% Solids	% of gravel reporting to the fine fraction	Uranium (U_3O_8)				Vanadium (V_2O_5)				Gypsum			
				% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction (ppm)	Up-grade factor	% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction (ppm)	Up-grade factor	% contained in the fraction	Grade of the gravel (%)	Grade of the fraction (%)	Up-grade factor
Dry Scrubbing & Screening <150µm															
LS1-1	0	-	9.2%	20.4%	123	272	2.2	11%	348	705	2.0	45%	1.9	14	7.5
LS3-1	60	-	1.6%	3.4%	74	158	2.1					3%	23.8	48	2.0
Wet Scrub & Wet Screen Tests															
<150µm fraction															
LS1-2	240	25	23.3%	96.2%	162	668	4.1	50.5%	553	1,201	2.2				
LS1-3	240	50	28.1%	96.4%	166	567	3.4	54.5%	533	1,031	1.9				
LS5-1	60	75	21.9%	86.0%	68	269	3.9	57.3%	828	2,169	2.6	47.6%	16.3	35.4	2.2
LS7-1	5	50	12.0%	77.6%	45	290	6.5	36.1%	337	1,014	3.0	24.7%	11.8	24.2	2.1
LS7-2	15	50	14.3%	80.5%	39	222	5.6	35.0%	312	763	2.4	32.6%	11.9	27.2	2.3
LS7-3	30	50	16.4%	84.1%	48	246	5.1	41.6%	367	929	2.5	45.3%	10.9	30.2	2.8
LS7-4	45	50	16.0%	86.1%	50	266	5.4	42.4%	350	927	2.6	44.9%	11.5	32.1	2.8
LS7-5	60	50	17.1%	87.6%	51	262	5.1	46.5%	378	1,030	2.7	49.2%	11.4	33.0	2.9
LS8-1	5	75	14.7%	89.5%	87	527	6.1	45.5%	547	2,553	4.7	30.5%	5.9	12.1	2.1
<75µm fraction															
LS5-1	60	75	16.8%	84.6%	68	344	5.0	53.9%	828	2,653	3.2	27.6%	16.3	26.7	1.6
LS7-1	5	50	9.3%	74.6%	45	358	8.0	30.9%	337	1,113	3.3	17.6%	11.8	22.2	1.9
LS7-2	15	50	11.3%	77.7%	39	270	6.9	30.2%	312	832	2.7	22.8%	11.9	24.1	2.0
LS7-3	30	50	12.1%	82.1%	48	327	6.8	33.7%	367	1,024	2.8	28.5%	10.9	25.8	2.4
LS7-4	45	50	13.1%	84.2%	50	319	6.4	37.5%	350	1,004	2.9	33.7%	11.5	29.6	2.6
LS7-5	60	50	13.6%	86.6%	51	325	6.4	40.3%	378	1,121	3.0	37.9%	11.4	32.0	2.8
LS8-1	5	75	12.8%	88.9%	87	603	7.0	44.0%	547	1,887	3.5	13.6%	5.9	6.2	1.1
Dry Screen Followed by Wet Scrub & Wet Screening:															
3mm dry screen followed by wet scrub <150µm															
LS3-3	60	50	16.1%	77.9%	57	277	4.8	49.4%	611	1,872	3.1	39.2%	9.2	22.3	2.4
LS3-4	60	50	14.5%	72.5%	69	341	5.0	39.5%	617	1,674	2.7	15.5%	6.7	7.1	1.1
LS3-5	60	50	13.9%	66.7%	60	289	4.8	35.8%	618	1,590	2.6	35.8%	8.1	20.7	2.6
3mm dry screen followed by wet scrub <75µm															
LS3-3	60	50	12.9%	75.8%	57	337	5.9	46.0%	611	2,182	3.6	21.7%	9.2	15.5	1.7
LS3-4	60	50	12.2%	68.0%	69	382	5.6	35.9%	617	1,819	2.9	9.5%	6.7	5.2	0.8
15mm dry screen followed by wet scrub <150 µm															
LS4-1	60	75	17.5%	86.2%	66	325	4.9	52.5%	763	2,291	3.0	33.7%	7.0	13.6	1.9
LS8-2	5	75	15.5%	90.0%	96	559	5.8	48.5%	558	1,748	3.1	27.3%	6.1	10.7	1.8
15mm dry screen followed by wet scrub <75 µm															
LS4-1	60	75	15.1%	85.8%	66	373	5.7	50.8%	763	2,559	3.4	15.5%	7.0	7.2	1.0
LS8-2	5	75	13.6%	89.5%	96	631	6.6	47.1%	558	1,928	3.5	10.7%	6.1	4.8	0.8

13.6.2.1.2.3 Uranium Distribution

Uranium distribution is influenced by the following:

- Scrub time: The greatest uranium recovery to the fine fraction was from tests LS1-2 and LS1-3 that were scrubbed for four hours in a smooth bottle roll (Figure 13-18). The uranium recovery to the fines from these samples was practically identical (96%) irrespective of percentage solids; LS1-2 was scrubbed at 25% solids while test LS1-3 was at 50%. Hence, scrub time is more important in uranium liberation than percentage solids in the case of the low kinetic energy smooth bottle roll. The importance of scrub time for uranium liberation is further illustrated by the test 7 series: these tests were done at a constant 50% solids and the lowest uranium recovery to the fines was from the five minute scrub (LS7-1), progressively increasing to the highest uranium recovery being from the one hour scrub (LS7-5, Table 13-17);

- Initial dry screen prior to wet scrubbing: Dry screening at 15mm followed by separate wet screening of the >15mm and <15mm fractions (test LS8-2) for one and five minutes respectively, resulted in a similar uranium recovery in the <75µm fines (90%) to the control test that was not initially dry screened at 15mm (89% in LS8-1, Figure 13-18). Both of these tests were conducted at 75% solids in a cement mixer;

- Percentage solids: Two pairs of tests are relevant here, the results of which suggest that percentage solids plays a more significant role in uranium recovery at shorter scrub times:
  - Tests LS7-1 and LS8-1 were conducted at 50% and 75% solids with a scrub time of five minutes. Higher uranium recoveries were achieved at higher solids density (89% uranium recovery at 75% solids and 75% at 50% solids in the 75µm fraction); and
  - Tests LS5-1 and LS7-5 were scrubbed for one hour at 75% and 50% solids respectively and generated similar uranium recoveries to the 75µm fines (85% uranium recovery at 75% solids and 87% at 50% solids).

13.6.2.1.2.4 Gypsum Distribution

The percentage of gypsum contained in each size fraction decreases log-linearly with decreasing grain size in Lago Seco gravels (Figure 13-19). Other factors that influence uranium and gypsum distribution are as follows:

- Scrub time: Longer scrub times result in a greater percentage of both uranium and gypsum reporting to the fines. This is illustrated by tests LS7-1 and LS7-3 which were wet scrubbed at 50% solids for five minutes and 30 minutes respectively: the five minute scrub resulted in 75% of the contained uranium reporting to the <75µm fraction with 18% of the gypsum. The 30 minute scrub yielded 82% of the uranium and 29% of the gypsum in the <75µm fraction;
- Dry scrub prior to separate wet screening: Two of the three tests that yielded the highest recovery of uranium and the lowest recovery and grade of gypsum in the fines were dry screened at 15mm before being wet scrubbed separately and the fines subsequently combined for further wet screening. The logic of this initial dry screening was to capture the bulk of the gypsum crystal clots with the pebbles and to minimise the scrub of this coarse material to reduce the extent of milling of the gypsum crystal masses, yet efficiently cleaning the uranium-vanadium bearing partial rind from the pebbles. Review of the >15mm fraction shows that it indeed contains clusters of gypsum crystals that were not significantly milled, which ensured that the bulk of the gypsum was retained in the coarse fraction (Figure 13-15). In test LS4-1 the <15mm fraction was scrubbed for one hour and for only five minutes in LS8-2. Test LS8-1, with a five minute scrub time without the initial dry screening at 15mm, provides a control against which the results of gypsum separation in LS8-2 can be compared. Likewise, test LS5-1, with a scrub time of one hour, provides a control for test LS4-1. Comparative results are as follows:
  - Test LS8-2, with the dry screen at 15mm followed by wet screening of both >15mm and <15mm fractions followed by a five minute scrub achieved the lowest gypsum grade in the <75µm fraction of 10.7% compared with 12.1% in LS8-1 that underwent a five minute scrub without the initial dry screening; and
  - Test LS4-1, with the dry screen at 15mm followed by wet screening of both >15mm and <15mm fractions followed by a one hour scrub achieved a relatively low gypsum grade of 13.6% compared with test LS5-1 with a gypsum grade of 35.4% in the <75µm fraction after one hour of scrubbing. These results are consistent in showing that uranium is maximised and gypsum minimised in the fine fractions where initial dry screening is followed by separate scrubbing of the <15mm and >15mm fractions.

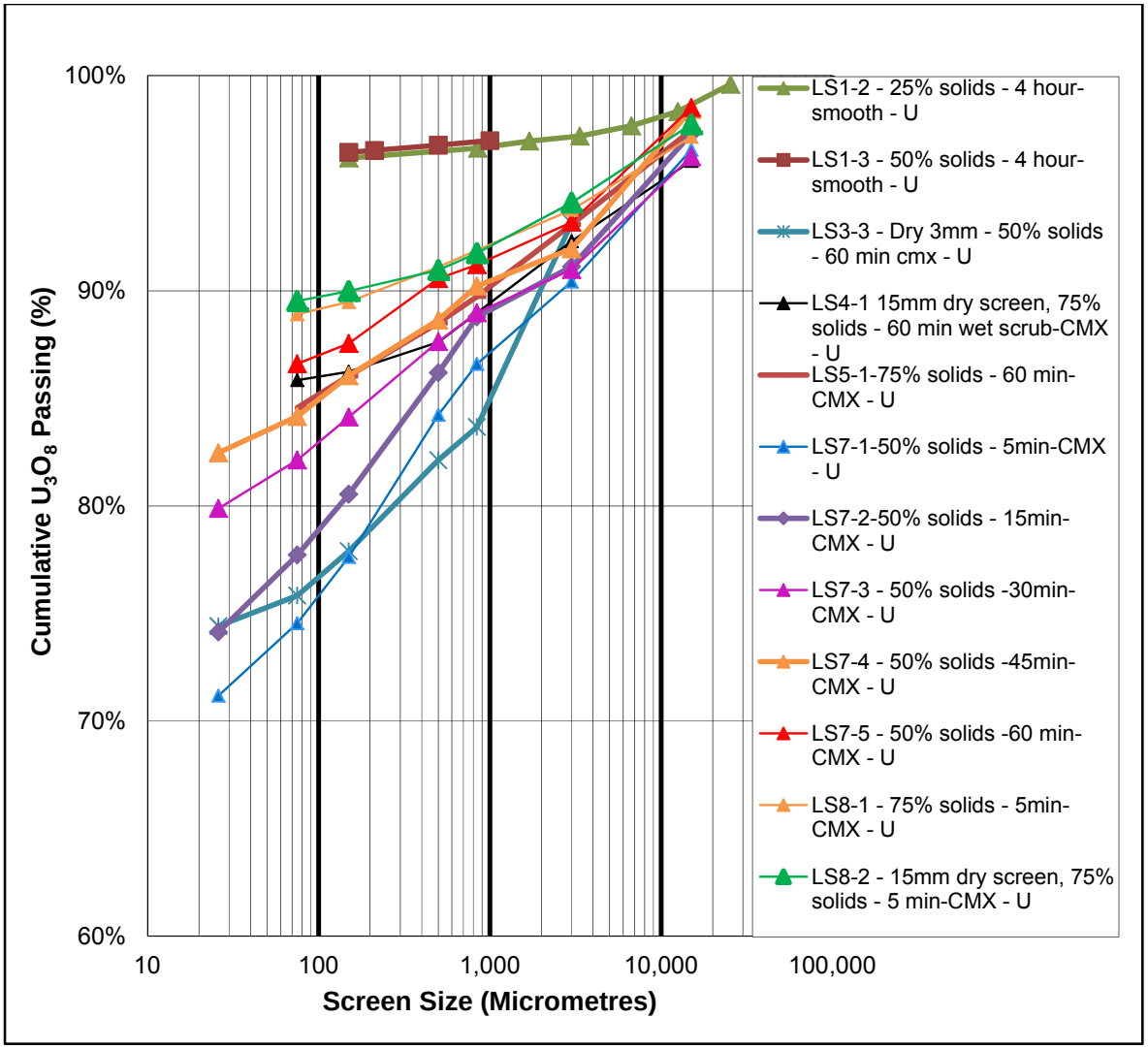


Figure 13-18: Uranium Distribution versus Grain Size Fraction for Guanaco Gravels under different conditions of scrub time, percentage solids and type of scrub

- Percentage solids: Higher percentage solids in the scrub also reduce the amount of gypsum reporting to the fines. This is illustrated by tests LS7-1 and LS8-1 that were scrubbed at different percentage solids for five minutes: the <75µm fraction of test LS8-1 with 75% solids contains 13.6% of the gravel's gypsum compared with 17.6% in LS7-1 that was scrubbed at 50% solids (Figure 13-20 and Table 13-17).

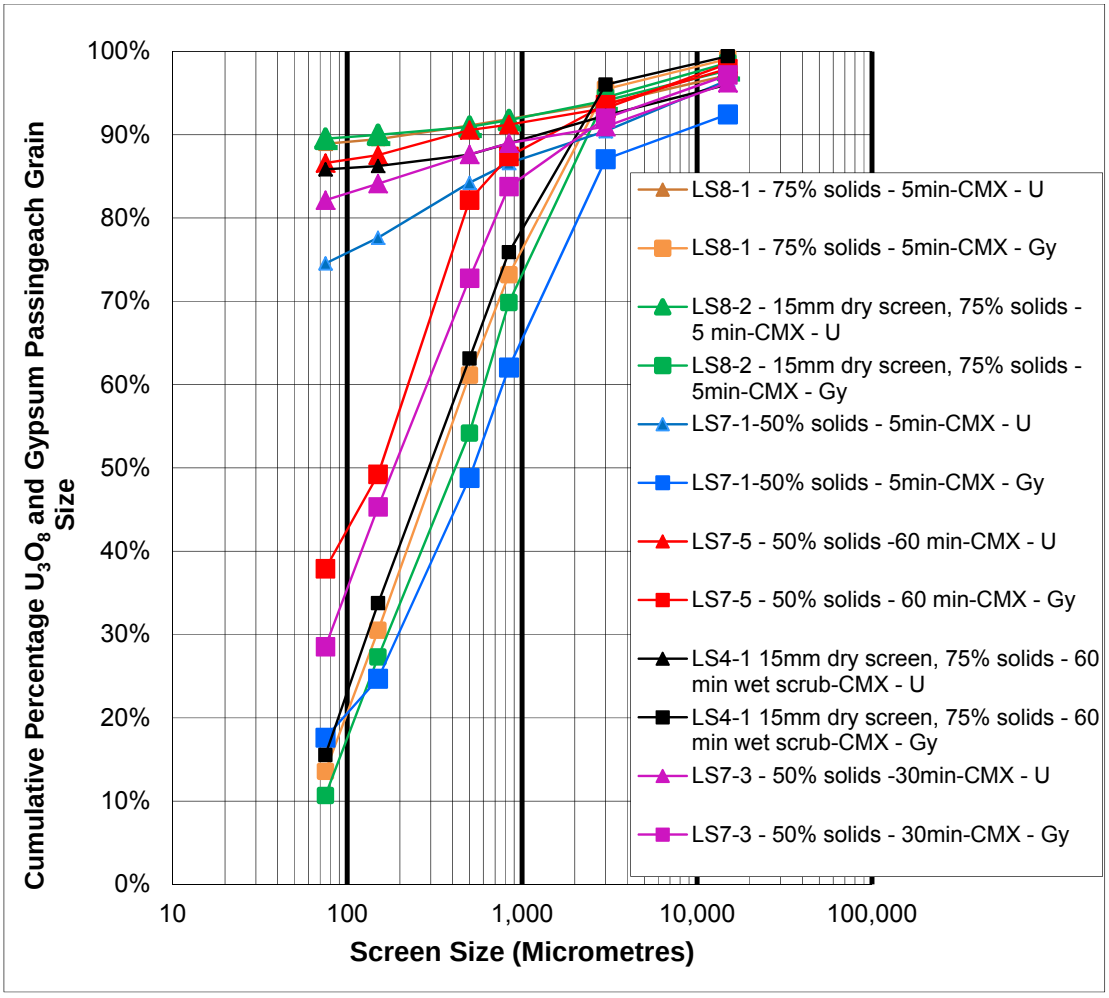


Figure 13-19: Uranium & Gypsum Distribution versus Grain Size Fraction for Lago Seco gravels under different conditions of scrub time, percentage solids and scrub-type

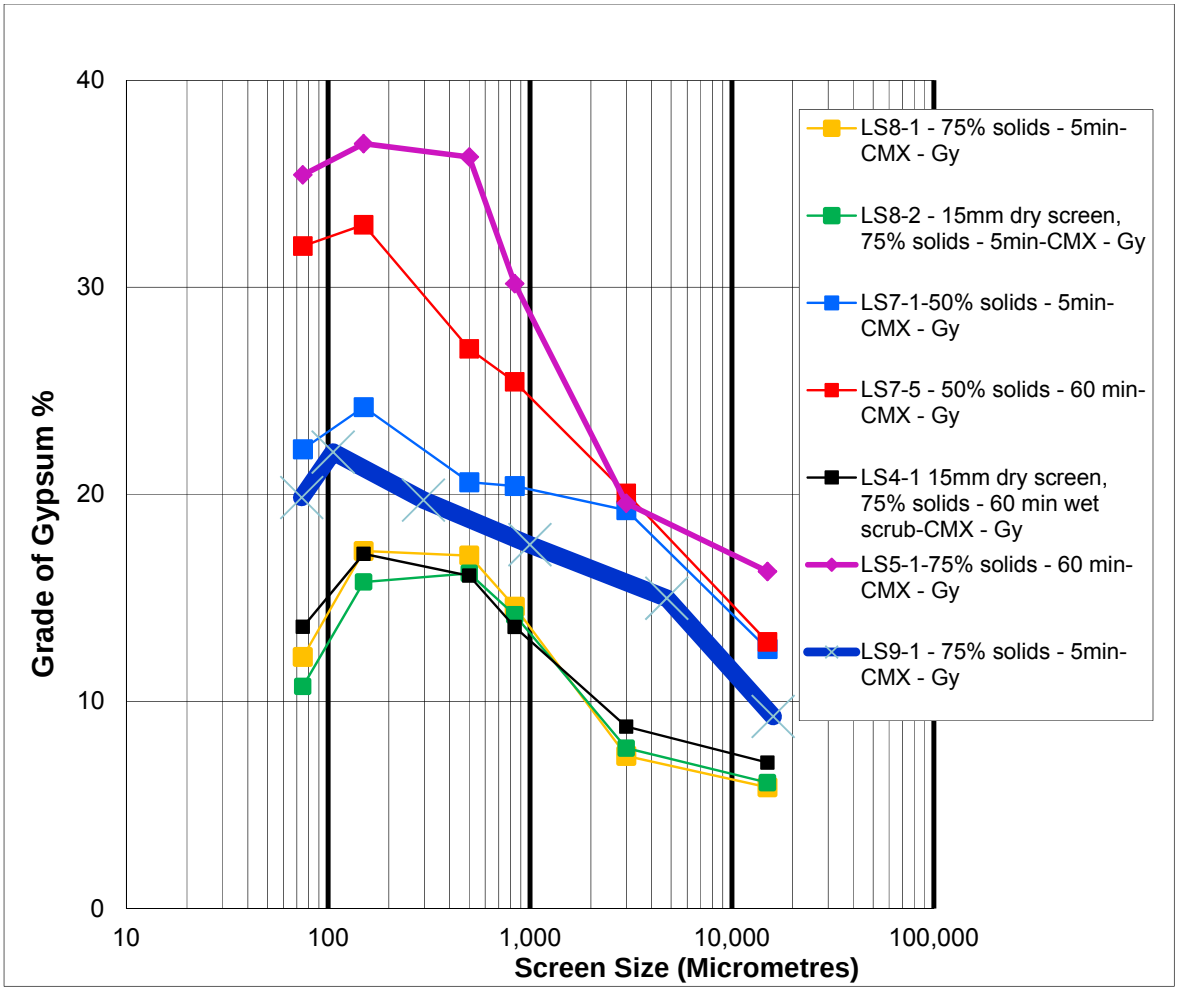


Figure 13-20: Gypsum grade of various grain sizes generated by wet scrubbing under various conditions followed by wet screening of Lago Seco gravels

13.6.2.1.2.5 Vanadium Distribution

There is a difference in the distribution of vanadium between Guanaco and Lago Seco: in the Lago Seco gravels, only 25%-30% of the vanadium is contained in the >3mm fraction compared with 40% to 90% in the Guanaco gravels

Results of test work show that vanadium recovery to the fine fraction is influenced by the following factors:

- Dry screening followed by wet scrubbing: The greatest recovery of vanadium to the fine fractions was in tests LS4-1 and LS8-2, both of which incorporated a dry screening step prior to wet screening of the <15mm and >15mm material (Figure 13-21, Table 13-17). The average vanadium recovery to the <75µm fraction in these tests was 49%;

- Scrub time: Vanadium recovery to the fines increases with scrub time. This is illustrated by the LS7 series tests in which vanadium recovery to the <75µm fraction increases from 31% with the five minute scrub (LS7-1) through 34% in the 30 minute scrub (LS7-3) to 40% in the 60 minute scrub (LS7-5). This series of tests was done at 50% solids; and
- Percent solids: Results from five minute wet scrub tests show that 75% solids (LS8-1) generate a higher vanadium recovery in the fines than 50% solids (LS7-1). Recovery of vanadium to the <75µm fraction was 44% after scrubbing at 75% solids in comparison to 31% at 50% solids.

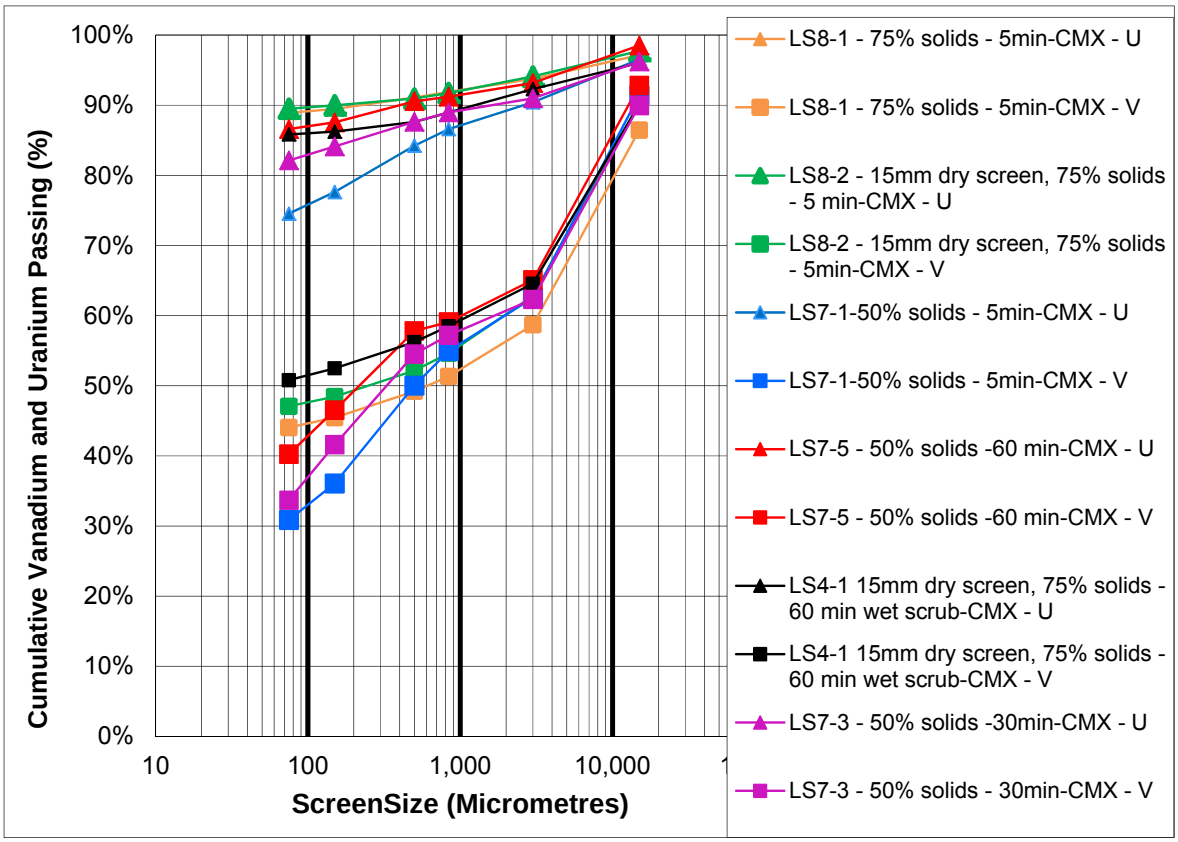


Figure 13-21: Vanadium Distribution versus Grain Size Fraction for Lago Seco gravels under different conditions of scrub time and percentage solids (scrub with cement mixer – "CMX").

13.6.2.2 Hydrocyclone Test Work

13.6.2.2.1 Procedure

Fine fractions from scrubbing and screening of Laguna Salada gravels were processed through a hydrocyclone system to establish the extent to which mass and gypsum content could be further reduced, while minimising the loss of uranium and vanadium in the overflow ultrafine fraction. The material used for the hydrocyclone test work was from composite samples LS4, LS5, LS8-1 and LS8-2. The way in which each of these samples was prepared is described in Section 13.6.1. Uranium grades of the four samples range from 66ppm to 96ppm U_3O_8, vanadium from 547ppm to 828ppm and gypsum from 6.1% to 16.3% (Table 13-18).

13.6.2.2.2 Results

- Results from scrub and screen test work showed that dry scrubbing at 15mm with the separate scrubbing of both fractions maximised uranium content while minimising gypsum concentration in the fines. Two of the hydrocyclone tests attempted to extend this separation of uranium and gypsum – tests LS4-1 (60 minute scrub at 75% solids) and LS8-2 (five minute scrub at 75% solids). The overflow fines from the sample with the longer scrub time (LS4-1) resulted in a recovery of only 69% of the uranium with 6.1% of the gypsum and 40% of the vanadium in comparison to 78% of the uranium, 7.5% of the gypsum and 41% of the vanadium in LS8-2 that was wet scrubbed for only five minutes. Therefore, there is less uranium recovery to the ultrafine fraction with the longer scrub time, whereas there is not much difference in the gypsum and vanadium content of the ultrafines of the two tests;
- Comparison of the results of the two hydrocyclone tests that were done on gravels that were not dry-screened before wet scrubbing and screening shows that sample that underwent one hour of wet scrubbing (LS5-1) had a greater mass of fines and a higher recovery of uranium, vanadium and gypsum to the fines than the sample that underwent five minutes of wet scrubbing (LS8-1);
- Comparison of the average of the two tests in which the feed had been scrubbed for an hour (LS4-1 and LS5-1) with the feed that had been scrubbed for five minutes (LS8-1 and LS8-2) are similar in terms of proportion of fines, uranium, vanadium and gypsum reporting to the ultrafine fraction suggesting that shorter scrub times are therefore advantageous due to their lower energy requirement;
- The overflow fraction from a feed of <75µm material from a scrub time of five minutes averaged 78% of the gravel's uranium, 40% of its vanadium and 8% of its gypsum reporting to 11% of the gravel's original mass. The average upgrade factor (grade in the ultrafines divided by the grade in the original gravel) is 7.1 times for uranium, 3.6 times for vanadium and 0.7 times for gypsum; and
- Beneficiation test work on a sample that has an anomalously high gypsum grade (LS5-1) of 16.3% showed a similar proportion of the gravel's gypsum reporting to the fine fractions as samples with lower gypsum grades that were beneficiated in a similar way. This is illustrated by test LS4-1 in which a sample with a gypsum grade similar to the average of the deposit resulted in 39% of the gypsum contained in the <75µm feed reporting to the hydrocyclone's overflow fines versus 35% in test LS5-1, that involved material with a significantly higher gypsum grade.

Table 13-18 : Distribution of mass and grade of uranium, vanadium and gypsum in hydrocyclone tests on Lago Seco fines

Composite Sample Details	Process	Grain Size of Feed (µm)	HC Characteristics		Products	Mass of Each Fraction (g)	Mass Split	U_3O_8 Grade in Each Fraction (ppm)	Recovery of Uranium to Each Fraction	Upgrade Factor for Uranium	V_2O_5 Grade in Each Fraction (ppm)	Recovery of Vanadium to Each Fraction	Upgrade Factor for Vanadium	Gypsum Grade in Each Fraction (%)	Recovery of Gypsum to Each Fraction	Upgrade Factor for Gypsum
			Pressure (psi)	Number of Passes												
LS3-5	3mm dry screen, 50% solids - 60 min wet scrub - smooth	150	2.3	1	Grade of original gravel			60			618			8.1%		
					<150µm HC Feed	5,705	13.9%	289	66.7%		1,590	35.8%		20.7%	35.8%	
					Overflow	1,940	4.7%	379	57.7%	6.3	2,001	29.8%	3.2	9.7%	11.1%	1.2
					Underflow	3,765	9.2%	115	9.0%		1,590	6.1%		42.1%	24.7%	
LS3-6	3mm dry screened, processed with deslimer	3,000		1	Grade of original gravel			49			568			6.7%		
					<3mm HC Feed	12,389	51.9%	73	71.3%		591	50.1%		12.1%	87.5%	
					Overflow	1,300	5.4%	408	45.2%	8.3	2,145	20.5%	3.8	4.4%	3.6%	0.7
					Underflow	10,200	42.7%	30	26.1%		393	29.6%		13.1%	84.0%	
LS3-7	Underflow from LS3-6	3,000			Grade of original gravel			75			693			5.3%		
					Feed from Underflow	12,389	48.1%	127	81.3%		851	59.1%		9.3%	84.3%	
					Overflow	4,044	16.9%	347	78.1%	4.6	1,967	48.0%	2.8	3.2%	10.2%	0.6
					Underflow	7,456	31.2%	7.6	3.2%		246	11.1%		12.6	74.2%	
LS4-1	15mm dry screened, then wet scrubbed at 75% solids for 60 min in CMX	75	1.5	3	Grade of original gravel			66			763			7.0		
					<75µm HC Feed	4,635	15.1%	373	85.8%		2,559	50.8%		7.2	15.5%	
					Overflow	3,308	10.8%	420	69.0%	6.4	2,839	40.2%	3.7	4.0	6.1%	0.6
					Underflow	1,327	4.3%	256	16.9%		2,559	10.6%		15.3	9.4%	
LS5-1	Wet scrubbed at 75% solids for 60 min in CMX	75	10	3	Grade of original gravel			68			693			16.3		
					<75µm HC Feed	7,548	16.8%	344	84.6%		347	53.9%		26.7	27.6%	
					Overflow	5,715	12.7%	440	81.9%	6.4	2,908	44.7%	4.2	12.4	9.7%	0.8
					Underflow	1,833	4.1%	44	2.6%		1,860	9.2%		71.1	17.8%	
Average of Overflow of 3-pass Hydrocyclone Tests on <75µm Feed from 60 Minute Scrub							**11.8%**		**75.5%**	**6.4**		**42.5%**	**4.0**		**7.9%**	**0.7**
LS8-1	Wet scrubbed at 75% solids for 5 min in CMX	75	1.5	3	Grade of original gravel			87			547			5.9		
					<75µm HC Feed	3,940	12.8%	603	88.9%		1,887	44.0%		6.2	13.6%	
					Overflow	3,260	10.6%	635	77.5%	7.3	1,974	38.1%	3.6	4.8	8.6%	0.8
					Underflow	720	2.2%	483	11.4%		1,469	5.9%		13.2	5.0%	
LS8-2	15mm dry screened, then wet scrubbed at 75% solids for 5 min in CMX	75	1.5	3	Grade of original gravel			96			558			6.1		
					<75µm HC Feed	4,280	13.6%	631	89.5%		1,928	47.1%		4.8	10.7%	
					Overflow	3,560	11.3%	661	78.0%	6.9	2,018	41.0%	3.6	4.0	7.5%	0.7
					Underflow	720	2.3%	483	11.5%		1,485	6.1%		8.5	3.2%	
Average of Overflow of 3-pass Hydrocyclone Tests on <75µm Feed from 5 Minute Scrub							**10.9%**		**77.8%**	**7.1**		**39.6%**	**3.6**		**8.0%**	**0.7**

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13.6.3 Leach Tests on Lago Seco Fines

13.6.3.1 Alkaline Leach

An initial alkaline leach test was done on <150µm fines from Lago Seco gravels by SGS. Further test work was all done at SRC on hydrocyclone overflow fines and one sample that was screened to <26µm fines under the test conditions listed in Table 13-19.

Poor metal extraction results were obtained from the alkaline leach test on <150µm wet-screened fines undertaken at SGS (Table 13-20). These poor results are due to the rapid consumption of the alkaline leach reagents by gypsum so that there was little reagent available for leaching of the uranium-vanadium minerals. Tests at SRC ensured that reagent concentrations were at appropriate levels.

Uranium and vanadium extraction peaked at four hours in most of the tests. Uranium extraction in the SRC test work is significantly higher at 80°C than 50°C: the average extraction at 80°C is 96% after four hours compared with 47% at 50°C (Table 13-20, Figure 13-22). Vanadium extraction is relatively constant over the two to six hour leach time (Figure 13-23). Average vanadium extraction was 58% after four hours at 80°C in comparison to 45% after four hours at 50°C (Table 13-20).

Sulphate (gypsum) dissolution is slightly lower at lower temperature, averaging 88% after a four hour leach at 50°C compared with 95% at a leach temperature of 80°C (Table 13-20). Alkaline reagent consumption were lower, on average, at higher leach temperatures: 48kg/t of fines for sodium carbonate and 10kg/t of sodium bicarbonate at leach temperatures of 80°C in comparison to 54kg of sodium carbonate and 13kg/t of sodium bicarbonate at leach temperatures of 50°C (Table 13-19).

Of particular interest are leach data from the samples whose preparation most closely reflects the beneficiation route concluded to be most efficient for Lago Seco gravels. These samples are LS8-1 and LS8-2 that were wet scrubbed for five minutes at 75% solids in a cement mixer before being wet screened to <75µm, and the fines fed into a hydrocyclone. After a leach time of four hours, the average extraction from these two samples was 99% for uranium and 71% for vanadium (Table 13-20). Average alkaline reagent consumption for these two tests was 31kg/t of fines for sodium carbonate and 14kg/t of fines for sodium bicarbonate.

Table 13-19: Alkaline leach test conditions for Lago Seco samples

Laboratory	Sample #	Leach Test #	Grain size (µm)	Temp (°C)	% Solids	Na_2CO_3		$NaHCO_3$	
						Added (g/L)	Consum^n (kg/t) after 4 hours	Added (g/L)	Consum^n (kg/t) afetr 4 hours
SGS	LS1-2	Test 9	<150	80	50	0	0	0	0
SRC	LS3-6	AD	HC overflow	80	25	50	55.9	20	-1.7
SRC	LS3-7	CH	HC overflow	80	25	50	65.6	20	5.5
SRC	LS3-5	CHB	HC overflow	80	25	50	64	20	14.5
SRC	LS3-3	CTLS	<26	80	33	50	57.1	20	11.5
SRC	LS4-1	CTLS-I-2013	HC overflow	50	40	50	56.2	20	18
				80	40	50	34.2	20	10.7
SRC	LS8-2	CTLS-V-B-O/F / 23662	HC overflow	50	40	50	54.3	20	12.3
				80	40	50	37	20	8.4
SRC	LS8-1	CTLS-V-A	HC overflow	50	40	50	51.4	20	8.7
				80	40	50	24.5	20	19.5
Average reagent consumption at 50°C							54.0		13.0
Average reagent consumption at 80°C							48.3		9.8
Average reagent consumption of LS8-1 & LS8-2 at 80°C							30.8		14.0

Note: HC refers to hydrocyclone.

Table 13-20: Results of alkaline leach tests on Lago Seco samples

Lab	Sample #	Leach Test #	Temp (°C)	% Uranium Extraction at various leach times (hours)					% Vanadium Extraction at various leach times (hours)				% Sulphate Extraction at various leach times (hours)		
				2	4	6	36	72	2	4	6	72	2	4	6
SGS	LS1-2	Test 9	80				4	4				11			
SRC	LS3-6	AD	80	99	99	97			63	66	54				
SRC	LS3-7	CH	80	78	96	92			31	15	44				
SRC	LS3-5	CHB	80	93	99	94			64	65	53				
SRC	LS3-3	CTLS	80	69	84	86			67	67	57				
SRC	LS4-1	CTLS-I-2013	50	29	36	47			30	50	48		100	99	100
			80	98	98	95			55	57	51		99	95	99
SRC	LS8-2	CTLS-V-B O/F	50	36	50	74			57	44	49		82	76	75
			80	97	98	98			65	71	69		89	94	98
SRC	LS8-1	CTLS-V-A	50	37	55	69			51	40	48		89	90	76
			80	96	99	99			70	71	69		100	96	100
Average extraction with 80 degree leach				89	96	94			58	58	57		96	95	99
Average extraction with 50 degree leach				34	47	63			46	45	48		90	88	84
Average extraction for LS8-1 & LS8-2 at 80° C				97	99	99			67	71	69		95	95	99

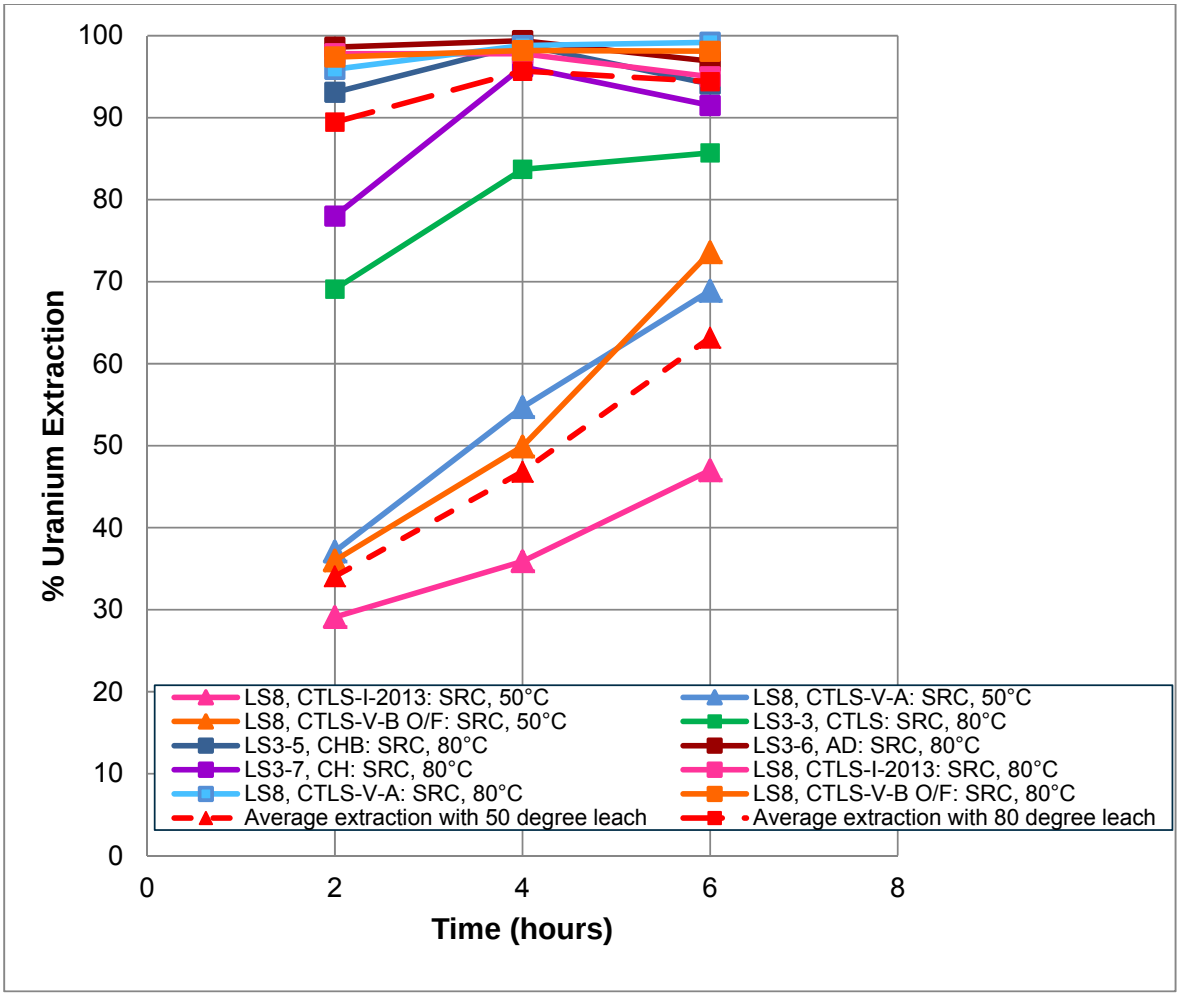


Figure 13-22: Kinetic extraction data for uranium from fines from Lago Seco gravels

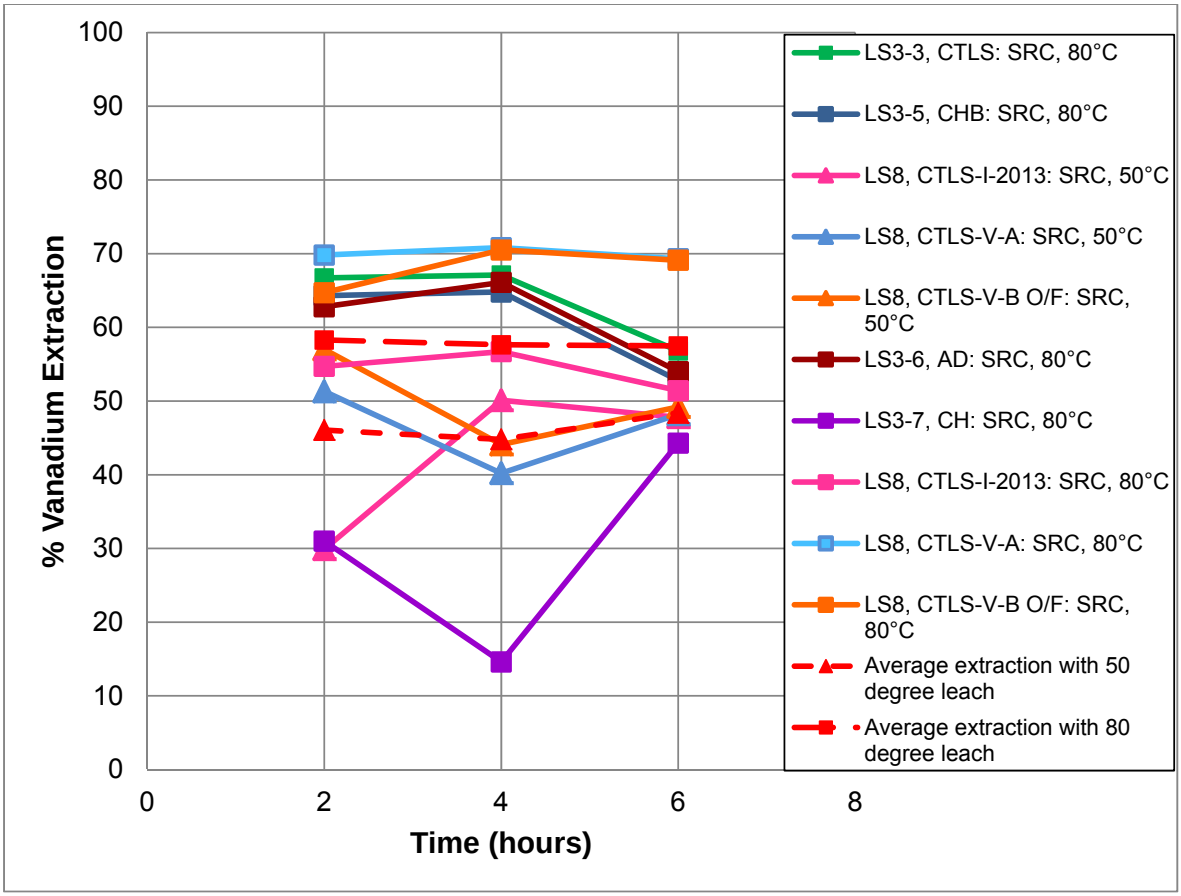


Figure 13-23: Kinetic extraction data for vanadium from fines from Lago Seco gravels

13.6.3.2 Acid Leach

Four acid leach tests were conducted on sample LS1 at SGS and one was conducted on sample LS3 by SRC. Test conditions are shown in Table 13-22.

Uranium extraction is rapid with up to 95% uranium extraction achieved after four hours and remaining elevated for up to 72 hours, although some data suggest that re-precipitation occurs with time (Table 13-22, Figure 13-24). Data for vanadium shows poor extraction of <10% at leach times of <12 hours, rising to a maximum of 71% after 72 hours of leaching. The data are compatible with a positive correlation between extraction and leach time. Acid consumption is high, varying from 106-158kg, with an average of 134kg/t of fines in the leach feed.

Table 13-21: Acid leach test conditions for the fine fraction of Lago Seco gravels

Laboratory	Sample #	Leach Test #	Grain size (µm)	Temp (°C)	% Solids	pH	ORP (mV)	H_2SO_4		
								Added (kg/t)	Free acid (kg/t)	Consumption (kg/t)
SGS	LS1-2	Test 7	<150	50	33	1.17	592	214.4	108.8	105.6
SGS	LS1-2	Test 31	<150	50	33	1.8	519	158.2	7	151.2
SGS	LS1-2	Test 58	<150	50	33	1.74	552	170.6	4.7	165.9
SGS	LS1-2	Test 59	<150	80	33	1.4	475	142.2	16	126.2
SRC	LS3-3	CTLS	<26	80	33	1.62	0	0	0	136.9

Table 13-22: Results of acid leach tests on Lago Seco samples

Lab	Sample #	Leach Test #	Temp (°C)	pH	% Uranium Extraction at various leach times (hours)								% Vanadium Extraction at various leach times (hours)				
					2	4	6	9	24	36	48	72	2	4	6	48	72
SGS	LS1-2	Test 7	50	1.17						97		97					71
SGS	LS1-2	Test 31	50	1.8				88	90		75					25	
SGS	LS1-2	Test 58	50	1.74				92	92		90					12	
SGS	LS1-2	Test 59	80	1.4				95	95		90					21	
SRC	LS3-3	CTLS	80	1.62	89	95	85						9	9	7		
Average					89	95	85	92	92	97	85	97				19	71

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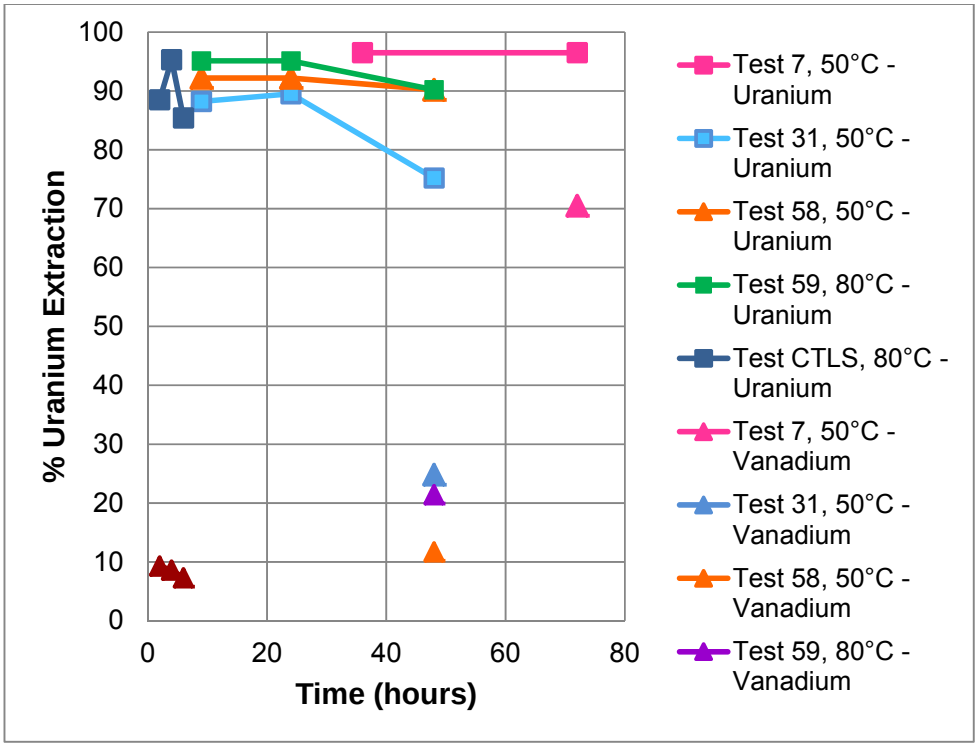


Figure 13-24: Kinetic Extraction Data for Uranium and Vanadium from the fine fraction from Lago Seco gravels

13.7 Conclusions

13.7.1 General

Uranium occurs mainly as the uranium-vanadium minerals, carnotite and tyuyamunite, with minor curite and meta-tyuyamunite. These minerals are extremely fine, typically consisting of 5µm grains and flakes. The majority of the vanadium in the deposit occurs in heavy iron and titanium minerals.

Gypsum occurs as fine powder in the matrix of the gravels and also as larger crystal masses up to 5cm in diameter. Lago Seco has an average gypsum grade of 12.7%. Approximately 47% of the Lago Seco area has a grade of <10% gypsum at an arithmetic average grade of 4.7% and the remaining 53% has an average arithmetic grade of 18%. In contrast, approximately 88% of the Guanaco area has a gypsum content <10%, at an average grade of 1.6% gypsum. The remaining 12% of the Guanaco area has an average gypsum grade of 15%.

13.7.2 Beneficiation

There are distinct differences in the nature of the Guanaco and Lago Seco gravels that have resulted in different optimal beneficiation procedures for the two areas as summarised below.

Wet scrubbing and screening is more efficient than dry scrubbing and screening for the concentration of uranium and vanadium, while minimising the gypsum content, in the fine fraction of gravels from both the Guanaco and Lago Seco areas.

13.7.2.1 Beneficiation of Guanaco Gravels

Results of bench-scale test work completed to date shows that the optimal conditions for scrubbing of Guanaco gravels are a 15 minute scrub time at 50%-75% solids in a cement mixer (Table 13-23). The representative tests completed under these conditions are G7-2, G8-1 and G8-2. Data from test G8-2 are included for uranium and vanadium, but the gypsum data is omitted because they are unreliable due to gypsum dissolution. Under these conditions, the average proportion of mass, metal and gypsum reporting to the fine fraction is:

- <150µm fraction:
  - Mass, 10%; uranium, 87%, gypsum; 37% and vanadium, 34%;
  - Associated enrichment factors in the <150µm fraction (grade in the fines divided by the original grade of the gravel) are: uranium, 9.7 times; gypsum, 3.2 times and vanadium, 3.5 times;
- The proportions reporting to the <75µm fraction from the above scrubbing and screening process is:
  - Mass, 8%; uranium, 85%; gypsum, 25% and vanadium, 29%;
  - Enrichment factors are: 12.2 times for uranium, 2.7 times for gypsum and four times for vanadium.
- Whether the <150µm or 75µm fraction is selected as the beneficiated leach feed depends on economic factors – the relative value of reagent consumption related to the reduction in the proportion of gypsum that reports to the fines versus the incremental value of the metals in the <150µm fraction versus the <75µm fraction. The <75µm fraction of this selected beneficiation route contains 2% less uranium, 38% less gypsum and 15% less vanadium than the <150µm fraction;
- Further beneficiation of the fine fraction of Guanaco gravels with a hydrocyclone does not reduce the gypsum content of the overflow fines when compared with the <75µm fraction generated after a 15 minute wet scrub followed by wet screening, but the hydrocyclone does reduce the uranium recovery by 11 percentage points and vanadium by seven percentage points (Table 13-23).

Table 13-23: Summary of the most efficient beneficiation processes for Guanaco gravels

Test	Scrub Time (mins)	% Solids	Scrub type	% of gravel reporting to the fine fraction	Uranium (U_3O_8)				Vanadium (V_2O_5)				Gypsum			
					% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction	Up-grade factor	% contained in the fraction	Grade of the gravel (%)	Grade of the fraction (%)	Up-grade factor
Screen Tests after 15 Minutes of Wet Scrubbing																
<150µm fraction																
G7-2	15	50	CM	14.9%	85.5%	34.1	196	5.7	42.9%	290	835	2.9	36.8%	4.1	10.1	2.5
G8-1	15	75	CM	7.0%	88.1%	70.1	877	12.5	28.2%	376	1,509	4.0	36.4%	1.5	7.6	5.2
G8-2	15	75	CM	8.0%	87.8%	62.9	690	11.0	29.9%	374	1,398	3.7	23.4%	2.4	4.3	1.8
Average of <150 µm fraction after 15 minute CM scrub at 50-75% solids				**10.0%**	**87.1%**			**9.7**	**33.7%**			**3.5**	**36.6%**			**3.2**
<75µm fraction																
G7-2	15	50	CM	11.2%	82.3%	34.1	251	7.4	34.6%	290	898	3.1	19.3%	4.1	7.0	1.7
G8-1	15	75	CM	6.6%	87.2%	70.1	931	13.3	27.4%	376	1,572	4.2	31.2%	1.5	7.0	4.8
G8-2	15	75	CM	5.3%	84.4%	62.9	995	15.8	25.7%	374	1,805	4.8	8.7%	1.5	2.4	1.6
Average of <75 µm fraction after 15 minute CM scrub at 50-75% solids				**7.7%**	**84.6%**			**12.2**	**29.3%**			**4.0**	**25.2%**			**2.7**
Hydrocyclone Tests from <150µm Feed After One Hour of Wet Scrubbing - three passes																
G3-3	60			5.3%	79.8%	23.9	358	15.0	18.6%	358	1,250	3.5	26.7%	0.3	1.6	5.0
G4-2	60			7.2%	67.3%	35.7	332	9.3	25.3%	415	1,458	3.5	22.4%	0.7	2.0	3.1
Average				**6.3%**	**73.5%**			**12.2**	**22.0%**			**3.5**	**24.5%**			**4.1**
Hydrocyclone Tests from <75µm Feed After One Hour of Wet Scrubbing - three passes																
G8-2	15			3.2%	65.7%	62.9	1,287	20.5	19.0%	374	2,219	5.9	6.2%	1.5	2.9	1.9

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13.7.2.2 Beneficiation of Lago Seco Gravels

Based on the test work completed to date, there are three potentially optimal beneficiation processes for Lago Seco gravels, and which of these options is optimal depends on economic factors including the cost of reagents and the uranium and vanadium price assumptions. The three most efficient beneficiation routes are as follows and are summarised in Table 13-24:

- Wet scrub in a cement mixer that provides some lift to the gravel at 75% solids for five minutes. This simple wet scrub followed by wet screening results in the following recoveries to the <75µm fraction (test LS8-1):
  - 89% of the uranium, 44% of the vanadium and 14% of the gypsum reporting to 13% of the gravel's mass;
  - Associated up-grade factors (grade of the fines divided by the grade of the original gravel is several times for uranium, 3.5 times for vanadium and 1.1 times for gypsum;
- Dry screen at 15mm followed by wet scrubbing and screening: the >15mm fraction is wet scrubbed for one minute in a cement mixer. The <15mm fraction is wet scrubbed at 75% solids. Test work shows that efficiency of uranium and vanadium concentration and rejection of gypsum from the fines is largely independent of scrub time with there being little difference in percentage recovery between scrub times of five and 60 minutes (Table 13-24). Longer scrub times and lower percentage solids lead to slightly greater recovery of uranium and vanadium to the fines, but also result in a much greater proportion of gypsum to the fines. In terms of the optimal size fraction after scrubbing and screening, the <150µm fraction contains slightly more uranium and vanadium, but approximately 50% more gypsum, than the <75µm fraction (Table 13-24). The <75µm fraction from tests using this beneficiation route yields the following recoveries:
  - 88% for uranium, 49% for vanadium and 13% for gypsum concentrated in 14% of the gravel's mass;
  - Associated up-grade factors are: 6.1 times for uranium, 3.4 times for vanadium and 0.9 times for gypsum;
- Further beneficiation of the fines generated by scrubbing and screening eliminates more gypsum at the expense of further uranium and vanadium losses (Table 13-24). Passing the <75µm fines from the material that was first dry screened at 15mm prior to wet scrubbing and screening through a hydrocyclone generates the following recoveries:
  - 74% for uranium, 41% for vanadium and 7% for gypsum in 11% of the gravel's mass;
  - Associated up-grade factors are: 6.6 times for uranium, 3.7 times for vanadium and 0.5 times for gypsum.

Table 13-24: Summary of optimal beneficiation routes on Lago Seco fines

Test	Scrub Time (mins)	% Solids	% of gravel reporting to the fine fraction	Uranium (U_3O_8)				Vanadium (V_2O_5)				Gypsum			
				% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction (ppm)	Up-grade factor	% contained in the fraction	Grade of the gravel (ppm)	Grade of the fraction (ppm)	Up-grade factor	% contained in the fraction	Grade of the gravel (%)	Grade of the fraction (%)	Up-grade factor
Wet Scrubbing & Screening <150µm															
LS8-1	5	75	12.8%	88.9%	87	603	7.0	44.0%	547	1,887	3.5	13.6%	5.9	6.2	1.1
Dry Screen Followed by Wet Scrub & Wet Screening:															
15mm dry screen followed by wet scrub <150 µm															
LS4-1	60	75	17.5%	86.2%	66	325	4.9	52.5%	763	2,291	3.0	33.7%	7.0	13.6	1.9
LS8-2	5	75	15.5%	90.0%	96	559	5.8	48.5%	558	1,748	3.1	27.3%	6.1	10.7	1.8
Average of LS4-1 & LS8-2 <150µm fraction)			**16.5%**	**88.1%**			**5.4**	**50.5%**			**3.1**	**30.5%**			**1.8**
15mm dry screen followed by wet scrub <75 µm															
LS4-1	60	75	15.1%	85.8%	66	373	5.7	50.8%	763	2,559	3.4	15.5%	7.0	7.2	1.0
LS8-2	5	75	13.6%	89.5%	96	631	6.6	47.1%	558	1,928	3.5	10.7%	6.1	4.8	0.8
Average of LS4-1 & LS8-2 <75µm fraction)			**14.4%**	**87.7%**			**6.1**	**48.9%**			**3.4**	**13.1%**			**0.9**
Hydrocyclone Overflow Fraction From <75 µm Feed															
LS5-1	Wet scrubbed at 75% solids for 60 min in CMX		12.7%	81.9%	68	440	6.4	44.7%	693	2,908	4.2	9.7%	16.3	12.4	0.8
LS8-1	Wet scrubbed at 75% solids for 5 min in CMX		10.6%	77.5%	87	635	7.3	38.1%	547	1,974	3.6	8.6%	5.9	4.8	0.8
Average of 75% solids scrubbed in CMX			11.6%	79.7%			6.9	41.4%			3.9	9.2%			0.8
LS4-1	15mm dry screened, then wet scrubbed at 75% solids for 60 min in CMX		10.8%	69.0%	66	420	6.4	40.2%	763	2,839	3.7	6.1%	12.4	4.0	0.3
LS8-2	15mm dry screened, then wet scrubbed at 75% solids for 5 min in CMX		11.3%	78.0%	96	661	6.9	41.0%	558	2,018	3.6	7.5%	6.1	4.0	0.7
Average of 75% solids scrubbed in CMX after dry screening at 15mm			11.1%	73.5%			6.6	40.6%			3.7	6.8%			0.5

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13.7.3 Gypsum and Sulphate Control

Screening of Guanaco gravels and screening combined with the use of a hydrocyclone on the fines from Lago Seco provide effective means of eliminating the majority of the gypsum from the fines. Hydrocyclone ultrafines from Lago Seco contain approximately 7% of the gravel's original gypsum, while the <75µm screened fraction from Guanaco contains approximately 25% of the gravel's original gypsum.

The relatively high solubility of gypsum in saline (compared to fresh) water provides a means of beneficiating the fines further by dissolving the gypsum. The concentration of sulphate in saline water after leaching Guanaco and Lago Seco fines was approximately 1.2%. To minimise the volume of water used in leaching the gypsum from the fines, it is essential to strip the sulphate from the water. Nanofiltration of the high sulphate solution is proposed to remove calcium sulphate from solution.

The ettringite process, which is in commercial use in several operations, precipitates sulphate from solution as the insoluble aluminium sulphate. The efficiency of the precipitation of sulphate with aluminium is not significantly affected by the salinity of the leach water. Ettringite precipitation is considered as an alternative option for sulphate removal.

Both membrane and the ettringite processes require additional test work.

13.7.4 Uranium and Vanadium Leaching

Alkaline leach is effective for uranium and moderately effective for vanadium in the fine fraction of Guanaco and Lago Seco gravels. Alkaline leach extraction reaches peak effectiveness at ~80°C at short leach times of between four and six hours.

Average extraction by a four hour alkaline leach at 80°C from the fine fraction of Guanaco gravels is 96% for uranium and 61% for vanadium. The two samples that were prepared in a similar way to the optimal beneficiation route yielded extractions of 96% for uranium and 71% for vanadium after a four hour leach at 80°C. Average alkaline reagent consumption for these two tests was 41kg/t of fines for sodium carbonate and 8.5kg/t of fines for sodium bicarbonate. However, in these, and in all other leach tests, gypsum was only removed using screening and its removal by the dissolution in saline water was not practiced. We anticipate very low reagent consumptions from fines that have been leached for gypsum removal. It is also possible that vanadium extraction will be increased following the removal of reagent-consuming gypsum.

Alkaline leach test work on fines generated either by screening only or by hydrocyclone processing of fines generated by screening showed average percentage extraction, after a four hour leach at 80°C, of 96% for uranium and 58% for vanadium. The average extraction from alkaline leach for four hours at 80°C of the two samples whose processing most closely reflects the optimal beneficiation route for Lago Seco gravels, is 99% for uranium and 71% for vanadium. Average alkaline reagent consumption for these two tests was 31kg/t of fines for sodium carbonate and 14kg/t of fines for sodium bicarbonate. Again, in these leach tests, gypsum was only removed using screening and dissolution in saline water was not practiced. We anticipate very low reagent consumptions from fines that have been leached for gypsum removal. It is also possible that vanadium extraction will be increased following the removal of reagent-consuming gypsum.

The extraction of sulphate through the ettringite process provides a means of rejecting sulphate from the fines prior to alkaline leaching and therefore provides a means of reducing alkaline reagent consumption very significantly from these levels. An alternative method for reducing the sulphate content of the feed prior to alkaline leaching is with membranes, and this requires test work.

13.7.5 Future Test Work

The following programs of metallurgical test work and studies are essential to further progress the Laguna Salada Project:

- Large scale sampling from areas with high, average and low gypsum grades;
- Large scale beneficiation tests using alternative scrubbing systems, screens, hydrocyclones and other size separation methods;
- Bench scale tests on the dissolution of gypsum using saline water with membrane and ettringite gypsum removal applied to the leach solutions;
- A study of the relative economics and practicality of membrane versus ettringite methods of gypsum removal from solution;
- Economic studies to determine the optimum physical beneficiation parameters, and the preferred combination of beneficiation and gypsum dissolution;
- Leach tests with sodium carbonate/bicarbonate at different temperatures and times and various levels of gypsum removal to determine the optimum conditions;
- The preparation of sufficient pregnant leach solution to allow test work to define the conditions for efficient uranium and vanadium recovery;
- Membrane separation tests to determine optimal conditions for uranium, vanadium and reagent recovery from leach solution;
- An economic analysis of the role of vanadium recovery to the overall Project;
- Limited ammonium carbonate/bicarbonate and acid leach tests to evaluate the effectiveness of these options on the extraction of uranium and vanadium from the Laguna Salada gravels. If these methods prove to have technical merit, brief economic studies of these leach options should be undertaken;
- The definition of the liquid-solid separation characteristics of relevant streams in the beneficiation, gypsum leaching, and uranium leaching and recovery sections of the process;
- Characterisation, through test work, of the properties of waste gravel, beneficiation plant tailings, residues from the membrane or ettringite plant, and leach plant tailings and tailings solutions; and
- Test work on any remedial measures that might be needed to allow acceptable storage of waste materials.