## SHEEP MOUNTAIN URANIUM PROJECT FREMONT COUNTY, WYOMING, USA

# 43-101 MINERAL RESERVE AND RESOURCE TECHNICAL REPORT

# PREPARED FOR: TITAN URANIUM USA A Wholly Owned Subsidiary of: ENERGY FUELS INC.



# **AUTHORED BY:**

Douglas L. Beahm, P.E., P.G. Principal Engineer



March 20, 2012

### SIGNATURE PAGE

## **DOUGLAS L. BEAHM**

I, Douglas L. Beahm, P.E., P.G., do hereby certify that:

- 1. I am the author of the report titled "SHEEP MOUNTAIN URANIUM PROJECT FREMONT COUNTY, WYOMING, USA, 43-101 MINERAL RESERVE AND RESOURCE TECHNICAL REPORT " and dated March 20, 2012.
- 2. I am responsible for all sections of the report.
- 3. I am the Principal Engineer and President of BRS, Inc., 1130 Major Avenue, Riverton, Wyoming 82501.
- 4. I graduated with a Bachelor of Science degree in Geological Engineering from the Colorado School of Mines in 1974.
- 5. I am a licensed Professional Engineer in Wyoming, Colorado, Utah, and Oregon; a licensed Professional Geologist in Wyoming; and Registered Member of the SME.
- 6. I have worked as an engineer and a geologist for over 37 years. My work experience includes uranium exploration, mine production, and mine/mill decommissioning and reclamation within sandstone-hosted uranium districts in Wyoming including the Sheep Mountain area and adjacent properties.
- 7. I have read the definition of "qualified person" set out in National Instrument 43-101 and certify that by reason of my education, professional registration, and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
- 8. I have prior working experience on the property as stated in the report. Specifically I have, as a consultant, worked on the Sheep Mountain Project continuously since the fall of 2009. This has included assistance in the planning and execution of drilling programs in 2009, 2010, and 2011 and a lead role in the project design and environmental permitting.
- 9. At the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 10. I am independent of the issuer applying all of the tests in NI 43-101.
- 11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with same.

20, March, 2012 Signed and Sealed



Douglas L. Beahm, PE, PG Principal Engineering, BRS Inc.

## **TABLE OF CONTENTS**

SECTION TITLE	PAGE
SECTION 1: SUMMARY	6
Project Overview	6
Project Location	
Development Status	
Regulatory Status	
Geology and Mineralization	
Exploration and Drilling Status	
Mineral Resources and Reserves	
Capital and Operating Costs	
Economic Analysis	
Conclusions	
Recommendations	
SECTION 2: INTRODUCTION	
SECTION 3: RELIANCE ON OTHER EXPERTS	
SECTION 4: PROPERTY DESCRIPTION AND LOC	2ATION
SECTION 5: ACCESSIBILITY, CLIMATE, LOCAL PHYSIOGRAPHY	RESOURCES, INFRASTRUCTURE, AND
SECTION 6: HISTORY	
SECTION 7: GEOLOGICAL SETTING AND MINEI	RALIZATION25
Geologic Setting	
Mineralization	
Additional Resource Areas	
SECTION 8: DEPOSIT TYPES	
SECTION 9: EXPLORATION	
SECTION 10: DRILLING	
SECTION 11: SAMPLE PREPERATION, ANALYSI	ES, AND SECURITY42
SECTION 12: DATA VERIFICATION	
SECTION 13: MINERAL PROCESSING AND MET.	ALLURGICAL TESTING47

SECTION 14: MINERAL RESOURCE ESTIMATES	50
Mineral Resource Summary	50
Resource Calculation Methods	52
SECTION 15: MINERAL RESERVE ESTIMATES	57
Probable Mineral Reserves	57
Determination of Mine Cutoff Grade	58
SECTION 16: MINING METHODS	60
Congo Open Pit	60
Sheep Underground	79
SECTION 17: RECOVERY METHODS	94
SECTION 18: PROJECT INFRASTRUCTURE	
SECTION 19: MARKET STUDIES AND CONTRACTS	
SECTION 20: ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OF IMPACT	COMMUNITY 110
Environmental Studies	
Operating Plans	
Permitting Requirements	
Social and Community Relations	
Closure and Reclamation Plans	
SECTION 21: CAPITAL AND OPERATING COSTS	
Production Profile	
CAPITAL COSTS	
OPERATING COSTS	
Personnel	
SECTION 22: ECONOMIC ANALYSIS	
Sensitivity to Price	
Sensitivity to Other Factors	
SECTION 23: ADJACENT PROPERTIES	
SECTION 24: OTHER RELEVANT DATA AND INFORMATION	
Radiometric Equilibrium	
Ground Water Conditions	
SECTION 25: INTERPRETATION AND CONCLUSIONS	

SECTION 26: RECOMMENDATIONS	
SECTION 27: REFERENCES	138
Previous Reports:	138
Publications Cited:	

## Tables

Table 1.1. Indicated Mineral Resource	12
Table 1.2: Probable Mineral Resource	
Table 1.3: OPEX- Preferred Alternative	
Table 1.4: CAPEX – Capital Expenditures	
Table 1.5: Economic Analysis	
Table 5.1: Jeffrey City, Wyoming (484925) Monthly C	Climate Summary23
Table 7.1: Congo Drill Data	
Table 7.2: Congo Drill Data Statistics	
Table 7.3: Congo Mineralization Thickness and Grade	
Table 7.4: Sheep Mountain Drill Data	
Table 7.5: Sheep Mountain Drill Data Statistics	
Table 7.6: Sheep Mountain Average Thickness and Gr	ade29
Table 7.7: Sun-Mc Drill Data	
Table 7.8: Sun-Mc Drill Data Statistics	
Table 7.9: 2011 Drilling Bev Claims	
Table 12.1: Comparison of 2009 Drilling to Historic D	rilling43
Table 13.1: Summary of Column Leach Results	47
Table 14.1: Total Indicated Mineral Resources	
Table 14.2: Congo Total Indicated Mineral Resources	
Table 14.3: Sheep Underground Total Indicated Miner	al Resources50
Table 14.4: Sun-Mc Total Indicated Mineral Resources	s51
Table 15.1: Sheep Mountain Project Probable Mineral	Reserves Summary56
Table 15.2: Congo Total Probable Mineral Reserves 0.	10 GT Cutoff
Table 15.3: Sheep Underground Total Probable Minera	al Reserves 0.45 GT Cutoff57
Table 15.4: Mineral Cutoff Grade	
Table 19.1: Uranium Prices 2009 Through 2011	
Table 21.1: Production Profile- Preferred Alternative	
Table 21.2: Capital Cost Summary Alt. 1; Open Pit and	d Underground Concurrent Start120
Table 21.3: Capital Cost Summary Alt. 2; Open Pit and	d Underground Concurrent End120
Table 21.4: Capital Cost Summary Alt. 3; Open Pit On	ly121
Table 21.5: OPEX Alternative 1 and 2, Open Pit and U	Inderground Mining124
Table 21.6: OPEX Alternative 3, Open Pit Mining Onl	y125
Table 22.1: Alternative 1- Open Pit and Underground	Common Start128
Table 22.2: Alternative 2- Open Pit and Underground	Common End128
Table 22.3: Alternative 3- Open Pit Only	
Table 22.4: Alternative 1 Sensitivity- Open Pit and Un	derground Common Start129
Table 22.5: Alternative 2 Sensitivity- Open Pit and Un	derground Common End129
Table 22.6: Alternative 3 Sensitivity- Open Pit Only	

Table 22.7: Sensitivity Summary	130
Table 24.1: Comparison of Radiometric Equilibrium Based on Gamma and USAT Logging	s134

## Figures

Figure 1.1: Sheep Mountail Existing Conditions	7
Figure 1.2: Sheep Mountain During Construction	8
Figure 1.3: Sheep Mountain Reclamation	9
Figure 4.1: Location Map	17
Figure 4.2: Sheep Mountain Mine Ownership Map	20
Figure 4.3: Sheep Mountain Mine Royalty Map	21
Figure 7.1: Geologic Map	26
Figure 8.1 Uranium Roll Front in Golden Goose Mine	
Figure 8.2: Little Sheep Decline 2011	34
Figure 10.1: Congo Drillhole Map	
Figure 10.2: Sheep Mountain Drillhole Map	
Figure 10.3: Sun-Mc Drillhole Map	40
Figure 16.1: Project Overview	60
Figure 16.2: Existing McIntosh Pit	61
Figure 16.3: Congo Pit Annual Pit Sequence	62
Figure 16.4: Pit 1	63
Figure 16.5: Pit 2	64
Figure 16.6: Pit 3	65
Figure 16.7: Pit 4	66
Figure 16.8: Pit 5	67
Figure 16.9: Pit 6	68
Figure 16.10: Pit 7	69
Figure 16.11: Pit 8	70
Figure 16.12: Pit 9	71
Figure 16.13: Pit 10	72
Figure 16.14: Pit 11	73
Figure 16.15: Pit 12	74
Figure 16.16: Pit 13	75
Figure 16.17: Pit 14	76
Figure 16.18: Pit 15	77
Figure 16.19: Sheep Underground Index	81
Figure 16.20: Sheep Underground Sequence	82
Figure 16.21: Sheep Underground Year 1	83
Figure 16.22: Sheep Underground Year 2	84
Figure 16.23: Sheep Underground Year 3	85
Figure 16.24: Sheep Underground Year 4	86
Figure 16.25: Sheep Underground Year 5	87
Figure 16.26: Sheep Underground Year 6	
Figure 16.27: Sheep Underground Year 7	89
Figure 16.28: Sheep Underground Year 8	90
Figure 16.29: Sheep Underground Year 9	91

<b>)</b> 2
<b>)</b> 3
<b>)</b> 5
<b>)</b> 6
<del>)</del> 9
)0
)1
)2
)3
)4
)5
)6
)8
27
32

## Appendices

Appendix A – Mineral Resource and Reserve GT Contour Maps

- Appendix A1 Congo Open Pit
- Appendix A2 Sheep Underground
- Appendix A3 Sun Mc Areas

Appendix B – Active Mining Claims

## **SECTION 1: SUMMARY**

This Technical Report was prepared for Titan Uranium USA Inc. (Titan), a wholly owned subsidiary of Energy Fuels Inc. (EFR), in compliance with National Instrument 43-101, *Standards of Disclosure for Mineral Projects* and in accordance with Canadian Institute Mining (CIM) *Best Practice Guidelines for the Estimation of Mineral Resources and Mineral Reserves*.

Note that EFR is in the process of changing the name of Titan Uranium Inc. to Energy Fuels Wyoming Inc. As such any reference to Titan in this report or the associated drawings, figures, tables, and conclusions also applies to the entity Energy Fuels Wyoming Inc.

This report updates both the "SHEEP MOUNTAIN URANIUM PROJECT, Fremont County, Wyoming, USA, 43-101 MINERAL RESERVE AND RESOURCE REPORT", dated April 8, 2010, and the "SHEEP MOUNTAIN URANIUM PROJECT, Fremont County, Wyoming, USA, 43-101 MINERALRESOURCE REPORT UPDATE", dated March 1, 2011. These reports were prepared by BRS Inc., of Riverton, Wyoming, who has also prepared the current report. As a prerequisite to the preparation of the current report, the "SHEEP MOUNTAIN MINES, Fremont County, Wyoming, USA, PRE-FEASIBILITY STUDY, dated April 8, 2010, BRS Inc., has also been updated.

## **Project Overview**

The Sheep Mountain Project includes the Congo Pit, a proposed open pit development, and the reopening of the existing Sheep Underground mine. Although alternatives were considered, the recommended uranium recovery method includes the processing of mined materials via an on-site heap leach facility.

Permitting and licensing of the project is well advanced. A Plan of Operations was submitted to the Bureau of Land Management (BLM) in June 2011, and the BLM is currently preparing an Environmental Impact Statement (EIS) for the project. There is an existing mine permit for the Sheep Mountain Project, Mine Permit 381C, which is in good standing with the State of Wyoming, Department of Environmental Quality, Land Quality Division (WDEQ/LQD). Revisions to the Mine Permit and an a Source Material License application are being developed and will besubmitted to theWDEQ/LQD and the U.S. Nuclear Regulatory Commission (NRC), respectively.

Mining will be completed by both underground and open pit methods. Mined product from the underground and open pit mine operations will be commingled at the stockpile site located near the underground portal and in close proximity to the pit. At the stockpile the mine product will be sized if needed, blended, and then conveyed via a covered overland conveyor system to the heap leach pad where it will be stacked on a double lined pad for leaching. The primary lixiviant will be sulfuric acid. Concentrated leach solution will be collected by gravity in a double lined collection pond and then transferred to the mineral processing facility for extraction and drying. The final product produced will be a uranium oxide, commonly referred to as yellowcake.

The preferred alternative for the development of the Sheep Mountain Project begins the operation with the open pit and heap leach facility and brings the underground mine into operation some 5 years later such that the forecasted end of mining for both the open pit and underground coincide. This approach defers a substantial amount of initial capital, minimizes risk, and allows for a gradual startup of site activities while maximizing resource recovery. Having the end of mining coincide for both operations optimizes the fixed costs of personnel and facilities. Subsequent renderings depict the project in its current condition, through mine development, and final reclamation.



Figure 1.1 - Sheep Mountain Existing Conditions

SPOILS 2 CONGO PIT SHEEP I SHAFT SHEEP IN SHAFT UNDERGROUND DECLINE CONVEYOR SPOILS 1 ACCESS ROAD CONVEYOR ACCESS ROAD HEAP CROOKS GAP ROAD PLANT SX MCINTOSH PIT **BIG EAGLE ROAD** <u>BRS</u> SHEEP MOUNTAIN MINE DURING PRODUCTION







## **Project Location**

The Sheep Mountain Project is located in portions of Sections 8, 9, 15, 16, 17, 20, 21, 22, 27, 28, 29, 30, 31, 32, and 33, Township 28 North, Range 92 West at approximate Latitude 42° 24' North and Longitude 107° 49' West, within the Wyoming Basin physiographic province in the Great Divide Basin at the northern edge of the Great Divide Basin. The project is approximately 8 miles south of Jeffrey City, Wyoming (Refer to Figure 4.1 – Location Map).

The Sheep Mountain Project is comprised of 179 unpatented mining claims comprising approximately 3,205 acres and approximately 640 acres of State of Wyoming lease (i.e., ML 0-15536 located in Section 16, Township 28 North, Range 92 West). There are approximately 630 acres of private lease lands in Section 20, 29, 31, 32, and 33. Refer to Figure 4.2, Claim Map. The combined land holdings comprise some 4,475 acres.

## **Development Status**

A preliminary feasibility study for the project has been completed which includes the preliminary design and sequencing of the open pit and underground mine operations and the heap leach mineral processing facility. Designs and sequencing are inclusive of pre-production, production, and decommissioning and reclamation.

Capital and operating costs estimates (CAPEX and OPEX) have been completed and are in current (2012) US dollars.

Telephone, electric and natural gas service has been established to the proposed plant site. In addition, electric service and a waterline have been extended via a Right of Way (ROW) issued by the BLM in 2011 to the Sheep I and II shafts. Water rights held by Titan are adequate for planned operations. Publicly maintained access roads exist to within one mile of the project. Private access roads from past operations are established throughout the project area.

## **Regulatory Status**

The Sheep Mountain Project includes the proposed Congo Open Pit, the re-opening of the existing Sheep Underground Mine and the Heap Leach processing of the mined product to produce yellowcake. Permitting and licensing of the project is well advanced including:

- Baseline environmental studies are being completed for the requisite time frames required and/or recommended by state and federal regulatory guidance.
- There is an existing mine permit for the Sheep Mountain Project, Mine Permit 381C, which is in good standing with the State of Wyoming, Department of Environmental Quality, Land Quality Division (WDEQ/LQD).
- A draft permit revision including a revision of the existing reclamation bond has been submitted to the WDEQ/LQD and a courtesy review was conducted by the agency.
- A Plan of Operations (POO) has been prepared and submitted to the BLM in conjunction with the mine permit revisions. Public scoping and preparation of an EIS is underway.
- A draft NRC Source Material License application has been prepared including the Environmental Report (ER) and Technical Report (TR).
- A pre-application audit with the NRC has been completed and technical comments received.

#### **Geology and Mineralization**

Within the Sheep Mountain Project area, uranium mineralization is contained in the lower to middle Eocene Battle Spring Formation. The Battle Spring Formation, consisting of upper and lower members (designated the "A" for the lower and "B" for the upper), is a fluvial deposit. Mineralization is hosted by the Battle Spring Formation and has been described extensively since the 1960s and has been termed a 'Wyoming Roll Front System'. These deposits are often organic-rich, fine grained lenses in tabular, or "roll front", configurations. The uranium mineralization occurs primarily in the lower member of the Battle Spring Formation (Stephens, 1974).

#### **Exploration and Drilling Status**

While mineralization was originally discovered by aerial and ground radiometric surveys completed in the early 1950's, exploration since that time has been dominantly by drilling. Drill data from approximately 4,000 drill holes were utilized in this study. While the majority of the drilling is of a historic nature, Titan has the original geophysical and lithologic logs for most of the historic drill holes. This data was reviewed and validated. In addition, 159 new drill holes have been completed on the project since 2006 to confirm and extend known mineralization and to delineate areas for mine planning.

Mineral resource and reserve estimates for the Sheep Mountain Project are based on radiometric data. As discussed in this report, available data indicates that variations in radiometric equilibrium are local in their effect, which impacts the mining grade control program but does not appreciably affect the overall mineral resources or reserves.

#### **Mineral Resources and Reserves**

The estimation of mineral resources and reserves presented here is compliant with CIM standards for National Instrument 43-101 Mineral Resources and Mineral Reserves reporting.

Based on the drill density, the apparent continuity of the mineralization along trends, geologic correlation and modeling of the deposit, a review of historic mining with respect to current resource projections, and verification drilling, the Mineral Resource estimate herein meets CIM criteria as an Indicated Mineral Resource. A summary of total mineral resource is provided in the following table. Detailed information relative to mineral resources is provided in Section 14 of this report.

Sheep Underground	GT Cutoff	>0.30
	Pounds eU <sub>3</sub> O <sub>8</sub>	13,245,000
	Tons	5,640,000
	Avg Grade % eU3O8	0.117
Congo Pit Area	GT Cutoff	>0.10
	Pounds eU <sub>3</sub> O <sub>8</sub>	15,040,000
	Tons	6,176,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.122
Sun-Mc	GT Cutoff	>0.10
	Pounds e U <sub>3</sub> O <sub>8</sub>	2,000,000
	Tons	1,080,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.093
Total Indicated Mineral Resource	GT Cutoff	As Above
	Pounds e U <sub>3</sub> O <sub>8</sub>	30,285,000
	Tons	12,895,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.117

Table 1.1 - Indicated Mineral Resource\*

\*numbers rounded

The following Mineral Reserves are fully included in the total Mineral Resources. The Probable Mineral Reserve for the Sheep Mountain Project, including both open pit and underground projected mining areas, is that portion of the indicated mineral resource that is included in current mine designs and is considered economic under current cost and market conditions. The mineral reserve estimate is compliant with CIM Definition Standards on Mineral Resources and Reserves. A summary of the total mineral reserve is provided in the following table. Detailed information relative to probable mineral reserves is provided in Section 15 of this report.

	GT	Pounds %		Average Grade
Area	Minimum	eU <sub>3</sub> O <sub>8</sub>	Tons	% <sub>e</sub> U <sub>3</sub> O <sub>8</sub>
Open Pit	0.10	9,117,000*	3,955,000*	0.115
Underground	0.45	9,248,000*	3,498,000*	0.132
Total		18,365,000*	7,453,000*	0.123

 Table 1.2 - Probable Mineral Reserves

\*numbers rounded

## **Capital and Operating Costs**

The preferred alternative for the development of the Sheep Mountain Project is an open pit and underground conventional mine operation with on-site mineral processing featuring an acid heap leach and solvent extraction recovery facility. The preferred alternative begins the operation with the open pit and heap leach facility and brings the underground mine into production some 5 years later such that the forecasted end of mining for both the open pit and underground coincide.

Estimated (OPEX) is summarized as follows:

Table 1.3	- OPEX -	Preferred	Alternative
-----------	----------	-----------	-------------

			(current doll	ars x 1,000)
	Life of Mir	ne Cost Per Ton	Cost Per	Cost Per Lb
	OPEX	Mined	Lb Mined	Recovered
Total Surface Mine				
(3,955,000 tons, 9,117,000 lbs)	\$ 110	,403 \$ 27.91	\$ 12.11	\$ 13.26
Total Underground Mine				
(3,498,000 tons, 9,248,000 lbs)	\$ 202	\$ 57.79	\$ 21.86	\$ 23.65
Blended Mining Costs*				
(7,435,000 tons, 18,365,000 lbs)	\$ 312	\$ 41.93	\$ 17.02	\$ 18.52
Total Reclamation and Closure	\$ 11	,840 \$ 1.59	\$ 0.64	\$ 0.70
Total Heap Leach	\$ 107	\$ 14.39	\$ 5.84	\$ 6.35
Reclamation Bond Mine and				
Неар	\$ 7	,140 \$ 0.96	\$ 0.39	\$ 0.42
Total Taxes and Royalties	\$ 106	\$,639 \$ 14.31	\$ 5.81	\$ 6.32
TOTAL DIRECT COSTS	\$ 545	\$,396 \$ 73.18	\$ 29.70	\$ 32.31

\*Blended mine costs represent the weighted average of open pit and underground mines. Surface and underground mine costs are shown for information but are not additive to the total cost.

Estimated CAPEX is summarized as follows:

Table 1.4 – CAPEX - Capital Expenditures

( current dollars x 1,000)				
	Contingency	Initial Capital	Years 2-20	Life of Mine
Permitting (NRC, BLM, and WDEQ)		\$ 4,328		\$ 4,328
Pre-Development Mine Design		\$ 1,200		\$ 1,200
OP Mine Equipment	15%	\$ 14,301		\$ 14,301
UG Mine Equipment	15-30%		\$ 61,601	\$ 61,601
Office, Shop, Dry, and support	15%	\$ 3,166		\$ 3,166
Mineral Processing	25%	\$ 37,803		\$ 37,803
TOTAL CAPITAL EXPENDITURES		\$ 60,798	\$ 61,601	\$ 122,399
COST PER POUND RECOVERED				\$7.01

## **Economic Analysis**

The financial evaluation for the preferred alternative represents constant US dollars (2012) and an average sales price of \$65.00 per pound of uranium oxide. All costs are forward looking and do not include any previous project expenditures or sunk costs. Operating costs include all direct taxes and royalties but <u>do not</u> include US Federal Income Tax. Net Present Value (NPV) is calculated at a range of hurdle rates.

#### Table 1.5 – Economic Analysis

	(current	dollars x 1,000)
PREFERRED		
ALTERNATIVE		
IRR		35%
NPV 5%	\$	224,378
NPV 7%	\$	173,548
NPV 10%	\$	118,490
NPV 15%	\$	62,733
NPV 20%	\$	32,425

## **Conclusions**

The preferred alternative for the development of the Sheep Mountain Project is an open pit and underground conventional mine operation with on-site mineral processing featuring an acid heap leach and solvent extraction recovery facility. The preferred alternative begins the operation with the open pit and heap leach facility and brings the underground mine into operation some 5 years later such that the forecasted end of mining for both the open pit and underground coincide. This approach defers a substantial amount of initial capital, minimizes risk, and allows for a gradual startup of site activities while maximizing resource recovery. Having the end of mining coincide for both operations optimizes the fixed costs of personnel and facilities.

The Sheep Mountain Project if implemented would be profitable under current economic conditions. Under the base case (preferred alternative and \$65 per pound selling price) the project is estimated to generate an IRR of 35% before taxes and has an NPV of over 118 million dollars US at a 10% discount rate.

The technical risks related to the project are low as the mining and recovery methods are proven. The mining methods recommended have been employed successfully at the project in the past. Successful uranium recovery from the mineralized material at Sheep Mountain and similar areas such as the Gas Hills has been demonstrated via both conventional milling and heap leach recovery.

Risks related to permitting and licensing the project are low as the project is a brown-field development located in a state which tends to favor mining and industrial development. The project has been well received locally and will also provide substantial revenues to both Fremont County and the State of Wyoming in addition to providing long term employment for the region. The project development is timed well with respect to the market and substantial increases in financial return may be realized in what is being forecast as a rising market.

## **Recommendations**

It is recommended that development of the project be supported and that significant effort be directed at environmental permitting. Through 2014, Titan has estimated cost related to permitting the mine and mineral processing operations with the State of Wyoming, US BLM, and US NRC to be in excess of 4.3 million dollars. The author concurs with this estimate. This is the single most important item in moving the project forward.

It is the author's opinion that there is significant promise in the development of alternative underground mining methods. Current CAPEX and OPEX are based on traditional drill and blast methods which are highly labor and capital intensive. The general areas for significant improvement of the underground operations would include:

- Hydraulic Mining Based on limited testwork in the existing Sheep decline the host formation appears amenable to this method and further testing is recommended. This could improve costs and safety of operations and would be applicable at least to the development decline and development drifts which are not in mineralized material. With proper control of solutions it may also be applicable for work in mineralized zones.
- Mechanical Upgrading Some testing has been completed using both the ablation methodology which in being developed in Casper, Wyoming and attrition scrubbing which is a proven commercial technique. Both methods have promise as they could operate underground and return 80% or more of the total mined volume as backfill in the mine while shipping a concentrated product to the surface for mineral processing.
- Budgetary estimate \$500,000 to investigate both alternatives.

Although the current project has significant mineral resources and reserves, there are two areas with potentially significant resources which have not been fully evaluated.

- A mineral resource estimate has been completed for the Sun Mc area but no mine design efforts have been made to date. The budgetary estimate for preliminary mine design \$100,000.
- The Bev claims have known historic mineral resources and confirmatory drilling completed in 2011 verified the mineralization. However, a compliant mineral resource estimate for this area has not been completed and is not included in the current mineral resource estimate. The budgetary estimate for mineral resource estimation, \$50,000. Once the mineral resource has been defined preliminary mine planning should be completed. The budgetary estimate for preliminary mine design is \$100,000.

## **SECTION 2: INTRODUCTION**

This Technical Report was prepared for Titan Uranium USA Inc. (Titan) a wholly owned subsidiary of Energy Fuels Inc. (EFR) in compliance with National Instrument 43-101, *Standards of Disclosure for Mineral Projects* and in accordance with Canadian Institute Mining (CIM) *Best Practice Guidelines for the Estimation of Mineral Resources and Mineral Reserves*.

This report updates both the "SHEEP MOUNTAIN URANIUM PROJECT, Fremont County, Wyoming, USA, 43-101 MINERAL RESERVE AND RESOURCE REPORT", dated April 8, 2010, and the "SHEEP MOUNTAIN URANIUM PROJECT, Fremont County, Wyoming, USA, 43-101 MINERALRESOURCE REPORT UPDATE", dated March 1, 2011. These reports were prepared by BRS Inc., of Riverton, Wyoming, who has also prepared the current report. As a prerequisite to the preparation of the current report, the "SHEEP MOUNTAIN MINES, Fremont County, Wyoming, USA, PRE-FEASIBILITY STUDY, dated April 8, 2010, BRS Inc., has also been updated.

The lead author of this report and the updated feasibility study, Mr. Beahm, is both a Professional Geologist and a Professional Engineer licensed in Wyoming, and a Registered Member of the US Society of Mining Engineers (SME). He is independent of the Issuer, using the test set out in Section 1.4 of National Instrument 43-101. Mr. Beahm is experienced with uranium exploration, development, and mining including past employment with the Homestake Mining Company, Union Carbide Mining and Metals Division, and AGIP Mining USA. As a consultant and principal engineer of BRS, Inc., Mr. Beahm has provided geological and engineering services relative to the development of mining and reclamation plans for uranium projects in Wyoming, Utah, Colorado, Arizona, and Oregon, as well as numerous mineral resource and economic feasibility evaluations. This experience spans a period of thirty-eight years dating back to 1974. Mr. Beahm has direct work experience within the Crooks Gap/Green Mountain District and the adjoining Gas Hills District.

The lead author has worked as a consultant on the Sheep Mountain Project continuously since the fall of 2009. Mr. Beahm assisted in the planning and execution of the Titan drilling programs in 2009, 2010, and 2011 and was directly involved in supervision of drilling, logging and recordation of samples, selection of mineralized material samples for testing, and delivery of mineralized material samples for analysis. Mr. Beahm has also played a leading role in the project design and permitting. Mr. Beahm's most recent visit to the site was October 25, 2011 at which time he conducted a site tour with representatives of the USNRC, USBLM, Wyoming DEQ, and members of the public as part of the pre-application audit of the draft Source Materials License prepared for the project.

## **SECTION 3: RELIANCE ON OTHER EXPERTS**

The author has relied on the accuracy of the historical and new data as itemized in Section 4, various project reports as referenced in Section 23 of this report, and on the accuracy of data and interpretations provided by the previous 43-101 mineral resource report for the project (RPA, 2005 and 2006).

The location of the unpatented mining lode claims and the state mineral leases, shown on Figure 6.2, which form the basis of the mineral holdings, was in part provided by Titan and was relied upon as defining the mineral holdings of Titan in the development of this report.

The author has relied upon capital cost (CAPEX) and operating cost (OPEX) estimates prepared and independent studies completed for the project including:

- CAPEX and OPEX for underground mining prepared by Dave Scriven, Western States Mining as part of the 2010 pre-feasibility study and as updated for the current preliminary feasibility study, 2012.
- CAPEX and OPEX for mineral processing completed by Lyntek in February 2012, including the conveyance of mined product from stockpiles to the heap leach processing facility, construction and operation of the heap leach, and construction and operation of the associate mineral processing facility.
- Column leach amenability studies completed by R and D Enterprises, February 21, 2011.
- Personal discussion with DR. Terry McNulty relative to heap leach recovery, February, 2012.

## **SECTION 4: PROPERTY DESCRIPTION AND LOCATION**

The Sheep Mountain Project is located in portions of Sections 8, 9, 15, 16, 17, 20, 21, 22, 27, 28, 29, 30, 31, 32, and 33, Township 28 North, Range 92 West at approximate Latitude 42° 24' North and Longitude 107° 49' West, within the Wyoming Basin physiographic province in the Great Divide Basin at the northern edge of the Great Divide Basin. The project is approximately 8 miles south of Jeffrey City, Wyoming. (Refer to Figure 4.1 – Location Map).





(RPA, 2006)

Figure 4.2. represents the approximate location of unpatented mining lode claims and state leases held by Titan. In addition, copies of location certificates and filings for unpatented mining lode were provided by Titan. Said data and mapping was reviewed and found to be complete. The Sheep Mountain Project is comprised of 179 unpatented mining claims comprising approximately 3,205 acres and approximately 640 acres of State of Wyoming lease (ML 0-15536 located in Section 16, Township 28 North, Range 92 West). There are approximately 630 acres of private lease lands in Section 20, 29, 31, 32, and 33 (refer to Figure 4.2, Claim Map). The combination of the land holdings comprises some 4,475 acres and gives Titan the mineral rights to the resources as defined in the Congo Pit and Sheep Underground mine areas. A listing of Active claims is provided in Appendix B.

To maintain these mineral rights, Titan must comply with the state lease provisions including annual payments with respect to the State of Wyoming leases; private leases; BLM and Fremont County, as well as Wyoming filing and/or annual payment requirements to maintain the validity of the unpatented mining lode claims.

Mineral royalties are summarized in the *Technical Report on the Sheep Mountain Uranium Project, Wyoming*, (RPA, 2006). The project is subject to an overall sliding scale royalty of 1 to 4% due to Western Nuclear, based on the Nuclear Exchange Corporation ("NUEXCO") Exchange Value. This royalty is currently at its maximum rate of 4%. Additional royalties vary from \$0.50 per pound produced to 5% Gross Royalty to other private parties and a 5% Gross Royalty due to the State of Wyoming for the Section 16 state lease (RPA, 2006). Figure 4.3. shows the current mining claims with shading indicating the location of various royalty owners. It is recommended that as the project moves forward to production, the individual royalties be consolidated and bought out wherever possible to avoid future conflicts.

Uranium mining in Wyoming is subject to both a gross products (county) and mineral severance tax (state). At the federal level: aggregate corporate profit from mining ventures is taxable at corporate income tax rates, i.e. individual mining projects are not assessed federal income tax but rather the corporate entity is assessed as a whole. For mineral properties: depletion tax credits are available on a cost or percentage basis whichever is greater. The percentage depletion tax credit for uranium is 22%, among the highest for mineral commodities, IRS Pub. 535.

Titan acquired a 50% interest in the property when it acquired Uranium Power Corp (UPC) by a Plan of Arrangement in July 2009. The ownership was subsequently transferred to Titan's wholly-owned subsidiary, Titan Uranium USA. The remaining 50% interest was purchased from Uranium One Inc. (U1) on October 1, 2009, with the following terms:

- 1. An initial cash payment of US\$750,000 for U1's 50% interest in Sheep Mountain;
- 2. A payment of US\$2,000,000 if the month-end spot uranium price reported by Ux Consulting Company exceeds US\$65.00 per pound within three years of the closing date, payable within six months;
- 3. A further payment of US\$4,000,000 if the month-end spot uranium price reported by Ux Consulting Company exceeds US\$85.00 per pound within three years of the closing date, payable within twelve months;

Payment of US\$1,000,000 under Item 2, above, was made in 2011. An additional payment to U1 of US\$1,000,000 is due on July 31, 2012. Titan is negotiating with U1 to defer this payment until after the

Project begins production which is anticipated as the 2 quarter, 2015. The additional payment, under Item 3 above, will not become due unless the spot price of uranium reaches US\$85.00 per pound by the end of September, 2012. This was considered unlikely by the author given current market projections and was not included as a cost in the current preliminary feasibility study.

The surface rights to the lands encompassing the Sheep Mountain Project include the lands located within the state lease administered by the Wyoming State Lands and Investment Division, lands associated with unpatented mining lode claims administered by the US Bureau of Land Management (BLM), and lands associated with private leases.

Titan has entered into a purchase agreement for the surface lands associated with the heap leach and mineral processing plant site. This site is a split estate meaning that the surface rights are held privately while the mineral rights are federal. Titan holds the mineral rights in this area via mining claims and thus holds both surface and mineral rights within the heap leach and mineral processing plant site.



Figure 4.2 – Sheep Mountain Mine Ownership Map



Figure 4.3 – Sheep Mountain Mine Royalty Map

# SECTION 5: ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

The Sheep Mountain Project is located at approximate Latitude 42° 24' North and Longitude 107° 49' West, within the Wyoming Basin physiographic province in the Great Divide Basin at the northern edge of the Great Divide Basin. The project is approximately 8 miles south of Jeffrey City, Wyoming and is accessible via 2-wheel drive on existing county and two-track roads, as follows; Proceed south from Highway 287 on the Crooks Gap/Wamsutter Road, County Road 23, at Jeffrey City towards Crooks Gap approximately 7.2 miles; then proceed easterly on two track road approximately 1 mile to the site.

## Physiography and Climate

Historic climate records were available through a National Weather Service cooperative station until 2005. The Sheep Mountain Project falls within the intermountain semi-desert weather province. The following is a summary of the climatic conditions.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	31.1	34.0	43.5	54.7	64.5	75.1	84.9	82.8	71.8	59.4	40.1	31.1	56.1
Average Min. Temperature (F)	9.1	10.3	18.5	26.4	34.8	42.5	49.2	48.1	38.2	28.7	16.6	9.5	27.7
Average Total Precipitation (in.)	0.36	0.42	0.79	1.28	2.04	1.07	0.89	0.64	0.78	0.83	0.62	0.40	10.12
Average Total Snow Fall (in.)	5.1	6.6	8.3	9.7	4.0	0.3	0.0	0.0	1.1	5.4	9.7	6.2	56.5
Average Snow Depth (in.)	2	2	1	0	0	0	0	0	0	0	1	2	1

Table 5.1 -JEFFREY CITY, WYOMING (484925) - Monthly Climate Summary Period of Record : 4/10/1964 to 12/31/2005

Titan has established an on-site remote weather station and has recorded temperature, precipitation (rain and snow), barometric pressure, and wind speed since August, 2010.

Topography consists of rounded hills with moderate to steep slopes. Elevations range from 6,600 ft. up to 8,000 ft. above sea level. The ground is sparsely vegetated with sage and grasses with occasional small to medium sized pine trees at the higher elevations.

## Infrastructure

Telephone, electric and natural gas service has been established to the proposed plant site. In addition, electric service and a waterline have been extended via a ROW issued by the BLM in 2011 to both the Sheep 1 and 2 shafts. Water rights are held by Titan but need to be updated with the Wyoming State Engineer. Further discussion of infrastructure is provided in Section 18.

## **SECTION 6: HISTORY**

Uranium was first found in the Crooks Gap district, which includes the Sheep Mountain area, in 1955. Three companies dominated the district by the mid 1950s: Western Nuclear (WN), Phelps Dodge (PD) and Continental Uranium (CU). WN built the Split Rock Mill at Jeffrey City in 1957 and initiated production from the Paydirt pit in 1961, Golden Goose 1 in 1966 and Golden Goose 2 in 1970. PD was the principal shareholder and operator of the Green Mountain Uranium Corporation's Ravine Mine which began production in 1956. CU developed the Seismic Pit in 1956, the Seismic Mine in 1957, the Reserve Mine in 1961 and the Congo Decline in 1968. In 1967 CU acquired the PD properties and in 1972 WN acquired all of CU's Crooks Gap holdings. During the mid 1970s PD acquired an interest in WN which began work on Sheep Mountain I in 1974, the McIntosh Pit in 1975, and Sheep Mountain II in 1976. Production from the area ceased in 1982 and U.S. Energy-Crested Corp (USECC) acquired the properties from WN in 1988.

In December 2004, Uranium Power Corp (UPC) (then known as Bell Coast Capital) entered into a Purchase and Sales Agreement with USECC to acquire a 50% interest in the Sheep Mountain property. The acquisition was completed in late 2007 with aggregate payments to USECC of \$7.05 million and the issuance of 4 million common shares to USECC. USECC sold all of its uranium assets, including its 50% interest in Sheep Mountain, to Uranium One Ventures (USA) Inc (U1) in April 2007.

Titan Uranium Inc (Titan) acquired UPC's 50% interest in the property when it acquired UPC by a Plan of Arrangement in July 2009. The ownership was subsequently transferred to Titan's wholly-owned subsidiary, Titan Uranium USA. As of February 29, 2012 Titan is a wholly owned subsidiary of Energy Fuels Inc. (EFR).

Production reports for the district, for the period from 1976 to 1982, vary from 17.4 million lbs, (USE document) to 13.8 million lbs (Irwin, 1998). Production from the Sheep Mountain I is reported to be 312,701 tons at  $0.107\% U_3O_8$ . Subsequent to closure of the Sheep Mountain I by WN, during April to September, 1987, Pathfinder Mines Corp. (PMC) mined a reported 12,959 tons, containing 39,898 pounds of uranium at an average grade of  $0.154 U_3O_8$  from Sheep Mountain I, (PMC, 1987). The following year during May to October, 1988 USE mined 23,000 tons from Sheep Mountain I, recovering 100,000 lbs of uranium for a mill head grade of  $0.216\% U_3O_8$  (WGM, 1999). The material was treated at PMC's Shirley Basin mill, 130 miles east of the mine. The mines were allowed to flood in 2000 (RPA, 2005).

## SECTION 7: GEOLOGICAL SETTING AND MINERALIZATION

## Geologic Setting

Surface geology and regional geologic cross sections are shown on Figure 7.1 from Stephens, 1955. Within the project area surficial geologic exposures include:

- Quaternary alluvial and colluvial deposits mapped as;
  - Qal Quaternary Alluvium
  - Qf –Quaternary Floodplain (colluvium)
  - Tertiary Battle Spring Formation (Eocene);
    - Tb Member B (Upper)
    - Tb Member A (Lower)
- Tf Tertiary Fort Union (Paleocene)
- Kc Cretaceous Cody Shale

The Battle Spring is Eocene in age. Prior to deposition of the Battle Spring Formation and subsequent younger Tertiary formations- including the White River and Split Rock Formations- underlying Paleocene, Cretaceous, and older formations were deformed during the Laramide Orogeny. During the Laramide Orogeny, faults, including the Emigrant Thrust Fault at the northern end of the project area, were active and displaced sediments by over 20,000 feet (Rackely, 1975). Coincident with this mountain building event Paleocene and older formations were folded in a series of en echelon anticlines and synclines, generally trending from southeast to northwest.

The Battle Spring Formation was deposited unconformably on an erosional landscape influenced by these pre-depositional features. Initial stream channels transporting clastic sediments from the Granite Mountains formed in the synclinal valleys. With continued erosion of the Granite Mountains and deposition of sediments into the surrounding basins, the pre-tertiary surface was buried successively by the Battle Spring, White River, and Split Rock formations. The formations once blanketed the entire area. Subsequently, the Granite Mountains collapsed forming a series of normal faults including the Kirk Normal Fault at the northern end of the project.

Within the project area the Battle Spring Formation only limited faulting has been observed and, where present, displacement is minor. The largest reported displacement from the historic mining is four feet. The Battle Spring is folded with a series of southeast plunging anticline/syncline features. Folding is reported to be more extensive in the lower Battle Spring or A Member than in the upper or B Member. The nature of the folding and faulting in the Battle Spring suggests that it was either contemporaneous with deposition of the sediments or occurred shortly after deposition. Post-Miocene erosion has exhumed portions of the Granite Mountains regionally and has exposed the Battle Spring Formation at the project.

The geologic setting of the project is important in that it controlled uranium mineralization by focusing the movement of the ground waters which emplaced the uranium into the stream channels which had developed on the pre-tertiary landscape. In a similar manner, the geologic setting influences the present ground water system. Ground water flow is from the north-northeast to the south-southwest. Ground water flow in the Battle Spring at the site is isolated in the subsurface from the local surface drainages, Crooks Creek to the west, and Sheep Creek to the east. In addition, the recharge area for the ground water system is limited which will in turn limit dewatering requirements.

As shown on Figure 7.1 the Battle Spring Formation and associated mineralization at Sheep Mountain is bounded to the east by the western flank of the Sheep Mountain Syncline and to the west by the Spring Creek Anticline. To the north the system is cutoff by erosion. To the south the Battle Spring is continues into the northern portions of the Great Divide Basin. In cross section (Figure 7.1) the Battle Spring Formation within the project area is underlain and bounded on three sides by the Fort Union and/or Cody Shale in areas where the Fort Union was removed by erosion prior to deposition of the Battle Spring.

Mineralization occurs throughout the lower A Member of the Battle Spring Formation and is locally up to 1500 feet thick. The upper B Member is present only in portions of the project and may be up to 500 feet thick. The A Member of the Battle Spring is folded as shown on Figure 7.1. The folding is considered to have focused mineralization in the troughs of the synclines (Stephens, 1974).

Although arkosic sandstone is the preferred host, uranium has been extracted from all lithologies. Grade and thickness are extremely variable depending on whether the samples are taken from the nose or the tails of a roll front. Typically the deposits range from 50 feet to 200 feet along strike, 5 feet to 8 feet in height, and 20 feet to 100 feet in width. A single mineralized zone might contain 40,000 to 100,000 tons of mineralized material. Deposits in the Sheep Mountain area occur in stacked horizons from 7,127 feet elevation down to 6,050 feet elevation. Typical intercepts from surface drill holes include 4 feet at 0.47 % U<sub>3</sub>O<sub>8</sub>, 9.5 feet at 0.26% U<sub>3</sub>O<sub>8</sub>, 3 feet at 0.347% U<sub>3</sub>O<sub>8</sub>, 6 feet at 0.11% U<sub>3</sub>O<sub>8</sub>, and 11 feet at 0.09% U<sub>3</sub>O<sub>8</sub>. (RPA 2005)

Please note the following terminology is used in this report:

- 1. GT is the grade thickness product.
- 2. Grade is expressed as weight percent.
- 3.  $eU_3O_8$  means radiometric equivalent  $U_3O_8$ .

Mineral resource and reserve estimates for the Sheep Mountain Project are based on radiometric data. As discussed in Section 14 of this report, available data indicates that variations in radiometric equilibrium are local in their affect which impacts the mining grade control program but does not appreciably affect the overall mineral resources or reserves.



Figure 7.1 Geologic Map

### **Mineralization**

Mineralization is known to exist at numerous locations throughout the project. Mineral resource and reserve estimates in this report are limited to the Congo open pit area, the Sheep underground area, and the Sun Mc area for which mine plans have yet to be defined. Additional areas of know historic mineral resources are discussed but are not included in the mineral resource and reserve estimates.

### Congo Open Pit

The Congo Open Pit mineral resource and reserve estimates were based on data from 2,780 individual drill holes. While most of the drilling remains of a historical nature confirmatory drilling has been completed as follows;

- seventeen (17) drill holes in 2006,
- five (5) drill holes in 2009,
- sixty-two (62) drill holes in 2010, and
- seventy-three (73) drill holes in 2011.

A summary of mineralization reflected in the drill holes follows.

 Table 7.1 - Congo Drill Data

	Trace	>0.10 GT
# of Intercepts	12,070	9,455
Avg. Thickness (ft)	3.7	4.1
Avg. Grade (%U <sub>3</sub> O <sub>8</sub> )	0.133	0.148

Thus the Congo data set is composed of a total of 2,780 drill holes of which 107 are barren and the remaining 2,673 drill holes contain mineralization. Within the 2,673 mineralized drill holes, 12,070 individual intercepts were present. A portion of the historic data consisted of  $\frac{1}{2}$  foot data from the Century Geophysical Compulog<sup>tm</sup> system. For this data a minimum cutoff thickness and grade of 2 ft of 0.03% eU<sub>3</sub>O<sub>8</sub> was applied resulting in 2,673 composite intercepts.

The remaining 2,284 intercepts did not have  $\frac{1}{2}$  foot data but consisted of composite intercepts interpreted using the half amplitude convention for geophysical log interpretation. Log interpretation and intercepts from the historic database were spot checked especially with regard to higher grade mineralized intercepts. Correlation of the mineralized sand units was available from historic reports. This historic naming convention for the sand units was maintained. The following table summarizes the mineralized intercepts in the Congo database by sand unit.

Zone	# of Composite Intercepts	Avg. Depth to Bottom of Ore
41A	203	266
41	245	298
45	436	279
48	371	255
52	461	268
54/56	316	243
59	359	196
63	587	170
66	452	202
67	365	209
72	324	232
75	224	195
79	126	204
83	103	204
86	38	253
89	14	176
94	8	207
Total	4,632	189

 Table 7.2 - Congo Drill Hole Statistics

## Mineralization Thickness and Grade

Congo mineralized thickness ranges from 1 foot to over 19 feet. Average thickness varies with GT cutoff as follows. Grade varies from the minimum grade cutoff of  $0.1 \% eU_3O_8$  to a maximum reported grade of  $1.87 \% eU_3O_8$ .

Congo Pit	Mineralized
	>0.1 GT
Average Grade %eU <sub>3</sub> O <sub>8</sub>	0.148
Average Thickness	4.1

#### Sheep Underground

The Sheep Underground data set is composed of a total of 485 drill holes based on data from 483 historic drill holes and 2 confirmatory drill holes completed in 2006. Of those 485 drill holes only 33 were barren and 452 of the drill holes contained mineralization of at least 0.5 ft of 0.05%  $eU_3O_8$ . Within the 452 mineralized drill holes, 3,223 individual intercepts were present. Using the cutoff thickness and grade of 2 ft of 0.05%  $eU_3O_8$ , 552 composites diluted to a minimum thickness of 6 ft were created from the 3,223 individual intercepts were then correlated into one of the 17 different mineralized zones based on geologic interpretations. If the composite could not be correlated within a zone it was designated as isolated and its influence in subsequent mineral resource estimation limited. Data summaries follow.

Table 7.4 - Sheep Drill Data

	Trace >0.02 GT	>0.3 GT	>0.6 GT	>0.9 GT
# of Intercepts	3,223	708	315	165
Avg. Thickness (ft)	2.1	4.4	5.9	7.1
Avg. Grade (%U <sub>3</sub> O <sub>8</sub> )	0.115	0.21	0.257	0.301

## **Table 7.5 - Sheep Drill Hole Statistics**

Zone	# of Composite Intercepts	Avg. Depth to Bottom of Ore
1	6	758
2U	4	1,040
2L	13	878
3	23	838
4	47	1,010
5	38	1,039
6	35	1,016
7	38	997
8	47	1,038
9	47	957
10	38	1,151
11	38	1,173
12	27	1,214
13	31	1,313
14	28	1,349
15	16	1,354
16	8	1,252
Isolated	68	1,123
Total	552	1,089

Sheep Underground mineralized thickness ranges from 0.5 foot to over 26.5 feet. Grade varies from the minimum grade cutoff of  $0.05\% eU_3O_8$  to a maximum reported grade of  $2.19\% eU_3O_8$ . Average thickness varies with GT cutoff as follows.

<b>Table 7.6</b> -	Sheep	Mineralization	Average Thicknes	s and Grade
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	Zone 1		ne 1 Zone 2U		Zone 2L		Zone 3		Zone 4	
	THK	G	THK	G	THK	G	THK	G	THK	G
>0.3 GT	6.0	0.066	7.6	0.122	6.2	0.081	6.6	0.108	6.6	0.113
>0.6 GT	NA	NA	7.6	0.122	6.5	0.106	7.1	0.148	6.9	0.146
>0.9 GT	NA	NA	8.0	0.141	8.0	0.118	7.7	0.198	7.8	0.192

	Zone 5		Zo	Zone 6 Zor		ne 7	Zo	ne 8	Zo	Zone 9	
	THK	G	THK	G	THK	G	THK	G	THK	G	
>0.3 GT	8.1	0.142	7.3	0.155	8.3	0.180	7.0	0.101	7.4	0.161	
>0.6 GT	9.0	0.173	8.2	0.230	9.5	0.237	8.2	0.142	7.8	0.200	
>0.9 GT	10.4	0.204	8.9	0.275	10.1	0.260	11.5	0.180	8.4	0.256	
	Zor	ne 10	Zor	ne 11	Zor	Zone 12		ne 13	Zone 14		
	THK	G	THK	G	THK	G	THK	G	THK	G	
>0.3 GT	8.2	0.122	7.7	0.134	8.6	0.114	6.5	0.109	7.6	0.127	
>0.6 GT	9.7	0.157	8.6	0.175	10.3	0.144	7.0	0.176	8.2	0.151	
>0.9 GT	12.9	0.190	9.7	0.203	11.9	0.174	7.3	0.187	9.1	0.180	
	Zor	ne 15	Zor	ne 16	Isolated			1		1	
	THK	G	THK	G	THK	G					
>0.3 GT	7.0	0.124	7.4	0.128	6.4	0.100					
>0.6 GT	7.6	0.160	7.6	0.136	7.4	0.178					
>0.9 GT	9.5	0.223	10.3	0.193	7.6	0.241					

\*Average THK is diluted mineralized thickness in ft

\*\*Average G is diluted grade in % eU<sub>3</sub>O<sub>8</sub>

\*\*\*Cutoff thickness and grade of 2 ft of 0.15% e  $U_3O_8$  used and then diluted to 6 ft minimum

#### Width and Trend Length

Estimated trend width and length were based on the geologic model and actual mine workings as follows. The Sheep typical trend width is approximately 100 ft. The mine maps available for the Sheep area show development drifts, ready for extraction, with widths greater than 100 ft. In the limited areas where full extraction occurred, mined out rooms were 50 to 100 feet or in some cases wider. The Sheep trend length varies from a few hundred feet to a maximum length of about 5,500 feet based on correlation of geophysical logs.

#### **Additional Resource Areas**

#### Sun Mc Area

The Sun Mc Mineral Resource estimate contained herein was based on 704 historic drill holes. A summary of mineralization reflected in the drill holes follows. No confirmation drilling has been completed, however, the Sun Mc Area correlates with the Sheep Underground and the data available for both areas is similar in nature. The author thus concludes that the data for the Sun Mc Area is reliable for the purpose of estimating mineral resources. Data summaries follow.

 Table 7.7 - Sun Mc Drill Data

	Trace	>0.10 GT	>0.25 GT	>0.50 GT	>1.0 GT
# of Intercepts	1880	1608	887	430	133
Avg. Thickness (ft)	3.8	4.2	5.7	7.6	10.4
Avg. Grade (%U <sub>3</sub> O <sub>8</sub> )	0.392	0.446	0.677	1.027	1.774

Of the 704 drill holes, 181 are barren holes and 523 drill holes contain mineralization. Within the 521 mineralized drill holes, 1880 individual intercepts were present. A portion of the historic data consisted of  $\frac{1}{2}$  foot data from the Century Geophysical Compulog<sup>tm</sup> system. For this data a minimum cutoff thickness and grade of 2 ft of 0.03% eU<sub>3</sub>O<sub>8</sub> was applied. For drill holes without  $\frac{1}{2}$  foot data the original geophysical logs were interpreted using the half amplitude method. The historic database was spot checked especially with regard to higher grade mineralized intercepts using the half amplitude geophysical log interpretation method. Correlation of the mineralized sand units was available from historic reports. This historic naming convention for the sand units was maintained. The following table summarizes the mineralized intercepts in the Sun Mc database by sand unit.

Zone	<pre># of Composite intercepts</pre>	Avg. Depth to Bottom of Ore
DA	8	71
DB	49	108
DC	122	136
DD	149	141
DE	145	129
DF	184	129
DG	244	166
DHDI	223	210
DJDK	127	298
DLDM	69	373
DNDO	30	449
DPDQ	3	564
Total	1353	231

### Table 7.8 - Sun Mc Drill Hole Statistics

#### Other Resource Areas

Additional areas within the project area have known historic mineral resources. These include the Ravine, Golden Goose I, Golden Goose II, and McIntosh South Pit areas which were explored and/or developed by WNC and are included within the current Wyoming Mine Permit 381C. In addition, in the northern portions of the Project the Bev claims were once controlled and explored by Kerr McGee Corp (Refer to Figure 4.2, Claim Map). The Bev claims fall outside the current mine permit. Titan completed three drill holes on the Bev claims in 2011 under a Notice of Intent (NOI) for drilling. A summary of results follow.

Table 7.9 - 2011 Drilling Bev Claims

SC-1	
14-20'	trace
31-44'	13'/.057
SC-3	
255.5-259'	3.5'/.055
267-271.5	4'/.08
274-282'	8'/.104
284.5-285.5'	1'/.041
SC-5	
78-81'	trace
407-409'	trace
495-497	trace

No data and/or historic mineral resources from these areas of historic mineral resources have been included in either the mineral resource or mineral reserve calculations and summaries within this report.

## **SECTION 8: DEPOSIT TYPES**

Most of the ore in the Crooks Gap district occurs in roll-front deposits (NURE, 1982). Roll fronts have an erratic linear distribution but are usually concordant with the bedding. Deposits have been discovered from the surface down to a depth of 1,500 ft (Stephens, 1964). The two major ore minerals are uranophane and autunite. Exploration drilling indicates that the deeper roll-type deposits are concentrated in synclinal troughs in the lower Battle Spring Formation. Three possible sources for uranium have been suggested: post-Eocene tuffaceous sediments, leached Battle Spring arkoses, and Precambrian granites (Granite Mountains).

Structural controls of uranium occurrences along roll fronts include carbonaceous siltstone beds that provide a local reducing environment for precipitation of uranium-bearing minerals, and abrupt changes in permeability along faults, where impermeable gouge is in contact with permeable sandstones (Stephens, 1964). Uranium has also been localized along the edges of stream channels and at contacts with carbonaceous shales (NURE, 1982).

Further documentation of the type of mineralization can be found in the literature as with this historic photo of a uranium roll front in the Golden Goose Mine (Bailey, 1969).



Figure 8.1 – Uranium Roll Front in Golden Goose Mine
The author concurs with the forgoing summary as to the deposit type, based upon his site work and interpretation of drill data, as well as, site observations of exposures of alteration and mineralization in the McIntosh open pit and the Sheep decline. The following photo shows alteration in the rib of the Little Sheep decline with remnant uranium mineralization concentrated around a clast of carbonaceous clay near the center of the photo. This exposure is typical of the geochemical alteration which occurs within the altered zone in advance of roll fronts.

Figure 8.2 – Little Sheep Decline 2011



## **SECTION 9: EXPLORATION**

To the author's knowledge, no relevant exploration work other than drilling, as described in Section 10: Drilling, of this report has been conducted on the property in recent years. The Project is located within a brownfield site which has experienced past mine production and extensive exploration and development drilling. The initial discovery was based on aerial and ground radiometric surveys in the 1950's, but since that time exploratory work on the site has been primarily drilling.

During the National Uranium Resource Evaluation (NURE) program conducted by the US DOE in the late 1970's and early 1908's, the project area and vicinity were evaluated. This evaluation included aerial gamma, magnetic, and gravimetric surveys; soil and surface water geochemical surveys and sampling; and geologic studies and classification of environments favorable for uranium mineralization (NURE, 1982).

# **SECTION 10: DRILLING**

Data available for the preparation of this report included historic data developed by previous owners of the property and data from Titan's 2009, 2010, and 2011 drilling programs. Based upon the confirmatory drilling completed in 2005 (RPA, 2006) and 2009, 2010 and 2011 Titan drilling, the data used for the current mineral resource and reserve estimate is considered reliable.

### Historic Drilling

Drilling in the mineral resource areas investigated as part of this report includes approximately 4,000 drill holes, most of which were open-hole rotary drilling, reliant upon down-hole geophysical logging to determine equivalent uranium grade (%eU<sub>3</sub>O<sub>8</sub>). However, some core drilling for chemical analyses was also completed. The historic data available for this mineral resource evaluation is based upon drill and mine plan maps originally developed by Western Nuclear Corporation (WNC). The drill maps show hole locations at the surface and downhole drift, the thickness and radiometric grade of uranium measured in weight percent  $eU_3O_8$ , elevation to the bottom of mineralized intercept, collar elevation, and elevation of the bottom of the hole. Also available were half foot and composite intercept data in paper printouts from Western Nuclear's 1979 and 1980 preliminary feasibility study and geostatistical resource modeling. Original drill logs, both lithology and geophysical were available for the great majority of the drill holes and are currently located at BRS' office in Riverton, Wyoming. The author has training and experience in the interpretation of geophysical logging data for uranium and reviewed and/or interpreted the available original geophysical logs, as appropriate.

### Recent Drilling

Refer to Figure 10.1 – Congo Drill Hole Map and Figure 10.2 – Sheep Underground Drill Hole Map, for the locations of drill holes attributed to the Congo and Sheep Underground respectively.

In 2006, Uranium Power Corporation (UPC), now wholly owned by Titan, completed a drilling program consisting of 19 drill holes totaling 12,072 feet. Coring was attempted in one hole but recoveries were poor. Two of the 19 holes completed by UPC were located in Section 28 with the purpose of confirming mineralization within the Sheep Underground mine area. The remaining seventeen drill holes were completed in the planned Congo Pit area to test both shallow mineralization within the Congo Pit and to explore a deeper mineralized horizon, the 58 sand, which was shown in two historic drill holes. (RPA, 2006). RPA was present during the 2006 drilling program and concluded in their report of October 10, 2006 that drilling has confirmed the presence of mineralization with the shallow horizons in the Congo Pit area and has identified and extended roll front mineralization in the 58 sand along strike. Further, RPA concludes that drilling in the Sheep Mountain area (referred to herein as the Sheep underground) has validated the presence of mineralization at depth. Following the acquisition of UPC by Titan, and in consideration of both the recommendations included in RPA's 2006 report and indentified data needs for the continued development of the project, five holes were drilled in the Congo Pit in 2009 for a total of 1,700 feet. The five drill holes were planned and completed to serve multiple purposes including;

- > Additional verification of mineralization in the Congo Pit area;
- Determination of radiometric equilibrium conditions utilizing a direct comparison of the Uranium Spectrum Analysis Tool (USAT) and conventional gamma logging;
- > Collection of bulk samples of mineralized material for metallurgical testing; and
- Collection of bulk samples for characterization of overburden materials as required by State of Wyoming Department of Environmental Quality (WDEQ) regulations.

The goals of the 2009 drilling program were met. The drill holes were completed by rotary air drilling to depths exceeding 300 feet using a top drive rotary drilling rig. Drill cuttings were collected continuously during the drilling process, in two foot increments near anticipated mineralized horizons and in five foot increments for overburden sampling. Over 500 pounds of mineralized material for metallurgical testing was collected in addition to the collection of representative samples for overburden analysis and characterization in accordance with WDEQ guidelines. *In situ* mineral grades for 2009 drilling were determined by geophysical logging including both conventional gamma logging and the state-of-the art Uranium Spectrum Analysis Tool (USAT) (BRS, 2010). Each drill hole was first logged using a conventional logging tool which provided a suite of gamma ray, SP (Spontaneous Potential), resistivity, and deviation. The best mineralized zones were chosen for USAT logging. Both geophysical logging tools were provided commercially by Century Wireline Services.

In 2010 an additional 62 exploratory drill holes and 5 monitor wells were completed in the Congo Pit Area with the intention of defining the pit limits. All of the holes drilled encountered mineralization extending the pit limits, however, drilling extended mineralization and did not completely define the pit limits. Of the 62 drill holes completed in 2010 within the Congo Pit Area:

- ➤ 1 holes was lost
- ➢ 7 holes were barren
- > 54 holes exceeded a 0.1 GT at a minimum grade of 0.03 %  $eU_3O_8$  including;
- ➢ 51 exceeding a 0.25 GT
- $\succ$  37 exceeding a 0.50 GT; and
- ➢ 25 exceeding a 1.0 GT

In 2011 an additional 73 exploratory drill holes and 5 monitor wells were completed in the Congo Pit Area to define the pit limits and confirm mineralization and the absence of underground mining in select areas. These objectives were met and the pit limits and mineral reserves were expanded as detailed in this report. Of the 73 drill holes completed in 2010 within the Congo Pit Area:

- ➢ 17 holes were barren
- > 51 holes exceeded a 0.1 GT at a minimum grade of 0.03 %  $eU_3O_8$  including;
- ➢ 35 exceeding a 0.25 GT
- ➢ 20 exceeding a 0.50 GT; and
- ➢ 9 exceeding a 1.0 GT

#### Sun Mc Area

Figure 10.3 shows the historic drilling for the Sun Mc Areas. Available historic drill hole data for this area included 704 drill holes. The majority of the original geophysical logs were reviewed and verified, especially any high grade areas. No additional drilling has been completed in this area.





Figure 10.2 – Sheep Underground Drill Hole Map





## SECTION 11: SAMPLE PREPERATION, ANALYSES, AND SECURITY

The majority of the sample data available for the evaluation of resources for the Sheep Mountain Project is the historic geophysical log data. Titan has the complete hard copy data set which was passed through the chain of property title from Western Nuclear Corporation (WNC); through US Energy Crested Corporation (USECC); through the joint venture between UPC and Uranium One; and ultimately to Titan through its acquisition of UPC and acquisition of Uranium One's share of the property.

For the Congo Pit, Sheep Underground, and Sun Mc areas, the majority of the hard copy logs were reviewed both for data verification and for geologic interpretation. The majority of the Sheep Underground logs were also available as scanned images. In addition, the data includes an extensive collection of detailed mine and drill maps, both surface and underground. The underground maps show the extent of mining by date and include rib and longhole data. All pertinent maps with respect to mine design, extent of mining, drill maps, and mapping related to the mine permit have been scanned and rectified digitally. This data is stored at BRS' Riverton, Wyoming office

Mineral resource and reserve estimates for the Sheep Mountain Project are based on radiometric data. As discussed in Section 14 of this report, available data indicates that variations in radiometric equilibrium are local in their effect which impacts the mining grade control program but does not appreciably affect the overall mineral resources or reserves.

A discussion of historical data and drill data collected during the 2006 UPC drilling program is provided in the previous 43-101 mineral resource report completed by RPA in 2006.

With respect to the 2009 drilling program completed by Titan, drilling and sampling was observed by and/or completed by Titan and BRS personnel. Drill samples for overburden testing were sealed in plastic bags and are currently stored in an on-site warehouse facility. Drill samples for metallurgical testing were stored and sealed in new 5 gallon plastic buckets. Samples within the mineralized zones as determined by gamma and USAT logging were delivered to Lyntek's facility in Denver, Colorado for further assay and testing by BRS personnel. A chain of custody was established. Representative sample splits were prepared for chemical assay and were delivered to Energy Laboratories of Casper, Wyoming for assay utilizing standard protocol and adhering to a chain of custody. These assays were used in the selection of samples for metallurgical testing. In addition to the samples from the Congo Pit drilling, mineralized stockpiles from mine material at the Sheep I shaft was sampled, assayed, and utilized for metallurgical testing. Seven samples of the Sheep I stockpile were collected ranging in grade from 0.022 to 0.067 %U<sub>3</sub>O<sub>8</sub> and averaging 0.045 % U<sub>3</sub>O<sub>8</sub>. Bottle roll leach tests have been completed for composite samples selected to represent mineralization at both the Congo Pit and Sheep Underground. The remaining samples, with the exception of reserves sample splits, were utilized in the column leach testing for heap leach amenability.

No samples were collected during the 2010 drilling program. Drill cuttings were logged in the field. All holes were logged by a commercial geophysical logging company. Geophysical log data was provided in both hard copy and electronic format with the down-hole count data converted to  $\frac{1}{2}$  foot equivalent  $\frac{1}{2}$  foot equivalent for  $\frac{1}{2}$  foot equivalent

In 2011 both rotary and reverse circulation drilling was completed. Bulk samples from the reverse circulation drilling have been retained in sealed containers stored at the site for further metallurgical testing

In summary, the data utilized in this report is considered accurate and reliable for the purposes of completing a mineral resource and reserve estimate for the property.

# **SECTION 12: DATA VERIFICATION**

## <u>Congo</u>

Historic drill data for each drill hole consisting of radiometric data was posted on drill maps including collar elevation, elevation to the bottom of the mineralized intercept, thickness of mineralization, grade of mineralization, and elevation of the bottom of the hole. Half foot and composite intercept data in paper printouts were available from Western Nuclear's 1979 and 1980 Preliminary Feasibility Study geostatistical model. Data entry was checked and confirmed including a review of the original drill geophysical and lithologic logs. Drill hole locations were digitized from the drill maps to create a coordinate listing and then plotted. The resultant drill maps were then checked and confirmed by overlaying with the original maps.

Titan drilled 5 exploration holes for a total of 1700 feet in 2009. The purpose of this program was to take samples for overburden classification and also to take bulk mineralized samples for heap leach testing. Overburden samples were gathered every five feet down hole until water was added for lifting cuttings. The depth where the holes either started making water or water was added was approximately 330-360 feet. Sampling stopped at that point in each hole if it was drilled deep enough to encounter that zone. Bulk samples were gathered every 2 feet through known mineralized zones. The drill locations were picked by "twinning" historic drill holes.

The following table provides a comparison of the 2009 drilling to adjacent or twinned historic drill holes

Drill Hole	Twinned hole	Offset Distance	Results
Congo 1	S16-96	3'	Good correlation, marginally higher radiometric grades encountered
Congo 2	S16-291	3'	Good correlation, slightly lower radiometric grades in some zones with higher in others
Congo 3	GG1-36	24'	Radiometric zones correlated
	GG1-37	35'	Radiometric zones correlated
Congo 4	S16-253	24'	Acceptable correlation, slightly lower radiometric grades in some zones with higher in others
Congo 5	S16-146	21'	Good correlation, marginally higher radiometric grades encountered
	S16-147	28'	Acceptable correlation, slightly lower radiometric grades in some zones with higher in others

Table 12.1 - Comparison of 2009 Drilling to Historic Drilling

#### 2010 Drilling

In 2010 an additional 62 exploratory drill holes and 5 monitor wells were completed in the Congo Pit Area with the intention of defining the pit limits. All of the holes drilled encountered mineralization extending the pit limits, however, drilling extended mineralization and did not completely define the pit limits.

Of the 62 drill holes completed in 2010 within the Congo Pit Area:

- ➤ 1 holes was lost
- ➢ 7 holes were barren
- > 54 holes exceeded a 0.1 GT at a minimum grade of 0.03 %  $eU_3O_8$  including;
- ➢ 51 exceeding a 0.25 GT
- ➢ 37 exceeding a 0.50 GT; and
- ➢ 25 exceeding a 1.0 GT

The 2010 drilling confirmed and extended the mineralization as projected in the Congo Pit Area.

#### 2011 Drilling

In 2011 an additional 73 exploratory drill holes and 5 monitor wells were completed in the Congo Pit Area to define the pit limits and confirm mineralization and the absence of underground mining in select areas. These objectives were met and the pit limits and mineral reserves were expanded as detailed in this report. Of the 73 drill holes completed in 2010 within the Congo Pit Area:

- ▶ 17 holes were barren
- > 51 holes exceeded a 0.1 GT at a minimum grade of 0.03 %  $eU_3O_8$  including;
- ➢ 35 exceeding a 0.25 GT
- ➢ 20 exceeding a 0.50 GT; and
- ➢ 9 exceeding a 1.0 GT

The 2011 drilling confirmed and extended the mineralization as projected in the Congo Pit Area.

#### Sheep Underground

Historic drill data for each drill hole consisting of radiometric data was posted on drill maps including collar elevation, elevation to the bottom of the mineralized intercept, thickness of mineralization, grade of mineralization, and elevation of the bottom of the hole. Data entry was checked and confirmed including a review of the original drill geophysical and lithologic logs. Drill hole locations were digitized from the drill maps to create a coordinate listing and then plotted. The resultant drill maps were then checked and confirmed by overlaying the original maps.

Once the database had been developed and data entry confirmed, each mineralized intercept within an individual drill hole was evaluated on a hole by hole basis and combined into the corresponding zone to represent a probable mining thickness appropriate for underground mining methods (minimum 6 feet). This process eliminated some thin and/or isolated mineralized intercepts. The resultant data was then utilized to develop the Grade Thickness (GT) map, GT and T Contours. The GT map was then compared to mine plans available from previous feasibility studies to verify the data and geologic interpretation.

Uranium Power Corporation (UPC), now wholly owned by Titan, completed a confirmatory drilling program in 2006 consisting of 19 drill holes totaling 12,072 feet. Two of the 19 holes completed by UPC were located in Section 28 with the purpose of confirming mineralization within the Sheep underground mine area. RPA concluded that drilling in the Sheep Mountain area (referred to herein as the Sheep underground) has validated the presence of mineralization at depth (RPA, 2006).

#### **Density**

A unit weight of 16 cubic feet per ton or 2.439 tonnes/m<sup>3</sup>was assumed for all mineral resource and reserve calculations. This assumption was based on data from feasibility studies prepared by previous operators on the mining and production history of the mines within the Sheep Mountain Project but was not independently confirmed. Some previous estimates used a density of 15 cubic feet per ton. Use of 15 cubic feet per ton would increase the mineral resource estimates by approximately 6%. The use of 16 cubic feet per ton is recommended by the author as a conservative value.

# SECTION 13: MINERAL PROCESSING AND METALLURGICAL TESTING Historic Mineral Processing

Western Nuclear Corp. (WNC) processed feed from Sheep Mountain over a 30 year period from the early 1950's through the mid 1980's at their Split Rock Mill which was located north of Jeffery City along the haulage road to the Gas Hills. WNC also processed Gas Hills ores at its mill and operated a commercial heap leach in the Gas Hills, as did Union Carbide Corp. (UCC). Historical and published data indicates an acid consumption of 50 pounds per ton  $H_2SO_4$  and a loss for heap leaching of 0.008 %  $U_3O_8$ . The current test results are consistent with or better than historic experience with respect to recovery and acid consumption.

#### **Pre-Feasibility Metallurgical Studies**

In late-2009 drill cuttings were obtained from the Congo Pit during mineral resource validation drilling consisting of several wide spaced holes and from existing mineralized stockpiles left by US Energy near the Sheep I Shaft. Bottle roll leach tests were conducted using both acid and alkaline lixiviants. Acid leaching was preferred based on recovery and cost of lixiviant. In addition, the alkaline leach tests showed some swelling of clay minerals which could impede flow in the heap. Acid consumption was less than 20lbs/st with losses of  $0.009 \% U_3 O_8$  or less.

For the preliminary feasibility study (BRS, 2010) a constant residue, including soluble uranium losses, of  $0.010\% U_3O_8$  and a sulfuric acid consumption of 50 pounds per ton of mineralized material was used. This assumption was conservative with respect to the recent test work but representative of historic heap leaching experience with similar mineralized material. The soluble uranium loss in the rinsed heap residue and the impurity bleed to the evaporation pond will likely be on the order of 2 percent, suggesting a heap extraction of about 91.8 percent. This initial metallurgical work was followed up with large scale column leach studies.

#### **Column Leach Studies**

Titan commissioned three uranium recovery laboratory scale column leach studies to support the Sheep Mountain Project in mid-2010. Ore tested in the studies was derived from existing stockpiles left in the 1980's and "fresh" ore collected during current exploration drilling operations. The leach chemistry was selected based on industry experience and supported by the previous bottle roll tests to determine acid and oxidant consumption. A sulfuric acid, sodium chlorate lixiviate, was used in the column tests. The tests were conducted at the Inter-Mountain Laboratories, Inc.'s facility located in Sheridan, WY under the supervision of R.A. Garling of R & D Enterprises, Inc. Technical advice and support was provided by Lyntek, Inc., Doug Beahm of BRS, Inc., and Mr. Terry McNulty.

The first two columns were loaded with ore stockpile material which, due to 20 plus years of exposure, were believed to be fully oxidized. Two nearly identical columns were prepared containing 76 kg-dry of  $0.075\% U_3O_8$  ore. Columns were 6" diameter by 14' tall and contained a 12' ore charge. Initial acid/oxidant tests indicated that 1.4 lb/st H2SO4 with a sodium chlorate addition of 3 lb/st was sufficient to leach over 90% of the uranium present in a 24 hour period. Titan's consultants recommended maintaining a 10 g/L H2SO4 concentration above ore requirements. Given the low acid requirements, the

feed lixiviate selected was ~10 g/L H2SO4 with NaHClO3 added at a rate of 3 lb/s. Feed flow to the columns was 0.005 gpm/ft2. The columns were operated in down-flow mode to approximate typical heap leach conditions. During the 22 day leach period followed by a month+ rinse and drain phase, ~99.9% of available uranium was leached leaving tails of 0.0001%  $U_3O_8$ .

Subsequently, a third column study was conducted from November 12 through December 20, 2010. A single column was loaded with 80.5 kg of 0.104% U<sub>3</sub>O<sub>8</sub> ore derived from recent drilling programs on the Sheep property. The intent of the third test was to demonstrate the efficiency of the leach chemistry on unoxidized ore at a uranium grade approximately equivalent to the anticipated life of mine grade. Using the same lixiviate as columns 1 and 2 above, 97.5% of the available resource was extracted leaving tails of 0.0029% U<sub>3</sub>O<sub>8</sub>. Unlike the first test, in which over 95% of available uranium was extracted in the first pore volume (PV), the fresh ore represented a more traditional leach curve and required approximately PV to accomplish similar recoveries. Acid consumption rates on column 3 increased from the ~1.7 lb/st noted on C 1&2 to approximately 4 lb/st. No addition of sodium chlorate beyond the initial charge was required on any column to maintain the desired goal of +450 mv ORP.

In addition to the demonstration of uranium leach efficiency, the tests were designed to provide information pertinent to process plant design, heap configuration, and to support an NRC license application. Information detailing ore slump, pooling, and flow rates through the columns was collected. Data relating to future health physics (radiological and chemical) issues likely to be encountered in licensing activities were provided. The following table presents the test results for the three columns.

Column #	1	2	3
Specific Gravity (tested)	1.50 g/cm <sup>3</sup>	$1.36 \text{ g/cm}^3$	$1.46 \text{ g/cm}^3$
Ore % Moisture	8.5 %	8.5 %	4.3 %
Sulfuric Acid Consumed	1.68 lb/st	1.62 lb/st	3.90 lb/st
Lixiviate [H <sub>2</sub> SO <sub>4</sub> ]	10 g/L	10 g/L	10 g/L
Sodium Chlorate Addition Rate	3 lb/st	3 lb/st	3 lb/st
Ore Grade Assayed % U <sub>3</sub> O <sub>8</sub>	0.077%	0.077%	0.1039%
Tails Grade Assayed % U <sub>3</sub> O <sub>8</sub>	0.0001%	0.0001%	0.0029%
Tails % Moisture	13.7 %	14.7 %	17.0 %
Ore Grade % U <sub>3</sub> O <sub>8</sub>	0.0763%	0.0729%	0.1128%
% Uranium Recovery	99.87%	99.86%	97.47%

Table 13.1 – Summary of Column Leach Results

Key points with respect to project economics and operational efficiencies:

- The low acid consumption observed in the column leach studies, if experienced on a production scale would significantly reduce operating costs on a per pound basis. -The 2010 pre-feasibility study, completed prior to the column leach testing, made a conservative assumption, as discussed previously, of 50 pounds per ton consumption of sulfuric acid. Available data from all current leach tests shows a lower consumption of acid, less than 15 pounds per ton. For the current 2012 preliminary feasibility and cost estimation a conservative consumption of 30 pounds of sulfuric acid per ton, was used (BRS, 2012).
- The high recovery observed in the column leach studies, if experienced on a production scale, would significantly reduce operating costs on a per pound basis. Although available data shows higher recovery, a conservative recovery of 91.7%, based on the average grade and a constant residue, including soluble uranium losses, of 0.010% U<sub>3</sub>O<sub>8</sub>, was used in the current preliminary feasibility study (BRS, 2012).
- The relatively short leach cycles (2-3 pore volumes) and relatively high and consistent flow rates of lixiviant through the columns, if experienced on a production scale, will be favorable with respect to operating costs and efficiencies.
- The behavior of the material and geotechnical properties observed during the column leach testing indicate that the material can be placed directly on the leach pads without the use of a gravel drain layer resulting in lower capital costs.

Mineral processing and Heap Leach operations are discussed in SECTION 17: RECOVERY METHODS.

# **SECTION 14: MINERAL RESOURCE ESTIMATES**

The estimate of mineral resources for the Sheep Underground and the Sun Mc area are unchanged from the previous reports (BRS, 2011). With respect to the open pit area: mineral resources for the Congo, North Gap and South Congo areas were combined into a single comprehensive mineral resource model. Additional areas of known mineralization, based on historical data are known within the project area but have not been included in the mineral resource estimate at this time.

Mineral Resource Summary

The estimation of resources presented here is compliant with CIM standards for National Instrument 43-101 Mineral Resources and Mineral Reserves reporting. Based on the drill density, the apparent continuity of the mineralization along trends, geologic correlation and modeling of the deposit, a review of historic mining with respect to current resource projections, and verification drilling, the Mineral Resource estimate herein meets CIM criteria as an Indicated Mineral Resource. A summary of total mineral resource is provided in Table 14.1. A discussion of individual resource areas follows.

Sheep Underground	GT Cutoff	>0.30
	Pounds eU <sub>3</sub> O <sub>8</sub>	13,245,000
	Tons	5,640,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.117
Congo Pit Area	GT Cutoff	>0.10
	Pounds eU <sub>3</sub> O <sub>8</sub>	15,040,000
	Tons	6,176,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.122
Sun-Mc	GT Cutoff	>0.10
	Pounds e U <sub>3</sub> O <sub>8</sub>	2,000,000
	Tons	1,080,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.093
Total Indicated Mineral Resource	GT Cutoff	As Above
	Pounds e U <sub>3</sub> O <sub>8</sub>	30,285,000
	Tons	12,895,000
	Avg Grade % e U <sub>3</sub> O <sub>8</sub>	0.117

**Table 14.1 - Total Indicated Mineral Resources** 

\*numbers rounded

#### Congo Open Pit Mine

GT Cut-off	>0.10
lbs	15,040,000
Tons	6,176,000
Average Grade	0.122

**Table 14.2 - Congo Total Indicated Mineral Resources** 

\*numbers rounded

This estimate includes deletion of the portions of the mineral resource model which falls within the historic mine limits. Historic underground mining in the Congo Pit area is estimated to have removed some 25% of the total resource. Historic mining limits were imported into the resource model by individual sand horizons in three dimensions. The extent of mining was taken to be the actual mapped underground mine limit or the GT boundary representing the historical mining cutoff (8 feet @ 0.095 or a GT of 0.76), whichever was greatest. Although in many cases the mine maps showed remnant pillars, none of these areas were included in the mineral resource estimate. Thus, the estimate of current mineral resources is conservative with respect to the exclusion of areas affected by historic mining. Estimated mineral resources for potential open pit areas were diluted to a minimum mining thickness of two feet.

#### Sheep Underground Mine

The estimate of mineral resource for the Sheep Underground in unchanged from previous reports (BRS, 2011).

GT Cut-off	>0.30
lbs	13,245,000
Tons	5,640,000
Average Grade	0.117
Average Thickness	6.7

 Table 14.3 - Sheep Underground Total Indicated Mineral Resource

\*numbers rounded

This mineral resource accounts for the deletion of mined areas within our resource model estimated from surface drilling. The total reported mined tonnage from the Sheep I underground mine was 275,000 tons containing 522,500 pounds of  $U_3O_8$  and an average grade of 0.095 %  $U_3O_8$ . However, deleting only the resources which were within the mined area which corresponded with the current resource model, the total deletion from the total resource was only an estimated 62,618 tons of material containing 160,666 pounds of  $U_3O_8$  and an average grade of 0.128 %  $U_3O_8$ .

From review of the Sheep I and II as-built mine plans, it was apparent that little or no ore was mined at Sheep II and that only development work was completed. Further, it was apparent at the Sheep I mine that many of the mined areas were located by underground delineation drilling rather than by surface drilling. Based on the 3D model created from the as-built underground mine maps it was estimated the contained tons within the workings, using WNC's stated mine height of 8 feet and reported average grade of 0.095 % U<sub>3</sub>O<sub>8</sub>, represent 192,320 tons containing 365,408 pounds of U<sub>3</sub>O<sub>8</sub>. This estimate did not include the current resource model. The sum of the area mined within the resource model and the area mined outside the resource model thus represents a total of 526,074 pounds  $U_3O_8$ . This estimate from the as-built mine maps and current resource model closely approximates the reported production of 522,500 pounds  $U_3O_8$ .

#### Sun Mc Area

The estimate of mineral resources for the Sun Mac area in unchanged from the previous Technical Report (BRS, 2011). Resource estimates include deletion of the portions of the mineral resource model based on reported historic production records. Historic underground mining in the Sun Mc area is estimated to have removed some 10% of the total resource.

GT Cut-off	>0.10
lbs	2,000,000
Tons	1,080,000
Average Grade	0.093
Average Thickness	5.1

Table 14.4 - Sun Mc Total Indicated Mineral Resources

\*numbers rounded

### **Resource Calculation Methods**

#### Geologic Model

Geologic interpretation of the mineralized host sands was used, along with the intercepts that met the minimum cutoff grade and thickness, to develop a geologic model in which to estimate the mineral resources at the Sheep Mountain Project. The three-dimensional locations along the drill hole drift of all mineralized intercepts were plotted in AutoCAD <sup>TM</sup>. Each intercept was evaluated based on its geophysical log expression and location relative to adjacent intercepts. Whenever possible, geophysical logs were used to correlate and project intercepts between drill holes. Intercepts that met the minimum grade cutoff but were isolated above or below the host sand horizons; where data sets were incomplete; which did not fully penetrate the host sand were excluded from the mineralized envelope. The mineralized envelope was created by using the top and bottom of each intercept that was within the

geologic host sands. The intercepts that were used to make this envelope were then used in the resource estimate GT method.

Drill spacing within the Project is not uniform due in part to the steep and irregular surface terrain and in part to the somewhat random drift or deviation of the drill holes from vertical. Drill spacing in the Congo (open pit areas) range from roughly 50 foot centers to greater than 100 foot centers. Drill spacing at Sheep Underground area varies from roughly 200 foot centers to over 400 foot centers. Drilling depths at Congo are typically less than 400 feet in the northern portions of the area to generally over 600 feet to the south. Drilling depths at Sheep exceed 1,000 feet but are typically less than 1,500 feet. Drilling depths at Sun Mc are variable depending on terrain but are typically less than 1,000 feet.

In development of the initial geologic envelope, both surface drill data and data from underground mine maps was reviewed. For the Sheep Underground and other underground mines, such as the Seismic and Reserve mines adjacent and partially within the Congo Pit, the underground development and cross cut drifts were typically on 100 foot centers. Mining within the development drifts and cross cuts was completed by random room and pillar methods, extracting the mineralized material meeting the mine cutoff applicable at the time and leaving the lower grade material as pillars. In most cases entire 100x100 foot or larger blocks were mined and/or, in the case of the Sheep Underground, delineated by face sampling and longhole drilling but not yet mined. Previous mineral resource estimates, (RPA 2006), utilized a 2D block model with 150x150 foot block and an inverse distance algorithm to assign thickness and grade to the blocks.

The current geologic and resource model is a 3D model based on geologic interpretation of 18 mineralized zones in the Congo area and 17 mineralized zones in the Sheep area. Mineralized zones from Sheep were projectable down dip to the Sun Mc Area. The estimate of mineral resources and/or mineral reserves for the Sheep Underground Sun Mac area in unchanged from the previous Technical Report (BRS, 2011). For this report the North Gap, South Congo, and Congo mineralized zones as reported by BRS, 2011 were combined into a single unified mineral resource model.

Based on the former, once the data were separated by zone an initial area of influence of 50 feet (maximum 25 foot radius or 50 foot diameter) was applied to each drill hole by zone at its drifted location to establish an initial geologic limit to the projection of mineralization. Refinement of the geologic limit and projection of mineralization along trend was then based on specific correlation and interpretation of geophysical logs on a hole by hole basis. This interpretation was completed BRS staff and personally reviewed by the author of this technical report.

#### GT Contour Method

The mineral resource estimate was completed using the GT (Grade x Thickness) Contour Method on individual mineralized zones as defined in a full 3D geological model of the deposit. The Contour Method, also known as the Grade x Thickness (GT) method, is a well-established approach for estimating uranium resources and has been in use since the 1950's in the US. The technique is most useful in estimating tonnage and average grade of relatively planar bodies where lateral extent of the mineralized body is much greater than its thickness, as was observed in drilling of the Congo and Sheep deposits.

For tabular and roll front style deposits the GT method provides a clear illustration of the distribution of the thickness and average grade of uranium mineralization. The GT method is particularly applicable to the Congo and Sheep deposits as it can be effective in reducing the undue influence of high-grade or thick intersections as well as the effects of widely spaced, irregularly spaced, or clustered drill holes, all of

which occur to some degree in the Congo and Sheep deposits. This method also makes it possible for the geologist to fit the contour pattern to the geologic interpretation of the deposit.

The GT contour method is used as common practice for Mineral Reserve and Mineral Resource estimates for similar sandstone-hosted uranium projects ("Estimation of Mineral Resources and Mineral Reserves", adopted by CIM November 23, 2003, p 51.). It is the opinion of the author that the GT contour method, when properly constrained by geologic interpretation, provides an accurate estimation of contained pounds of uranium.

The current drill hole database consists of:

- Congo Open Pit Area
  - 2,780 drill holes in total; 2,673 mineralized, 107 barren
  - Includes recent drilling
    - 2009 5 drill holes
    - 2010 62 drill holes
    - 2011 73 drill holes
- Sheep Underground Area
  - 485 drill holes
  - Includes 2 holes completed in 2005
- Sun Mac Area
  - $\circ$  704 drill holes

The uranium quantities and grades are reported as equivalent  $U_3O_8$  ( $eU_3O_8$ ), as measured by downhole gamma logging. The industry standard protocol for reporting uranium in sandstone hosted deposits in the US has been validated for the Sheep Mountain Project by test drilling at the deposit, as well as by correlation with previous mining activities.

### Radiometric Equilibrium

In the fall of 2009, five rotary percussion holes were drilled on the property to study disequilibrium. Downhole logging of the drill holes was completed using standard gamma technology as well as a Uranium Spectral Analysis Tool (USAT), both supplied by Century Wireline of Tulsa OK. The USAT tool gives a direct measurement of uranium content and therefore allows determination of the equilibrium state of the uranium mineralization intersected in the hole. A total of 34 intervals were measured, showing an overall moderate positive disequilibrium (thus the true chemical grade of the mineralization is slightly higher than the equivalent grade determined by the gamma tool). The results of the resource estimates were not adjusted to account for this positive disequilibrium. Equilibrium data does show some local distribution of uranium values within mineralized zones. The ore control program recommended for this project will account for such variations.

Previous studies (RPA 2005 and 2006) also concluded that no adjustment for radiometric equilibrium was necessary.

#### Congo Pit

Refer to Appendix A1 – Congo Open Pit, for GT contour maps which show the mineral resource areas and the areas of historic mining for each individual sand.

The 2011 mineral resource estimate grouped sands for the North Gap and South Congo areas in to the five major sand units and calculated the amount of resource removed by historic mining based on a deduction from past production records, BRS, 2011. For the current report (BRS, 2012) the North Gap, South Congo, and Congo mineralized zones were combined into a single unified mineral resource model and deletions of resources related to past mining were determined from underground mine maps.

The current mineral resource model includes 18 separate sand units for all areas and includes deletion of the portions of the mineral resource model which falls within the historic mine limits determined from mine maps. Historic underground mining in the Congo Pit area is estimated to have removed some 25% of the total resource. Historic mining limits were imported into the resource model by individual sand horizons in three dimensions. The extent of mining was taken to be the actual mapped underground mine limit or the GT boundary representing the historical mining cutoff (8 feet @ 0.095 or a GT of 0.76), whichever was greatest. Although in many cases the mine maps showed remnant pillars, none of these areas were included in the mineral reserve estimate. Thus, the estimate of current mineral resources is conservative with respect to the exclusion of areas affected by historic mining. The difference between the 2011 estimate and the current estimate is a reduction of less than 1 % with respect to total pounds.

The Congo sum GT, diluted to a minimum 2 foot mining thickness from the mineralized envelope for each drill hole, was plotted in AutoCAD. If the thickness exceeded 2 feet, no dilution was added. The diluted thickness of mineralization for each drill hole was also plotted. Resource estimates include deletion of the portions of the mineral resource model which fall within the historic mine limits as previously discussed.

#### Sheep Underground

Refer to Appendix A2 – Sheep Underground, for GT contour maps which show, for each individual sand, the mineral resource areas and the areas of historic mining.

The GT, diluted to a minimum 6 foot mining thickness from the mineralized envelope for each drill hole and each horizon, was plotted in AutoCAD<sup>TM</sup>. If the thickness exceeded 6 feet no dilution was added. The diluted thickness of mineralization for each drill hole was also plotted. Mineral resource estimates account for the deletion of mined areas within the resource model estimated from surface drilling. The total reported mined tonnage from the Sheep I underground mine was 275,000 tons containing 522,500 pounds of  $U_3O_8$  and an average grade of 0.095 %  $U_3O_8$ . Deleting only the resources which were within the mined area and corresponded with the current resource model, the total deletion from the total resource was only an estimated 62,618 tons of material containing 160,666 pounds of  $U_3O_8$  and an average grade of 0.128 %  $U_3O_8$ . From review of the Sheep I and II as-built mine plans, it was apparent that little or no material was mined at Sheep II and that only development work was completed. Further, it was apparent at the Sheep I mine that many of the mined areas were located by underground delineation drilling rather than by surface drilling. Based on the 3D model created from the as-built underground mine maps, it was estimated the contained tons within the workings, using WNC's stated mine height of 8 feet and reported average grade of 0.095 %  $U_3O_8$ , as representing 192,320 tons containing 365,408 pounds of  $U_3O_8$ . The sum of the area mined within the resource model and the area mined outside the resource model thus represents a total of 526,074 pounds  $U_3O_8$ . This estimate from the as-built mine maps and current resource model closely approximates the reported production of 522,500 pounds  $U_3O_8$ . The mine history clearly shows that underground development drilling and sampling expanded the resource as compared to that which could be projected from the surface drilling alone.

For mine planning purposes, a three dimensional block model was created from the Sheep GT, geologic, and mineralized envelope models. The modeling utilized an automated routine that assigned the thickness of mineralization, GT, and mineralized elevation reflected by their respective contours, to the centroids of a uniform 25 foot by 25 foot grid. From the thickness and GT contours, average grade, mineralized and waste tonnages, and contained pounds was calculated and assigned to each block. Each 25'x25' block was then evaluated based on its grade and thickness for mine planning and scheduling.

#### Sun Mc Area

Refer to Appendix A3 – Sun Mc Area, for GT contour maps which show, for each individual sand, the mineral resource areas.

The Sun Mc sum GT, diluted to a minimum 2 foot mining thickness from the mineralized envelope for each drill hole, was plotted in AutoCAD<sup>TM</sup>. If the thickness exceeded 2 feet no dilution was added. The diluted thickness of mineralization for each drill hole was also plotted. Resource estimates include a reduction of estimated mineral resource based on reported past production. Historic underground mining in the Sun Mc area is estimated to have removed some 10% of the total resource. The estimate of mineral resources in the Sun Mac area in unchanged from the previous Technical Report, BRS, 2011.

# **SECTION 15: MINERAL RESERVE ESTIMATES**

### **Probable Mineral Reserves**

The estimate of mineral reserve for the Sheep Underground is unchanged from the previous reports (BRS, 2010 and 2011). With respect to the open pit mineral reserves, mineral resources for the Congo, North Gap, and South Congo areas were combined into a single comprehensive mineral resource model. Open pit mine designs and sequencing was completed for all areas, and the resultant mineral reserve estimate reflects the current open pit mine designs and economic evaluations.

The following Mineral Reserves are fully included in the total Mineral Resources reported in Section 14. The total Probable Mineral Reserve for the Sheep Mountain Project including both open pit and underground projected mining areas is tabulated below. This reserve estimate is compliant with CIM Definition Standards on Mineral Resources and Reserves.

	GT	Pounds %	Tong	Average Grade
	minimum	eU <sub>3</sub> O <sub>8</sub>	TONS	%eU <sub>3</sub> O <sub>8</sub>
Open Pit	0.10	9,117,000*	3,955,000*	0.115
Underground	0.45	9,248,000*	3,498,000*	0.132
Total		18,365,000*	7,453,000*	0.123

 Table 15.1 - Sheep Mountain Project Probable Mineral Reserve Summary

\*numbers rounded

## Congo Pit Conversion of Resources to Reserves

The following Probable Mineral Reserves are fully included in the total Indicated Mineral Resources for the Congo Pit and are not additive to that total. This estimate includes deletion of the portions of the mineral resource model which falls within the historic mine limits. Historic mining limits were imported into the resource model by individual sand horizons in three dimensions. The extent of mining was taken to be the actual mapped underground mine limit or the GT boundary representing the historical mining cutoff (7 feet @ 0.10 or a GT of 0.7), whichever was greatest. Although in many cases the mine maps showed remnant pillars, none of these areas were included in the mineral reserve estimate. Both the estimated mineral resources and mineral reserves were diluted to a minimum mining thickness of two feet. The reported Probable Mineral Reserve is that portion of the reported Indicated Mineral Resource that is within the current open pit design.

The cutoff grade of 0.05% eU<sub>3</sub>O<sub>8</sub> at a minimum mining height of 2 foot equates to a 0.10 GT cutoff. The following table summarizes the portion of the Congo Pit that is economically mineable and meets the open pit cutoff criteria.

Table 15.2 -	Congo Tot	al Probable	Mineral	Reserves	0.10	GT	Cutoff
1 abic 13.2	Congo I ou		ivinci ai	Iteser ves	0.10	<b>U</b> I	Cuton

GT minimum	Pounds % eU <sub>3</sub> O <sub>8</sub>	Tons	Average Grade %eU <sub>3</sub> O <sub>8</sub>
0.10	9,117,000	3,955,000	0.115

\*numbers rounded

Note that these figures are not additive in that the Probable Mineral Reserve is that portion of the Indicated Mineral Resources that is economic under current cost and pricing conditions.

### Sheep Underground Conversion of Resources to Reserves

The following Probable Mineral Reserves are fully included in the total Indicated Mineral Resources for the Sheep Underground. This estimate includes deletion of the portions of the mineral resource model which falls within the historic mine limits. Both the estimated mineral resources and mineral reserves were diluted to a minimum mining thickness of six feet. The reported Probable Mineral Reserve is that portion of the reported Indicated Mineral Resource that is within the current underground mine design.

The cutoff grade of  $0.05 \ \% eU_3O_8$  at a minimum mining height of 6 foot equals a 0.30 GT cutoff. The following table summarizes the portion of the Sheep I and II Underground Mine that is economically mineable and meets the cutoff criteria.

Table 15.3 - Sheep Underground Total Probable Mineral Reserves 0.45 GT Cutoff

GT minimum	Pounds % eU <sub>3</sub> O <sub>8</sub>	Tons	Average Grade %eU <sub>3</sub> O <sub>8</sub>
0.45	9,248,000	3,498,000	0.132

\*numbers rounded

Note that these figures are not additive in that the Probable Mineral Reserve is that portion of the Indicated Mineral Resource that is economic under current cost and pricing conditions.

## **Determination of Mine Cutoff Grade**

As the operating cost per ton varies substantially between the open pit and underground it is appropriate to have separate grade cutoff criteria for the two operations. The following table provides a calculation of breakeven cutoff grades for both the open pit and underground mines based on current cost forecasts and a sales price of \$65 per pound. The costs per ton reflect operating costs only and do not include capital write off. The calculation of breakeven cutoff grade allows for a constant tail or loss in the mineral processing of  $0.006 \ U_3O_8$ . Note that staff and support costs are included in the open pit mining costs. Incremental underground mining costs are solely related to underground mining and mineral processing costs.

#### Table 15.4 - Minimum Cutoff Grade

	Operating Cost \$/Ton	Breakeven Grade $U_3O_8$ @ \$65/lb Price	%
Open Pit Mine and Mineral Processing	\$23.87	0.024 % U <sub>3</sub> O <sub>8</sub>	
Underground Mine and Mineral Processing	\$ 52.24	0.046 % U <sub>3</sub> O <sub>8</sub>	

From this evaluation, and other factors such as minimum mining thickness, the mine design cutoffs were set above the minimum breakeven cutoff grades at;

- Open Pit
  - o Minimum 2 foot thickness
  - $\circ \quad \text{Minimum grade .05 \%} U_3O_8$
  - Minimum GT 0.10
- Underground
  - o Minimum 6 foot thickness
  - Minimum grade .075 %U<sub>3</sub>O<sub>8</sub>
  - Minimum GT 0.45

Based on these parameters, the average grade mined from a combined open pit and underground operation is estimated at  $0.123 \text{ e}\%\text{U}_3\text{O}_8$ . As mining proceeds, mineralized material encountered below the mine GT cutoff, which has to be excavated as part of the mine plan and would otherwise be disposed of as mine waste, could be salvaged at grades as low as the calculated breakeven grades of  $0.024 \% \text{U}_3\text{O}_8$  and  $0.046 \% \text{U}_3\text{O}_8$  for the open pit and underground mines, respectively. Without an increase in sales price or a decrease in operating costs, material salvaged at lesser grade would not be profitable. The mineral reserve as stated herein does not include the potential mineralized material, which may be salvaged, which meets the breakeven grade cutoff but is less than the design GT cutoff.

# **SECTION 16: MINING METHODS**

The Sheep Mountain Project includes the Congo Pit, a proposed open pit development, and the reopening of the existing Sheep Underground mine. Although alternatives were considered, the recommended uranium recovery method includes the processing of mined materials via an on-site heap leach facility as discussed in Section 17 of this report.

Figure 16.1 depicts the overall project. Mining will be completed by both underground and open pit methods as subsequently described. Mined product from the underground and open pit mine operations will be commingled at the stockpile site located near the underground portal and in close proximity to the pit. At the stockpile the mined product will be sized, if needed, blended, and then conveyed via a covered overland conveyor system to the heap leach pad where it will be stacked on a double lined pad for leaching. The primary lixiviant will be sulfuric acid. Concentrated leach solution will be collected by gravity in a double lined collection pond and then transferred to the mineral processing facility for extraction and drying. The final product produced will be a uranium oxide commonly referred to as yellowcake.





## Congo Open Pit

The current mine design for the Congo Pit includes typical highwall heights in the range of 100 to 400 feet, and reaches a maximum depth of 600 feet in localized areas in the southeast pit corner. The open pit design employs similar design parameters and mining equipment configurations to those used successfully in past Wyoming conventional mine operations. Highwall design is based upon the performance of past projects in the Sheep Mountain and Gas Hills districts, and includes an average highwall slope of 0.7:1, which reflects the average of a 10-foot bench width and 50-foot wall at a 0.5:1 slope.

As depicted in Figure 16.2., the open pit highwalls at the McIntosh pit, built to a similar design some 40 years ago, remain remarkably stable.

Figure 16.2 – Existing McIntosh Pit



Figure 16.3 displays the general mine sequence and annual limits of mining. Due to the nature and extent of mineralization, the Congo Pit is essentially a single open pit that will be developed sequentially to accommodate the desired mine production and allow for internal backfilling. This sequential schedule and internal backfilling reduces the amount of double-handling of mine waste material required to backfill and reclaim the mined pit during the life of the mine.

The host formation is exposed at the surface and dips between 9 and 16 degrees to the southeast. The initial pit construction will create access from the open pit mine area to the mine waste and stockpile areas. Subsequent pit extensions will utilize this access. Shallow mineralized areas exist along the north and northwest portions of the pit. As a result, the overall mine sequence begins in the areas where the mineralized zones have the least amount of cover and proceeds essentially along formational dip. The first 6 pits are constructed in a panel along the up dip portion of the deposit and are the shallowest. During this time, the out of pit mine spoils areas will be developed. Subsequent pits will be completed in successive panels proceeding down and along dip, i.e. pits 7 through 10; 11 through 13; and finally pits 14 and 15, which reach the greatest depths. Beginning with pit 7, the great majority of the mine waste will be sequentially backfilled in previous pits.

Detailed Open Pit Mine Sequence drawings follow as Figures 16.4 through 16.18 representing the open pit mining sequence for pits 1 through 15, respectively.

Figure 16.3 - Congo Pit Annual Pit Sequence



**Figure 16.4 – Pit 1** 



Figure 16.5 – Pit 2















**Figure 16.9 – Pit 6** 



Figure 16.10 – Pit 7



Figure 16.11 – Pit 8






Figure 16.13 – Pit 10























Existing underground mines will be encountered during open pit operations. Ground control for the underground mine areas that will be uncovered during the pit excavation will be conducted by the use of a crew including a medium sized excavator, a medium sized dozer, and oversight by a field engineer with access to the digital 3D modeling of the underground mines as completed from the historic underground mine mapping. The basic procedure for this process will be to locate shallow underground zones in the pit floor based upon the mine mapping, over-excavate and collapse the mine voids, and backfill the area prior to placing other mining equipment in the area. Assistance in location of the voids may be provided by in-pit drilling equipment and/or shallow seismic testing.

Based upon site relief in the Congo area, surface water inflow can be kept out of the pit by ditching around the highwall crest and day-lighting the runoff to offsite drainages. In addition to controlling surface water runoff, the ditching will serve as a safety berm to prevent access to the highwall. All offsite drainage will meet the requirements of the WYPDES permit, including appropriate sediment control measures. Excess groundwater inflow in the pit will be used as a part of the daily operation of the pit for dust control on haul roads or consumed at the processing facility. Current data indicates that ground water flow will average less than 150 gpm and will not be encountered until pit 6.

Equipment cycle times have been estimated for both stripping and mining using the specific haulage profiles shown on the open pit sequence maps, Figures 16.4 through 16.18. Based on these estimates, both the stripping and mining can be accomplished in a single 10-hour daily shift, 5 days per week. The proposed primary stripping fleet consists of three 637 CAT twin engine scrapers paired with three 631 CAT single engine scrapers in a push-pull configuration. Both stripping and mining equipment will be supported by dozers and motor graders. The nominal capacity of this configuration is capable of excavation and placement of over 5 million cubic yards of material on an annual basis. Mining will be completed in a selective manner with a 2 cubic-yard bucket on a medium-size excavator loading two 35 ton articulated mine haul trucks. The mining crew is projected to have excess annual capacity and will thus be responsible for handling the majority of the internal mine waste.

In-pit grade control will be a critical aspect of the project. This type of sandstone hosted uranium deposit may exhibit local variability in grade and thickness, and potentially variable radiometric equilibrium conditions. To address these conditions, minimize mine dilution, and maximize mine extraction: a tiered systematic grade control program is essential. The following narrative describes the tiered grade control program.

Tier 1, Radiometric Scanning: Field personnel equipped with calibrated hand-held gamma meters will be assigned to both the stripping and mining crews.

Tier 2, In-Pit Assay: A portable sample trailer equipped with a portable x-ray fluorescence (XRF) assay instrument, and appropriate sample preparation equipment will be located in the pit. Mine trucks will be sampled with an auger system; the samples prepped and assayed; and trucks will then be directed to deliver the material to the stockpile or mine waste area depending on the results of the assay.

Tier 3, Quality Control: As each mine truck is sampled and tested, the field assay sample rejects will be collected and separated by grade ranges. The daily pit samples will be blended and split to provide representative samples which will in turn be assayed at the plant laboratory. The plant lab will assay both solid and liquid samples and will be subject to an outside and/or third party quality control system.

## **Sheep Underground**

Sheep Mountain has operated as a conventional underground mine on three separate occasions under Permit to Mine No. 381C. The historic mining method was a modified room and pillar method using conventional techniques. Jacklegs were used to drill out the rounds and underground track haulage was used to transport the ore to Shaft No. 1.

The mining method proposed going forward is also a conventional method using a modified room and pillar method, but utilizing modern mining equipment such as jumbo drills and 7 cubic-yard scooptrams for haulage. A new double entry decline will be constructed starting at the Paydirt Pit and ending below the deposit. Haulage from the mine will be accomplished via a 36 inch conveyor within one of the double declines. The existing shafts will be used for ventilation purposes only, with exhaust fans mounted at both locations. If the existing borehole ventilation shafts can be rehabilitated, they will be used as intake shafts. The deposit is comprised of 16 mineralized zones with a total thickness of approximately 350 feet. The deposit will be mined primarily from bottom to top.

Sheep Underground mining method summary:

- Development drifts will utilize dual openings. 10 by 15 foot openings will be used for haulage, and 8 by 10 foot openings will be used for transportation and ventilation.
- Mining panels will utilize multiple entries depending on the width of the zone. Entries will be approximately 12 feet wide, minimum of 6 feet high and averaging 7 feet high.
- Crosscuts will be placed on 100 foot centers.
- Mining will be completed by advance and retreat methods.
- Advance mining is accomplished by driving approximately 12 by 7 feet drifts within zones meeting cutoff grade. Multiple drifts will be driven parallel to one another with crosscuts on 100 foot centers. The parallel drifts will be 27 feet apart on centerline.
- This will leave a pillar with a dimension of approximately 15 feet wide and 90 feet long. On retreat mining, these pillars are removed if they meet cutoff grade.
- Ventilation will be provided by two 500 HP exhaust fans at Sheep No. 1 Shaft and Sheep No. 2 Shaft assisted by multiple portable face fans. Ventilation requirements for this mine are approximately 220,000 cubic feet of air per minute. Fresh air must be directed across each of the working faces and through the drifts designed for personnel transport.
- Mine ventilation which meets standards for removal of diesel emissions will also provide adequate ventilation for radon gas given the anticipated mining grades.
- Blasting of the rock, both for development and mining, will be done by drilling 8 to 12 foot blast holes using jumbo drilling rigs and filling the blast holes with ANFO (Ammonium Nitrate and Fuel Oil).
- Haulage from the working faces to the haulage conveyor or to the loading chutes will utilize 7 cubic yard scooptrams which load, haul and dump mined product.
- Mined product will be hauled through development drifts directly to the decline or to two loading chutes to transport the mined product to the decline. The decline will be equipped with a 36 inch conveyor which will take the mined product and waste, when necessary, to the surface. Haulage drifts will be kept as level as practicable, not exceeding ten percent grades.
- The roof and sidewalls in the drifts, both mining and development, will be supported with rock bolts and wire mesh. A rock bolting machine which can drill holes both vertically and horizontally will place the rock bolts on approximately four foot centers as the drifts advance. There will be overlap of bolting and wire mesh between each round to ensure proper ground control coverage.

- Boreholes to construct loading chutes or to aid in ventilation will be drilled using raised boring methods.
- Waste rock, whenever possible, will be placed in mined out workings to minimize haulage of hauling the mined waste to the surface. When it is not possible, the waste will be taken to the surface where it will be stockpiled for final reclamation.
- Ground Support will, in addition to bolting and meshing, include:
  - In areas that do not have mineralized zones directly above them temporary support will be placed such as timbers or concrete cylinders, and the pillars will be removed allowing the roof to ultimately fail.
  - > In areas with ore pods directly overhead, the adjoining rooms will be backfilled using a cemented backfill. The backfill will be a combination of waste rock mixed with three and one half percent cement and three and one half percent fly ash. This backfill will exceed the strength of the native rock and prevent the roof from failing and diluting the ore pods above them.

The planned location of the new decline in relation to the existing workings is shown on Figure 16.19. This figure is also an index map for the annual underground mine sequence maps which follow. Figures 16.20 through 16.31 show the annual development and mining sequence for through eleven years of planned mining.

Figure 16.19 – Sheep Underground Location



Figure 16.20 – Sheep Underground Sequence



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Figure 16.21 – Sheep Underground Year 1

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Figure 16.22 –Sheep Underground Year 2

Z SHEEP 3.6 8胞 SHEEP MOUNTAIN MINES MINE PERMIT 381C JND YEAR 3 3.2 HE TOUS BR

Figure 16.23 –Sheep Underground Year 3

Z 名井 SHEEP MOUNTAIN MINES MINE PERMIT 381C 10-5 ŵ SHEEP-2 e IND YEAR 4 HE TOUN BR

Figure 16.24 – Sheep Underground Year 4



Figure 16.25 – Sheep Underground Year 5

Z 81 SHEEP MOUNTAIN MINES MINE PERMIT 381C Ē **GROUND YEAR 6 OND** HE TOURA τŔ. BR

Figure 16.26 – Sheep Underground Year 6



Figure 16.27 – Sheep Underground Year 7



Figure 16.28 – Sheep Underground Year 8

Z K SHEEP 8 SHEEP MOUNTAIN MINES MINE PERMIT 381C **GROUND YEAR 9 GN** 8 HE TOUR BR

Figure 16.29 – Sheep Underground Year 9

Z 81 SHEEP MOUNTAIN MINES MINE PERMIT 381C ó 4 **RGROUND YEAR 10** DND HE TOUNA BR

Figure 16.30 – Sheep Underground Year 10

Z K 8 SHEEP MOUNTAIN MINES MINE PERMIT 381C Ш -**RGROUND YEAR 11** DND HE TOUR BR

Figure 16.31 – Sheep Underground Year 11

## **SECTION 17: RECOVERY METHODS**

The planned uranium recovery method at the Sheep Mountain Project is conventional heap leaching which includes: the mobilization of uranium values into solution from the mined material stacked on the heap pad via acid leaching, delivery of uranium rich solutions to a recovery plant (mill), and concentration of the uranium to a saleable product via solvent extraction, and precipitation systems that will be capable of producing up to 2 million lbs  $U_3O_8$  annually. Annual uranium production as shown on Table 21.1 – Production Profile – Preferred Alternative, varies from as low as 366,000 pounds during start up to over 1.5 million pounds annually.

Uranium recovery at Sheep Mountain will include the following processes:

- stacking of mined material on the heap leach pad;
- application of leach solution;
- collection of pregnant leach solution (PLS);
- filtering of sand and fines from PLS;
- solvent extraction to concentrate and purify the extracted uranium;
- precipitation of uranium oxide, "yellowcake";
- washing, drying, packaging, storage and loading of yellowcake product;
- management of process solid and liquid waste and bleed streams; and,
- in-place reclamation of all 11e.(2) byproduct material in a double lined disposal cell, which will include the existing lined heap leach pad and the Raffinate and Collection Ponds.

The uranium recovery or "milling" process equipment will be housed in two buildings within the proposed mill boundary. All solvent extraction processing and equipment will be located within the SX Plant to isolate potential fire hazards associated with the organic solutions. Yellowcake processing, including precipitation, washing, drying, packaging, storage, and loading will be located within the Process Plant. Reagent storage and distribution systems will be located within or next to the process buildings.

Processing ('milling') begins as run-of-mine product is stacked on the double lined heap leach pad using covered belt conveyors and a covered radial arm stacking (RAS) belt conveyor as depicted on Figure 17.1 – Typical Heap Leach Schematic. The stacked mined material is leveled with low ground pressure equipment forming a "lift". A protective layer of gravel is place on top of the lift to mitigate fugitive dust and transport of radioparticulates from the heap. A drip irrigation system using conventional plastic piping is then installed on top of the completed lift, and the heap is ready for the application of leach solutions.



Figure 17.1 - Typical Heap Leach Schematic

Figure 17.2 – Overall Process Block Flow Diagram, depicts the general flow of solutions and uranium within the heap and recovery plant. The process begins with the pumping of the leach solution from the Raffinate Pond to the top of the heap where it is applied using drip emitters. The leach solution consists of water; an oxidizing agent, such as sodium chlorate, to convert the uranium to a soluble valence; and a complexing agent, sulfuric acid, to complex and solubilize the uranium. The result of the heap leaching process is a Pregnant Leach Solution (PLS) containing a mixture of uranyl trisulfate (UTS) and uranyl disulfate (UDS). PLS percolates through the stacked mined material via gravity drainage and is intercepted by the heap leach pad liner system and gathered into collection pipes, which drains by gravity into the Collection Pond. The PLS is then pumped from the Collection Pond into the Osolvent Extraction (SX) Plant where the PLS is filtered to remove suspended particulates, and the uranium is recovered using organic phase ionic exchange solutions. The resulting, uranium-depleted solution called barren leach solution or "raffinate," flows by gravity from the SX Plant to the Raffinate Pond. This raffinate solution is refortified with additional acid and oxidant and additional make-up water and is then pumped back to the heap in a continuous cycle. From the SX Plant, uranium-rich strip solution is sent to the Process Plant for precipitation of a yellow, solid uranium oxide known as 'yellowcake.' The precipitated yellowcake is then washed, dried, and packaged into sealed 55 gallon drums for shipment. Yellowcake is shipped via truck to an enrichment facility in regular shipments approximately once every two weeks.

Figure 17.2 - Overall Process Block Flow Diagram



To prevent buildup of undesirable ionic species in the circulating leach solution a bleed stream representing a small, specified portion of the total leach solution flow is removed from the circuit. The bleed stream is sent to the Holding Pond for storage and disposal. The bleed stream and other liquid wastes are disposed by evaporation in the Holding Pond or on spent portions of the heap leach pad.

The application, collection, stripping, and re-application of the leach solution is a continuous process. The mined material remains under leach throughout primary leaching, resting of the mined material between leach solution applications, secondary leaching, potential rinsing, and draindown. Only after the mined material is drained does it become a waste product under current regulatory definitions.

## Site Layout and Construction

The general site layout and construction requirements for the heap leach and processing facility are shown on Figure 17.3. The construction costs related to the heap leach and processing facility are included in the capital cost estimate.

The heap leach pad area is approximately 40 acres which is subdivided into four cells which can be loaded with up to four lifts of approximately 25 feet in height or a total of 100 feet. The stacking rate for individual lifts will depend on the variable mine production rates. Table 21.1 - Production Profile – Preferred Alternative shows the planned heap loading sequence which is graphically depicted on Figures 17.4 through 17.8 which show the operation of the heap by lift and year of operation.

Column leach testing; which simulates flow rates and uranium recovery from the heap and geotechnical testing of the leached material and its reactions, physical and chemical, with the liner; shows that it is possible to operate the heap leach up to four lifts or a final height of 100 feet. Production sequencing and cost estimation at his time have made the conservative assumption that active leaching should be limited to two lifts, rather than four, or 50 feet in height. To utilize the full capacity of the heap pad, leached material would be relocated within the pad area to allow successive leaching in no more than two vertical lifts. A description of this sequential process follows:

- Figure 17.4 McIntosh Heap Lift 1 Sequence, shows the completion of the first 25 foot lift in approximately 7 years based on the production profile for the preferred alternative.
- Lift 1 would be followed in succession by Lift 2, as depicted on Figure 17.5. Lift 2 would be completed early during year 11.
- Beginning late in year 10 the relocation of spent leach material from cell 1 would be relocated and placed on top of leached material in cell 3 as depicted in Figure 17.6. This would allow reuse of cell 1 to complete year 11 leaching.
- The relocation of spent leach material would continue such that cell 2 would be available for reuse in year 12.
- As depicted on Figure 17.7, leaching for year 13 and a portion of year 14 would be accomplished as a second lift over cells 1 and 2.
- As depicted on Figure 17.8, late in year 14 the spent material from year 13 would be relocated and placed on top of waste form previous years over cells 3 and 4.
- The relocation of spent leach material would continue in year 14 to accommodate the leaching of the final planned mine materials in years 15 and 16.

- During the relocation process of the leach material the material will be graded to its final configuration prior to capping, cover, and reclamation.
- The final spent heap configuration is shown on Figure 17.9, prior to placement of cap and cover.
- Once the spent heap is capped and covered. Final grading to nominal 6:1 reclamation slopes will then be completed to achieve long term stability requirements and the site will be covered with a combination of rock and/or vegetative cover. Refer to Figure 17.10.

Reclamation and decommissioning of the Sheep Mountain Project uranium recovery facility generally will consist of decommissioning the Process Plant, the SX Plant, ancillary facilities, and the Holding Pond, and placing the associated 11e.(2) byproduct material within the on-site disposal cell.(11e.(2) Byproduct material as defined in Section 11e.(2) of the NRC regulations is the tailings or wastes produced by the extraction or concentration of <u>uranium</u> or thorium from any ore processed primarily for its source material content.)The lined portions of the Collection Pond, Raffinate Pond, and heap leach pad will become the disposal cell for long-term isolation and stabilization of all liquid and solid 11e.(2) byproduct Material associated with the Proposed Action. The proposed NRC License Area and other areas potentially affected by licensed operations will be assessed and remediated to meet appropriate release criteria, and the disposal cell will be capped with an NRC approved cover to ensure compliance with the requirements of 10 CFR 40.

After the heap leach pad area has been completely filled and leaching, potential rinsing and potential treatment and subsequent drainage have been completed, spent heap materials, now tailings, will be graded to their final configuration. Any 11e.(2) byproduct material, including material from the plant decommissioning, liner from the Holding Pond, and any other 11e.(2) byproduct materials requiring disposal will be appropriately sized and placed within the lined disposal cell prior to completing the reclamation cover. The final cover will consist of a clay based radon barrier, a gravel/cobble capillary break, biointrusion and freeze/thaw protection layer, and a rip rap erosion protection layer. This final reclamation cover is designed to be a zero water balance cover using vegetation as a planned component of the cover water balance.

Costs for decommissioning and reclamation of the heap and mineral processing facilities are incorporated into the operating costs estimate, Section 21.

Figure 17.3 – Heap Leach Site Layout





Figure 17.4 – McIntosh Heap – Lift 1 Sequence



Figure 17.5 – McIntosh Heap – Lift 2 Sequence



Figure 17.6 – McIntosh Heap – Lift 2A Sequence

Figure 17.8



Figure 17.7 – McIntosh Heap – Lift 3 Sequence



Figure 17.8 – McIntosh Heap – Lift 4 Sequence

Figure 17.9 – Reconfigured Heap





Figure 17.10 – McIntosh Heap – Reclamation Cover
## **SECTION 18: PROJECT INFRASTRUCTURE**

## Mine Support, Infrastructure, and Access

Mine support facilities will consist of an office, mine shop and warehouse, and a dry facility. In consideration of the remoteness of the site and the potential for hazardous winter driving conditions, emergency stores of non-perishable food and water will be kept on-site along with portable cots should it be necessary for personnel to remain on-site during such conditions. Electric and natural gas service was provided to this site previously. Some upgrading and adaption of this infrastructure for the planned project has been completed. Ground water rights are held by Titan from a combination of various wells, the existing Sheep underground mine shafts, and the McIntosh pit. These sources of water will more than meet the consumptive needs for dust control, mineral processing and potable needs. The Sheep underground and McIntosh pit are considered as the primary source of process water. Beginning after year 7 the Congo pit will encounter ground water. This water will generally be consumed for dust control.

### Site Access and Infrastructure

Primary access roads and the majority of utility services are pre-existing. Right of Way applications for an overhead power line and mine dewatering pipe line utility corridor from the heap facility area (located on private land) to the Sheep I and Sheep II shafts have been approved, and the right of ways have been granted under BLM Grants WYW168211 and WYW168212. The main water supply pipeline for the plant will be located on private lands from either the McIntosh Pit or Sheep underground to the plant site. Refer to Figure 18.1, Existing Infrastructure Map.

## Public Safety and Facility Maintenance

Access to the site will be controlled by fencing where appropriate at the Mine Permit 381C boundary and internally at the Radiation Control boundary. Initial public access to the mine and heap leach facility will be controlled through a single entrance with a guard shack manned during operating hours and gated at all other times. The mine facility will be regulated by MSHA and the State Mine Inspectors Office. Any persons wishing to enter the facility will be required to complete safety training as required by regulations and be equipped with appropriate Personal Protective Equipment (PPE) depending on which areas they wish to enter.

The heap leach processing facility is internal to the mine permit and will be enclosed by additional fencing. As with the main entrance to the project, the entrance to the radiation control area will be protected by a guard shack manned during operating hours and gated at all other times. In addition to confirming safety training, all visitors accessing the radiation control area will be subject to radiometric scanning prior to entering the area and prior to leaving the area. All visitors and personnel will have to pass the scan out procedure prior to leaving the facility.

Fire and emergency services are available from Fremont County and Jeffery City. The site is registered with emergency services and emergency contact numbers are posted at the mine office.

Figure 18.1- Existing Infrastructure Map



## **SECTION 19: MARKET STUDIES AND CONTRACTS**

A long term uranium delivery price of \$65 per pound US is recommended as the base case for financial evaluations, based on the following. Monthly long term contract prices are posted by Cameco Corporation. The three year average given for long term uranium supply contract is \$64.40 per pound. Further Cameco forecasts rising uranium prices in the next few years.

	2008	2009	2010	2011	
Jan	\$95.00	\$69.50	\$61.00	\$71.50	
Feb	\$95.00	\$69.50	\$60.00	\$71.50	
Mar	\$95.00	\$69.50	\$59.00	\$70.00	
Apr	\$90.00	\$67.00	\$59.00	\$69.00	
May	\$87.50	\$65.00	\$59.00	\$68.00	
Jun	\$82.50	\$65.00	\$59.00	\$68.00	
Jul	\$80.00	\$65.00	\$60.00	\$68.00	
Aug	\$80.00	\$64.50	\$60.00	\$64.50	
Sep	\$75.00	\$64.50	\$61.00	\$63.50	
Oct	\$70.00	\$64.50	\$62.00	\$63.00	
Nov	\$70.00	\$61.00	\$65.00	\$62.50	
Dec	\$70.00	\$61.00	\$66.00	\$62.00	
	Average	\$65.50	\$60.92	\$66.79	\$64.40 ('09-'11)

(http://www.cameco.com/investors/uranium prices and spot price/)

Recently published information also forecasts rising uranium prices including "Uranium price may bounce back to \$75/lb in 2012" from <u>http://emetalprices.com/uranium-price-may-bounce-back-to-75lb-in-2012/</u> in which **David A. Talbot, Dundee Capital Markets Vice President and Senior Mining Analyst,** "sees very strong fundamentals, especially in the absence of substitutes for nuclear generation. Such a premise suggests that uranium use will rise with growing populations and needs." This article goes on to state, "We (Dundee Capital) forecast uranium prices of between \$65 and \$75/lb over the next couple of years, especially once the HEU (Highly Enriched Uranium) Agreement goes offline."

# SECTION 20: ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

Uranium mining at Sheep Mountain occurred from the mid-1950s through 1982, with only short periods of intermittent mining occurring since 1982. Both random room-and-pillar underground and open-pit surface mining methods were employed. In 1973, the State of Wyoming passed the Environmental Quality Act, which required mining operations to reclaim the land after conclusion of mining activity. A substantial amount of reclamation has since been performed at the property by mining companies and by the Wyoming Department of Environmental Quality's Abandoned Mine Land Division (WDEQ/AMLD). WDEQ/AML is responsible for reclaiming mining activities that predate the implementation of the 1973 Act. Because of the intensive mining that has occurred over the years, most of the property has experienced surface disturbance and mining related impacts.

The Sheep Mountain Project is situated on a mixture of private fee land with federal mineral rights, federal land and minerals administrated by the Bureau of Land Management (BLM), and State Trust lands with state-owned minerals administrated by the State of Wyoming, Department of Environmental Quality, Land Quality Division (WDEQ/LQD). The Sheep Mountain Project is permitted under an existing Mine Permit (381C), which is issued and administrated by the WDEQ/LQD. The original mine permit for the project was issued by the WDEQ Land Quality Division (WDEQ/LQD) in 1975 to Western Nuclear, Inc. The permit has been amended 5 times and remains active and in good standing. Initial environmental baseline studies for this Mine Permit were completed in the 1970s and early 1980s. Because of this mixture of land and mineral ownership and because the proposed mineral processing facility is licensed by the U.S. Nuclear Regulatory Commission (NRC), a number of state and federal agencies are involved in the permitting and licensing of this project. The WDEQ/LQD is the lead agency for the State, though other State agency approvals are necessary. The primary federal agencies involved include the BLM, NRC and U.S. Environmental Protection Agency (EPA). In addition, County approvals for construction are also required.

BLM and Wyoming have established a Memorandum of Understanding (MOU) that allows WDEQ/LQD to issue the Mine Permit for both State and BLM lands while the BLM administers the National Environmental Policy Act (NEPA) for activities and impacts to the federal lands based on a Plan of Operations (POO) prepared by the permitee. The BLM also comments on the mining, milling and reclamation activities proposed in the Mine Permit.

The planned mining operations are generally compatible with the existing Mine Permit. The only significant change in the Mine Permit will be the addition of an on-site mineral processing facility. This proposed mineral processing facility will consist of a heap leach operation and uranium processing facility that will produce a final product of yellow cake for shipment. The mineral processing facility will require a combined NRC Source Materials and Byproduct Materials License, which requires the submittal of an Environmental Report (ER), to support NRC's compliance with NEPA, and a Technical Report (TR). Once the ER and TR are accepted by the NRC, NRC will develop an Environmental Impact Statement (EIS) for the project. Formerly, a Source Materials License was held within the project limits for the Green Mountain Ion Exchange Facility (GMIX). This former license was terminated in the 1990s and the environmental obligations and liabilities associated with that license have been mitigated.

This section provides a summary of the environmental studies conducted at the site, the proposed operating plans, state and federal permitting requirements for the project, potential social or community relations requirements, and the proposed mine closure and reclamation plans. Although the permitting requirements for this project are substantial, the risk is relatively low as the project has strong local support and there are no identified environmental issues that would materially affect project permitting.

#### **Environmental Studies**

Initial environmental baseline studies for this Mine Permit were completed in the 1970s and early 1980s. Titan has conducted additional baseline studies from 2010 through the present time. Baseline studies include land use characterization, culture resource surveys, meteorology and air monitoring, geology, hydrology, soils, vegetation, wildlife, and radiology. These studies, which are summarized below, are being performed to the level of detail and quality typically required by state and federal agencies.

## Land Use

The Sheep Mountain Project is situated in steep terrain, ranging in elevation from 6,600 feet to 8,000 feet. Wildlife density and diversity is limited due to the sparse vegetation and lack of tree overstory over most of the property. The project is remote with only one residence located within 1.5 miles of the project boundary. Land use within the Mine Permit boundary is limited to the permitted mining and exploration activities, livestock grazing under BLM grazing leases and seasonal hunting. Livestock grazing and hunting access will be restricted within the Mine Permit boundary during the proposed project lifecycle. However, the area removed from hunting and grazing represents a minute fraction of the available hunting and grazing area within the region and is not anticipated to have a significant impact on either land use. No land use impacts outside the Mine Permit Boundary are anticipated.

### Cultural Resource Surveys

Cultural resource surveys were conducted on the land within the mine permit boundary. The scope for each of these studies was developed in consultation with BLM archeologists. No enrolled or eligible National Register of Historic Places (NRHP) cultural properties were found within the permit boundary. The closest NRHP eligible sites to the project are the Crooks Gap Stage Station and the Rawlins-to-Fort Washakie Road located outside the Mine Permit area. BLM has determined that visual setting is not a contributing factor to these NRHP sites. Therefore, the project is not expected to materially impact either of these NRHP sites.

#### Meteorology and Air Monitoring

The Sheep Mountain Project falls within the intermountain semi-desert weather province. Titan installed a 10-meter-tall meteorological station directly down-wind of the proposed mineral processing facility in August of 2010 and has operated this station continuously since that time in accordance with EPA and NRC guidance.

Titan has also installed nine air monitoring stations around the project area. These monitoring stations include high volume air samplers that collect radio-particulates, Track Etch cups that detect radon, and Threshold Limit Dosimeters (TLD) that record direct gamma radiation. The meteorological and air quality data will be used to support NRC licensing of the proposed mineral processing facility and air quality permitting with the State of Wyoming.

## <u>Geology</u>

The project sits within a southeast plunging synclinal fold with the Battle Springs Formation comprising the uppermost geologic unit. It is underlain sequentially by the Fort Union Formation and Cody Shale, which extend several thousand feet below the site. The ore reserves and resources are hosted by the Battle Springs Formation. The geologic conditions have been sufficiently characterized to support the proposed permitting activities.

## <u>Hydrology</u>

Surface water within the Mine Permit area is comprised of ephemeral drainages that flow only in response to snow melt and seasonal, high-intensity rainfall events. These ephemeral drainages drain to the west from Sheep Mountain into Crooks Creek, a locally perennial creek that flows south to north and is located approximately <sup>1</sup>/<sub>2</sub> mile west of the mine permit boundary. In addition, non-flowing surface water is present on the site in the un-reclaimed McIntosh Pit, and seasonally in permitted storm water retention structures. Both flowing and non-flowing surface water quality and quantity have been characterized through more than a year of regular sampling and flow gauging. Surface water sampling of the McIntosh Pit has been performed annually for more than a decade and the pit lake has exhibited relatively stable water quality.

Groundwater within the Mine Permit boundary exists within the synclinal fold of the Battle Spring Formation and Fort Union Formation and is bounded by the Cody Shale, which acts as a local aquiclude to vertical groundwater migration. Groundwater in the uppermost aquifer, hosted predominantly by the Battle Spring Formation, has been well characterized over more than 20 years spanning active mining and a long post-mining period. New monitoring wells have been installed in the areas proposed for mining and mineral processing. Collected groundwater quality data is representative of a full cycle of active mining and mine reclamation. The site's groundwater quality is considered Class III (Livestock/wildlife); no substantial changes to groundwater quality are anticipated from subsequent cycles of mining and reclamation.

#### Soils and Vegetation

Detailed soil and vegetation surveys were performed in 2010-2011 to update the 1980 data presented in the original Mine Permit. No Threatened and Endangered (T&E) plant species were encountered on the study area during the1980 field investigations or in the 2010-2011 surveys. One BLM-sensitive plant species, Pinus flexilus (Limber Pine) is present within the affected area as well as the control area. Any mitigation measures associated with this species are expected to be minimal. Two wetlands were located and mapped during the 2010-2011 surveys within the project area. However, they are located in the southeast corner of the project area near an unnamed pond where no surface disturbance is proposed. These wetlands are isolated and are likely non-jurisdictional.

## Wildlife

Wildlife surveys were performed in 2010 and 2011 to update the earlier studies presented in the existing Mine Permit. These studies include raptor surveys, Sage Grouse surveys, small and large mammal surveys, and fish surveys in local ponds. The proposed disturbances are outside the Sage Grouse Core Area designated by the State of Wyoming as well as crucial winter range for large game species. No T&E wildlife species were observed or are expected to occur within the permit area and no BLM sensitive species that warrant special attention were identified in site surveys. In summary, no wildlife management issues or conflicts have been identified that would preclude the proposed mining and milling activities.

## <u>Radiology</u>

Radiological surveys of the project area, as required by NRC Regulatory Guide 4.14, have been performed at the project site. This includes gamma radiation surveys, soil radium-226 concentration mapping, ambient gamma dose rate and radon monitoring, air radio-particulate monitoring, radon flux measurements, as well as soil and sediment, groundwater, surface water, vegetation, and animal tissue sampling (cattle and fish) for radionuclides. The radiological survey results reflect the elevated baseline conditions present at the site due to natural mineralization and previous mining disturbances. The radiological surveys have been conducted in accordance with the precision, accuracy and quality assurance guidelines recommended by the NRC.

## **Operating Plans**

The operating plans for the Congo Open Pit, Sheep Underground, and the heap leach and processing plant are described in detail in other sections of this report. Monitoring and reporting of air, ground water, surface water, reclamation and other mitigation measures will continue throughout the life of the project.

Health and safety at the mines will be primarily regulated through the Federal Mine Safety and Health Administration or MSHA. Sheep Mountain previously had a MSHA Mine Number designation which can be restored with submission of a current health and safety plan.

## **Permitting Requirements**

Permitting and licensing of the proposed mining and milling activities will involve county, state and federal agencies. Summaries of these permits and licenses follow.

## Fremont County

Construction permits for buildings and septic systems will be required by Fremont County. These permits applications will be developed and submitted once most substantive technical questions have been has been resolved with state and federal agencies. The County permits are not anticipated to present technical or time critical issues in the development of this project.

#### Wyoming Land Quality Division

An update to the existing Mine Permit (381C) is being developed and will be submitted to the WDEQ/LQD in mid-2012. Titan has had productive meetings with WDEQ in which WDEQ staff have been briefed on the proposed updates to the Mine Permit. It is anticipated that approval of this update to the Mine Permit will be ready in advance of the BLM completing its NEPA process. Under the MOU with BLM, WDEQ will formally approve the Mine Permit update after formal concurrence by BLM.

### Wyoming Abandoned Mine Land Division

The WDEQ/AMLD program does not administer any licenses or permits directly related to the Sheep Mountain Project mining or milling activities. However, the AMLD program has established a budget for reclamation of the McIntosh Pit in the most recent Wyoming State legislature session for program implementation in 2013. The reclamation of the McIntosh Pit, located directly south of the proposed mineral processing facility, provides for backfill of the pit lake. This will benefit the project, as it will facilitate future closure of the proposed mineral processing facility. Backfilling of the McIntosh Pit is also expected to modify the local groundwater hydrologic regime; however, monitoring wells are in place to quantify any changes that may take place. Accordingly, the AMLD activities are not anticipated to have a significant effect on the proposed Sheep Mountain Project mining and milling activities.

### Wyoming Air Quality Division

The Wyoming Air Quality Division (WAQD) administers the provisions of the Clean Air Act as delegated to the state by EPA Region VIII. Titan has initiated discussions with the WAQD and EPA regarding application of an air permit for the Sheep Mountain Project. The substance of these discussions indicates the Sheep Mountain Project will likely be considered a minor source under the State Air Quality Regulations. The existing baseline air quality and meteorological data discussed in Section 20.1.3 will be used in conjunction with calculated air emissions to develop the air permit application. Development of this application has been initiated and WAQD approval is anticipated in advance of the NRC approval of the combined Source and Byproduct Materials License.

#### Wyoming Water Quality Division

Discharges to surface water, if needed as part of the mine dewatering and mine water management program, are permitted by the State of Wyoming under authority delegated by EPA Region VIII for the National Pollution Discharge Elimination System (NPDES) program. Currently, water produced from mine dewatering is expected to be 100-percent consumed for mineral processing and dust suppression. A WPDES permits application may be developed at a later date should the dewatering of the deeper underground levels produce more water than can be consumed by the mining and processing operations.

#### Wyoming State Engineers Office

The Wyoming State Engineers Office (SEO) is responsible for permitting of wells and impoundments, and issuance and modification to water rights. An application to relocate the point of withdrawal for

Titan's existing water rights will be developed and submitted to the Wyoming SEO for mine dewatering. In addition, future monitoring wells and impoundments will be permitted with the SEO once the NRC combined Source and Byproduct Materials License application has passed completeness review and most substantive technical questions have been has been resolved. Approvals of the SEO permits are not anticipated to be time-critical approvals.

## U.S. Bureau of Land Management

The BLM is currently preparing an EIS based on the POO submitted by Titan on June 16, 2011, as amended. BLM has deemed the POO "complete", has held public scoping meetings, and is developing a Draft EIS for public comment. Titan continues to work closely with the BLM and anticipates that the BLM's review process under the National Environmental Policy Act (NEPA) will be concluded in advance of NRC's license approval, discussed below. BLM elected to develop its own EIS, separate from the NRC's EIS and NEPA process.

### U.S. Nuclear Regulatory Commission

Titan has held quarterly meetings with NRC to keep them apprised of the license application development since 2010. The NRC performed a three-day pre-application audit of Titan's draft ER and TR in October 2011 and has provided comments to Titan. Titan is in the process of incorporating NRC's comments and suggestions and completing these two documents, which will support NRC's development of their EIS and approval of the license application. The NRC license is the critical path approval requiring the longest time frame. Typical approval times for similar applications have averaged between 2 and 2.5 years. Titan anticipates submittal of this application in third quarter, 2012.

## U.S. Environmental Protection Agency

The EPA oversees compliance with 40 CFR Part 61 Subparts b (underground mine venting of radon) and subpart w (radon emissions from tailings). Prior to initiation of underground mine operations, Titan will submit construction plans to the EPA in which underground mine ventilation radon emissions will be modeled to demonstrate compliance with the requirements of Part 61, Subpart b. During underground operations, routine monitoring and annual modeling will be performed to verify regulatory compliance. The existing site air quality and meteorological data will be used to support these modeling efforts.

The project design currently includes control measures to minimize radon flux from the heap leach facility. Titan is anticipating that the EPA will issue draft changes to the Part 61 subpart w regulations in April 2012 that may include new regulations pertaining specifically to minimizing radon emissions from uranium heap leach operations. Titan will review these proposed rules when they become available and, if necessary, modify its heap leach facility plans to comply with the proposed regulations.

## **Social and Community Relations**

The surrounding communities have a long history of working with and for the region's mining and mineral resource industry; and, their support for this project has been strong. No substantive negative comments were identified during the four BLM public scoping meetings held in 2011 and Titan has a good working relationship with many of the local land owners and ranchers. Much of the project's local support is economically driven, as the project is expected to create more than 200 jobs over the approximately 20-year project life cycle and generate over \$58 million dollars in local and state taxes and royalties.

## **Closure and Reclamation Plans**

The land encompassing the project area is currently used for livestock grazing, wildlife habitat, and recreation (primarily hunting). The reclamation plan will return the areas disturbed by the project to the same pre-mining uses, except for the approximately 100-acre, byproduct-material disposal cell that will be transferred to the US Department of Energy (DOE) for long-term stewardship. Reclamation bonds will be in place prior to startup for both the mining and processing areas of the project in accordance with state and federal requirements.

#### Congo Pit and Sheep Underground

Mine overburden and waste rock from the Congo Pit will be used to backfill the pit in a phased manner over the life of the open pit. Initially, the waste will be removed from the pit and stockpiled in areas adjacent to the pit limits. As the pit deepens to the south, concurrent backfilling will be performed with waste placed in the mined out portions of the pit. Backfilling will be performed in a selective manner so that the more mineralized and radioactive material is covered with less mineralized subsoils and topsoil. The proposed plan is to backfill the pit to approximate original contours, returning the ground surface to essentially the pre-mining topographic contours. Selective backfilling will remove and isolate much of the naturally occurring radioactive materials left in the mine area from historical activities. The reclaimed Paydirt Pit will also be partially backfilled to create a flow-through drainage system, as opposed to the current closed drainage.

Underground operations will result in some additional waste rock being added to the open-pit overburden piles, construction of vent shafts and declines, and the installation of additional mine buildings. At the conclusion of underground operations, the mine openings will be sealed, mine buildings demolished, and waste piles used as backfill or reclaimed. The proposed reclamation plan for the open-pit and underground mining portion of the Sheep Mountain Project will provide for greater land restoration than is currently required under the existing Mine Permit.

#### Heap Leach and Processing Plant

Solid and liquid wastes from the processing of uranium ores will be managed on site. Upon closure, liquid wastes will either be a) stabilized and placed in the spent heap leach pad or b) evaporated on the heap leach pad surface prior to closure. Process buildings and equipment that cannot be released from the site, will be decommissioned, sized and placed in the spent heap according to NRC guidance. The heap leach pad and associated ponds will then be encapsulated within an engineered cover that is designed to minimize radon emissions and water infiltration. The disposal cell will then be monitored until the site meets DOE's requirements for long-term stewardship.As one of the major environmental permits, the Wyoming Permit to Mine, is already in place and there has previously been a facility at this site licensed by the NRC, there is limited risk with regard to permitting of the operations.

## **SECTION 21: CAPITAL AND OPERATING COSTS**

Project cost estimates are based on a conventional open pit and underground mine operation with on-site processing via a heap leach facility. Operating (OPEX) and Capital (CAPEX) costs reflect a full and complete operating cost going forward including all pre-production costs, permitting costs, mine and mineral processing costs through the production of yellowcake, and compete reclamation and closure costs for of the mine and mill. CAPEX does not include sunk costs or acquisition costs. Three major alternatives were considered for detailed financial evaluation including;

- Alternative 1: Open pit and underground mine development with concurrent start of mining.
- **Preferred Alternative Alternative 2**: Open pit and underground mine development with concurrent end of mining.
- Alternative 3: Open pit mine development only.

In all cases the estimates are based on proven approaches and technologies and conservative assumptions were employed. A summary of key assumptions follows.

- CAPEX Estimates
  - Open Pit Equipment; 15% contingency added to current vendor quotations for all major equipment.
  - Underground Equipment; 15-30% added depending on nature of current quotations.
  - Mineral Processing and Heap Leach Facility; 25% contingency added to all items.
- OPEX Estimates
  - Open Pit; all new equipment, 85 % availability, 90 % utilization, and an overall 8% contingency applied to all costs.
  - Underground mine; 90 % utilization and an overall 8% contingency applied to all costs.
  - Mineral Processing and Heap Leach Facility; 8% contingency added to all items.
- Heap recovery assumed a  $0.01 \ \% U_3 O_8$  loss.
  - $\circ$  Current column leach tests showed solid losses of 0.002 %U<sub>3</sub>O<sub>8</sub> or less.
  - The 0.01 %U<sub>3</sub>O<sub>8</sub> loss used in this study reflects a conservative 0.008 %U<sub>3</sub>O<sub>8</sub> solid loss and a liquid loss of 0.002 %U<sub>3</sub>O<sub>8</sub>. For the life of mine grade, average 91.7% recovery.
  - A loss of  $0.01 \ \text{\%U}_3\text{O}_8$  was achieved in the earliest developmental heap leach facilities in the Gas Hills (Woolery, 1978). Higher recoveries were achieved in subsequent heaps.
- Heap acid consumption was based on 30 lbs of sulfuric acid per ton of mineralized material.
  - Current metallurgical testing shows an acid consumption of less than 15 pounds of sulfuric acid per ton of mineralized material.
- Open Pit Mine reclamation costs account for backfill to original contours.
  - Wyoming regulations do not require complete backfill but return to "equal or better use". Regulations can be met with less complete backfill; however, the total backfill plan is conservative and can be readily permitted.

## **Production Profile**

Table 21.1 provides the planned production profile for the preferred alternative. Production varies from a low of 180,000 tons processed with 366,000 pounds of uranium produced per year during the start of operations of the open pit and heap leach, to a high of 660,000 tons per year processed with approximately 1,500,000 pounds of uranium produced per year at peak production with both the open pit and underground mines in operation. On average the open pit produces 264,000 tons per year containing 608,000 pounds of uranium. Similarly the underground produces an average of 318,000 tons per year containing 841,000 pounds of uranium. Average production from the heap leach and processing facility is estimated to be 1,224,000 pounds of uranium per year.

Congo Pit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15	Yr 16	Total
Tons	280	149	131	301	326	325	293	368	207	348	203	239	344	292	149		3,955
Pounds	603	341	694	665	567	660	506	909	539	647	399	523	677	753	637		9,118
Grade % U <sub>3</sub> O <sub>8</sub>	0.108	0.114	0.265	0.110	0.087	0.102	0.086	0.123	0.130	0.093	0.099	0.109	0.098	0.129	0.213		0.115
CY Interburden	165	88	77	178	192	192	173	217	122	205	120	141	203	172	88		2,334
CY Waste	4,331	4,601	4,713	5,069	6,010	4,642	3,980	4,820	5,330	4,546	5,020	5,037	5,169	5,666	4,667		73,601
Sheep UG																	
Tons					100	223	431	386	367	351	386	315	299	416	224		3,498
Pounds					300	600	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	348		9,248
Grade % U <sub>3</sub> O <sub>8</sub>					0.151	0.134	0.116	0.130	0.136	0.142	0.130	0.159	0.167	0.120	0.077		0.132
Waste Tons				200	90	162	144	189	208	224	189	260	276	159	75		2,176
Heap Leach																	
Total Tons	280	149	131	301	425	548	724	754	574	699	588	554	643	709	374		7,453
Total Pounds	603	341	694	665	867	1,260	1,506	1,909	1,539	1,647	1,399	1,523	1,677	1,753	984		18,365
Grade % U <sub>3</sub> O <sub>8</sub>	0.108	0.114	0.265	0.110	0.102	0.115	0.104	0.127	0.134	0.118	0.119	0.137	0.130	0.124	0.132		0.123
Tons Processed	180	180	180	300	360	600	660	660	660	660	660	600	600	600	480	73	7,453
Pounds	388	402	763	700	739	1,359	1,378	1,636	1,736	1,579	1,572	1,623	1,568	1,492	1,241	189	18,365
Feed Grade	0.108	0.112	0.212	0.117	0.103	0.113	0.104	0.124	0.132	0.120	0.119	0.135	0.131	0.124	0.129	0.129	0.123
Recovery	0.944	0.946	0.972	0.949	0.942	0.947	0.943	0.952	0.954	0.950	0.950	0.956	0.954	0.952	0.954	0.954	0.951
Lbs U <sub>3</sub> O <sub>8</sub>	366	381	741	664	695	1,287	1,299	1,557	1,657	1,500	1,493	1,551	1,496	1,420	1,184	181	17,471

(All tons and pound x 1,000)

## CAPITAL COSTS

Capital cost summaries follow for the three alternative development schedules. Capital costs estimates are for forward costs only and do not include any sunk or acquisition costs. In addition, while the capital cost estimates include initial warehouse and materials inventories, working capital is not included.

- Alternative 1: Open pit and underground mine development with concurrent start of mining.
- **Preferred Alternative Alternative 2**: Open pit and underground mine development with concurrent end of mining.
- Alternative 3: Open pit mine development only.

		(All	costs current of	dollars x 1,000)
Capital Expenditures:	Contingency	Initial Capital	Years 2-20	Life of Mine
Permitting (NRC, BLM, and				
WDEQ)		\$ 4,328		\$ 4,328
Pre-Development Mine Design		\$ 1,200		\$ 1,200
OP Mine Equipment	15%	\$ 14,301		\$ 14,301
UG Mine Equipment	15-30%	\$ 48,601	\$ 13,000	\$ 61,601
Office, Shop, Dry, and support	15%	\$ 3,166		\$ 3,166
Mineral Processing	25%	\$ 37,803		\$ 37,803
TOTAL CAPITAL				
EXPENDITURES		\$ 109,399	\$ 13,000	\$ 122,399
COST PER POUND				
RECOVERED				\$7.01

## Table 21.2 - Capital Cost Summary Alternative 1; Open Pit and Underground Concurrent Start (All costs current dollars x 1,000)

## Table 21.3 - Capital Cost Summary Alternative 2 (Preferred); Open Pit and Underground Concurrent End of Mining

Alternative 2 is the Preferred Alternative. Capital cost for Alternative 2, open pit and underground with a concurrent end of mining are the same as for Alternative 1, except the underground mine capital investment is delayed for 4 to 5 years. Although the total dollar amount is the same, delaying this portion of the capital investment has distinct advantages.

	(All costs current dollars x 1,000)							
Capital Expenditures:	Contingency	Initial Capital	Years 2-20	Life of Mine				
Permitting (NRC, BLM, and								
WDEQ)		\$ 4,328		\$ 4,328				
Pre-Development Mine Design		\$ 1,200		\$ 1,200				
OP Mine Equipment	15%	\$ 14,301		\$ 14,301				
UG Mine Equipment	15-30%		\$ 61,601	\$ 61,601				
Office, Shop, Dry, and support	15%	\$ 3,166		\$ 3,166				
Mineral Processing	25%	\$ 37,803		\$ 37,803				
TOTAL CAPITAL								
EXPENDITURES		\$ 60,798	\$ 61,601	\$ 122,399				
COST PER POUND								
RECOVERED				\$7.01				

## Table 21.4 - Capital Cost Summary Alternative 3; Open Pit Only

Capital costs for Alternative 3, open pit only, are greatly reduced in comparison to alternatives 1 and 2 as follows. The initial and life of mine capital estimates for Alternative 3 are unchanged as major equipment and replacement and repair is included in the OPEX for the surface mine equipment and mineral processing facility.

Capital Expenditures:	Contingency	Initial Capital	Years 2-20	Life of Mine
Permitting (NRC, BLM, and				
WDEQ)		\$ 4,328		\$ 4,328
Pre-Development Mine Design		\$ 1,200		\$ 1,200
OP Mine Equipment	15%	\$ 14,301		\$ 14,301
Office, Shop, Dry, and support	15%	\$ 3,166		
Mineral Processing	25%	\$ 37,803		\$ 3,166
				\$ 37,803
TOTAL CAPITAL				
EXPENDITURES		\$ 60,798		\$ 60,798
COST PER POUND				
RECOVERED				\$7.03

## **OPERATING COSTS**

Operating cost estimates are based on a conventional open pit and underground mine operation with onsite processing via a heap leach facility. Operating (OPEX) costs reflect a full and complete operation including all mine and mineral processing costs through the production of yellowcake and through final reclamation. In all cases the estimates are based on proven approaches and technologies. Refer to Tables 21.5 and 21.6 for open pit with underground and for open pit only, respectively.

Operating cost estimates were based on vendor quotations, published mine costing data, and contractor quotations. Such estimates were generally provided for budgetary purposes and where considered valid at the time the quotations were provided. In all cases, appropriate suppliers, manufacturers, tax authorities, smelters, and transportation companies should be consulted before substantial investments or commitments are made.

Three alternatives were considered for the development of the Sheep Mountain Uranium Project. Alternatives 1 and 2 which include both open pit and underground mining have the same OPEX, \$73.18 per ton mined and \$31.22 per pound recovered. The difference in these options is the timing of required capital investment.

Alternative 3, the open pit only case has lower operating costs of \$65.90 per ton and \$30.16 per pound recovered. Actual mining costs, open pit versus underground, are substantially lower \$27.91 per ton mined open pit versus \$57.79 per ton for underground. Overall OPEX on a per pound basis is similar between the options because fixed costs including reclamation are spread over more recovered pounds with the open pit and underground combined operations as compared to the open pit only operation.

Open pit mining operating costs account for:

- All earth moving costs related to excavation and placement including:
  - Primary stripping
  - o Mining
  - Interburden
  - Preparation of heap base
- Surface support equipment
- Overall mine supervision including health and safety
- Surface mine and heap leach reclamation costs

## Underground mine operating costs account for:

- All costs related to underground mine excavation
- Conveyance of mined material to the surface for loading on the heap
- Underground mine supervision, support and miner training
- Underground development between mining levels and areas
- Ventilation
- Dewatering
- Mine safety and ground control

## Mineral processing operating costs account for:

- All costs related to the operation of the heap leach
  - Overland conveyor transport from the mine
    - Heap stacking and loading
    - Heap leaching and liquid handling
    - Power and water use and handling
- All costs related to processing of uranium bearing liquids from the heap leach
  - Solvent extraction
  - Ammonia stripping and precipitation
  - Yellowcake drying and packaging
  - Power use
- Mineral processing supervision and support
  - o Radiation Safety and compliance
  - On site laboratory facilities
  - General supervision

## Reclamation and Closure Costs

Reclamation and closure costs have been incorporated primarily into the open pit mine operating costs as the open pit and heap leach reclamation represent the largest cost components for reclamation. A specific allowance for decommissioning of buildings, facilities, and equipment was not included as these costs will be substantially offset by the salvage value for the same and/or the facilities and equipment can continue in use for the mining and processing of additional mineral resource either within reasonable proximity to the Sheep Mountain Project. The NRC licensing will include provisions to process mineralized material and/or intermediate product from like facilities and/or mines.

The current cost model is based on complete backfill of the open pit including sub-grade disposal of the heap leach material and appurtenances including liners, piping, and other materials deemed to be regulated material with respect to the NRC license.

Bonding costs are included as a line item based on an annual rate of 2 % and an estimated bond for the mine and processing facility of 17 million dollars US.

#### Additional Costs

Additional costs include a gross products tax payable to Fremont County; mineral severance tax payable to the State of Wyoming; and various claim and state lease royalties.

Tables 21.5 and 21.6 which follow summarize OPEX for the mine development alternatives.

Table 21.5 –	OPEX A	Iternative 1	1 & 2.	Open	Pit and	Undergr	ound N	<b>Mining</b>
								8

OPEX - OPEN PIT AND UNDERGROUND MINING	Alternatives 1 & 2 Open Pit and UG	Cost Per Ton Mined	Cost Per Lb Mined	Cost Per Lb Recovered
Surface Mine	1			
Strip	\$ 55.518	\$ 14.04	\$ 6.09	\$ 6.67
Mining	\$ 15,672	\$ 3.96	\$ 1.72	\$ 1.88
Support	\$ 15,002	\$ 3.79	\$ 1.65	\$ 1.80
Staff	\$ 24,211	\$ 6.12	\$ 2.66	\$ 2.91
Total Surface Mine				
(3,955,000 tons, 9,117,000 lbs)	\$ 110,403	\$ 27.91	\$ 12.11	\$ 13.26
Underground Mine				
Production	\$ 116,088	\$ 33.19	\$ 12.55	\$ 13.58
Development	\$ 30,048	\$ 8.59	\$ 3.25	\$ 3.52
Support	\$ 28,062	\$ 8.02	\$ 3.03	\$ 3.28
Staff	\$ 12,974	\$ 3.71	\$ 1.40	\$ 1.52
Contingency	\$ 14,973	\$ 4.28	\$ 1.63	\$ 1.75
Total Underground Mine		<b></b>		
(3,498,000 tons, 9,248,000 lbs)	\$ 202,145	\$ 57.79	\$ 21.86	\$ 23.65
Blended Mining Costs*		<b>6</b> 41 02	¢ 17.03	¢ 10.53
(7,435,000 tons, 18,365,000 lbs)	\$ 312,548	\$ 41.93	\$ 17.02	\$ 18.52
<b>Reclamation and Closure</b>				
NRC Annual Inspection Fees	\$ 840	\$ 0.11	\$ 0.05	\$ 0.05
Final Grading and Revegetation	\$ 2,000	\$ 0.27	\$ 0.11	\$ 0.12
Plant Decommissioning and Reclamation	\$ 9,000	\$ 1.21	\$ 0.49	\$ 0.53
Total Reclamation and Closure	\$ 11,840	\$ 1.59	\$ 0.64	\$ 0.70
Heap Leach				
Variable costs per ton	\$ 61,323	\$ 8.23	\$ 3.34	\$ 3.63
Fixed Costs per year	\$ 42,906	\$ 5.76	\$ 2.34	\$ 2.54
Relocate Spent Material	\$ 3,000	\$ 0.40	\$ 0.16	\$ 0.18
Total Heap Leach	\$ 107,229	\$ 14.39	\$ 5.84	\$ 6.35
<b>Reclamation Bond Mine and Heap</b>	\$ 7,140	\$ 0.96	\$ 0.39	\$ 0.42
· · ·				
Taxes & Royalties				
Gross Products tax per/lb	\$ 37.038	\$ 4.97	\$ 2.02	\$ 2 19
Severance Tax per/lb	\$ 19.078	\$ 2.56	\$ 1.02	\$ 113
State lease (pit)	\$ 27.838	\$ 3.73	\$ 1.52	\$ 1.65
Claim royalties (UG)	\$ 22,685	\$ 3.04	\$ 1.24	\$ 1.34
Total Taxes and Royalties	\$ 106.639	\$ 14.31	\$ 5.81	\$ 6.32
TOTAL DIDECT COSTS	¢ 545.20C	¢ 72 10	\$ 20.70	¢ 23 21
IOTAL DIRECT COSTS	\$ 545,396	\$ /3.18	\$ 29.70	\$ 32.31

\*Blended mine costs represents the weighted average of open pit and underground mines. Open pit and underground mine costs, itemized separately above, are not additive but are included in the blended mine costs.

OPEX - OPEN PIT MINING ONLY	Alternative 3 Open Pit Only		Cost Per Ton Mined		Cost Per Lb Mined		Cost Per Lb Recovered	
Surface Mine								
Strip	\$5	5,518	\$	14.04	\$	6.09	\$	6.67
Mining	\$ 1	5,672	\$	3.96	\$	1.72	\$	1.88
Support	\$ 1	5,002	\$	3.79	\$	1.65	\$	1.80
Staff	\$ 2	4,211	\$	6.12	\$	2.66	\$	2.91
Total Surface Mine	\$ 11	0,403	\$	27.91	\$	12.11	\$	13.26
Reclamation and Closure								
NRC Annual Inspection Fees	\$	840	\$	0.21	\$	0.09	\$	0.10
Final Grading and Revegetation	\$	2,000	\$	0.51	\$	0.22	\$	0.24
Plant Decommissioning and Reclamation	\$	9 000	\$	12 28	\$	0 99	\$	1.08
Total Reclamation and Closure	پ د 1	1 840	÷	2 99	φ \$	1 30	¢ \$	1.00
	J I	1,040	Ψ	2.))	Φ	1.50	Ψ	1,74
Heap Leach								
Variable costs per ton	\$ 3	2,544	\$	8.23	\$	3.57	\$	3.91
Fixed Costs per year	\$ 4	2,906	\$	10.85	\$	4.71	\$	5.15
Total Heap Leach	\$ 7	5,450	\$	19.07	\$	8.28	\$	9.06
Reclamation Bond Mine and Heap	\$	7,140	\$	1.81	\$	0.78	\$	0.86
Taxas & Davaltias								
Taxes & Royalties	¢ 1	0 222	¢	1.62	¢	2.01		1 2 20
Gross Products tax per/lb	<u>م</u>	8,323 0.429	¢	4.05	\$ \$	2.01		$\begin{array}{c} \bullet  2.20 \\ \bullet  1.12 \end{array}$
Severance Tax per/16	\$	9,438	¢	2.39	ۍ د	2.09		• 1.13
	\$ 2	8,090	\$	/.10	\$	5.08		\$ 3.37
Claim royalties (UG)		\$ 0		\$ 0		\$ 0		\$ 0
Total Taxes and Rovalties	\$ 5	5.852	\$	14.12	\$	6.13		§ 6.71
	÷ 0	- , =	Ŷ					
TOTAL DIRECT COSTS	\$ 26	0,685	\$	65.90	\$	28.59	2	\$ 31.31

## Table 21.6 – OPEX Alternative 3, Open Pit Mining Only

## Personnel

At full production the Sheep Mountain Project will require approximately 200 employees. Roughly 80 employees will be required for operation of the open pit, heap leach, and mineral processing plant with the remainder required for the underground mine. Personnel for the open pit mine operation can be readily recruited locally as can the majority of the personnel needed for the heap leach and mineral processing plant. Some skilled positions and staff positions will need to be recruited regionally. Recruitment of underground mine personnel may pose a greater challenge. As a result cost allowances for recruiting and training of underground miners were included in the cost estimate. Figure 21.1 illustrates general project organization chart.

## **Figure 21.1 - Project Organization Chart**



(200 Total Personnel)

## **SECTION 22: ECONOMIC ANALYSIS**

Financial evaluations for the three development alternatives represent constant US dollars, 2012 and an average sales price of \$65.00 per pound of uranium oxide. As previously stated all costs are forward looking and do not include any previous project expenditures or sunk costs. Operating costs include all direct taxes and royalties but <u>do not</u> include US Federal Income Tax. Net Present Value (NPV) is calculated at a range of hurdle rates as shown.

Alternative 1 - Open Pit and Underground						
Common Start						
IRR		42%				
NPV 5%	\$	248,926				
NPV 7%	\$	200,606				
NPV 10%	\$	145,763				
NPV 15%	\$	86,103				
NPV 20%	\$	50,595				

Table 22.2

PREFERRED ALTERNATIVE						
Alternative 2 - Open Pit and Underground						
Common End						
IRR		35%				
NPV 5%	\$	224,378				
NPV 7%	\$	173,548				
NPV 10%	\$	118,490				
NPV 15%	\$	62,733				
NPV 20%	\$	32,425				

Table 22.3

Alternative 3 - Open Pit Only				
IRR		33%		
NPV 5%	\$	121,818		
NPV 7%	\$	96,062		
NPV 10%	\$	67,253		
NPV 15%	\$	36,668		
NPV 20%	\$	19,065		

## **Sensitivity to Price**

The Sheep Mountain Project, like all similar projects, is quite sensitive to price as shown in the subsequent tabulations. A summary of sensitivity of the projected IRR and NPV with respect to key parameters other than price also follows. The project is roughly twice as sensitive to variances in mine recovery and/or dilution as it is to variance in OPEX or CAPEX.

Table	22.4
1 auro	/ <i>4 4</i> . <b>T</b>

Alternative 1 - Open Pit and Underground						
Common Start						
Selling Price (USD/pound)						
Discount Rate	\$60	\$65*	\$70			
NPV 5% (Million \$)	\$ 202	\$ 249	<b>\$ 296</b>			
NPV 7% (Million \$)	\$ 161	\$ 201	<b>\$ 240</b>			
NPV 10% (Million \$)	\$ 115	\$ 146	<b>\$ 176</b>			
IRR	36%	42%	48%			

#### Table 22.5

PREFERRED ALTERNATIVE						
Alternative 2 - Open Pit and Underground						
	Selling Price (USD/pound)					
Discount Rate	\$60	\$65*	\$70			
NPV 5% (Million \$)	\$ 182	\$ 224	\$ 267			
NPV 7% (Million \$)	\$ 139	\$ 174	<b>\$ 208</b>			
NPV 10% (Million \$)	\$ 93	\$ 118	\$ 144			
IRR	31%	35%	40%			

Table 22.6

Alternative 3 - Open Pit Only						
	Selling Price (USD/pound)					
Discount Rate	\$60	\$65*	\$70			
NPV 5% (Million \$)	\$ 100	\$ 122	<b>\$ 144</b>			
NPV 7% (Million \$)	\$ 78	\$ 96	\$ 114			
NPV 10% (Million \$)	\$ 53	\$ 67	\$ 81			
IRR	29%	33%	37%			

\*Base Case selling price

## Sensitivity to Other Factors

Sensitivity of the projected IRR and NPV with respect to key parameters other than price, previously shown, is summarized in the following table. It is considered possible that a higher heap recovery may be realized based on current metallurgical test work and historical production experience. An improvement in uranium loss of 0.004  $U_3O_8$  loss would result in a 3% improvement in IRR and an improvement in NPV @ 10% discount of 12 million \$. The sensitivity analysis shows that the project is not highly sensitive to minor changes in OPEX and/or CAPEX. As contingencies were added to both of these items and as costs were based primarily upon recent contractor and vendor quotes it is considered unlikely that a variance in CAPEX and/or OPEX in excess of 10% will occur. With respect to Mine Recovery and/or Mine Dilution, the sensitivity is similar to that of uranium price in that much of the same costs are incurred, and any variance in mine recovery or dilution affects gross revenues either positively or negatively. The project is roughly twice as sensitive to variances in mine recovery and/or dilution as it is to variance in OPEX or CAPEX. Mine recovery and dilution are highly dependent upon grade control and mining selectivity. The mine plan, equipment selection, and personnel allocations included in the cost estimate, for both the open pit and underground, provide for selective mining and tight grade control in recognition of this factor.

Table 22.7 -	Sensitivity	Summary

Parameter	Change from	Change in IRR	Change in NPV at
	Base Case		10% discount
Mine Recovery or	10 %	6 %	\$36 million
Dilution			
Heap recovery	0.004 U <sub>3</sub> O <sub>8</sub> loss	3%	\$12 million
CAPEX	10 %	3%	\$ 7 million
OPEX	10 %	3%	\$17 million

## **SECTION 23: ADJACENT PROPERTIES**

Figure 23.1 – Adjacent Properties, shows the Sheep Mountain Project in relationship to adjacent properties with planned, near term, and/or past uranium production. The Sheep Mountain Project is within the Crooks Gap/Green Mountain Uranium District. Past production occurred at both Sheep Mountain by WNC and others and at Green Mountain by Pathfinder Mines at their Big Eagle Mine. Rio Tinto currently controls the majority of the known mineral resources in the Green Mountain area and the Big Eagle mine which is currently closed.

Sheep Mountain is approximately 25 air miles SSW of the Gas Hills Uranium District. The Gas Hills historically produced over 100 million pounds of uranium and once supported three uranium mills. The mineralization at Gas Hills is similar in nature to that at Sheep Mountain with respect to geologic history, age, source of sediments, source of uranium and genesis of mineralization.

Sheep Mountain is approximately 25 air miles north of the Sweetwater Uranium mill. The Sweetwater mill is controlled by Rio Tinto. The mill has not been decommissioned and has a US NRC Source Materials License but has not operated since the early 1980's.

Sheep Mountain is less than 25 air miles from planned development projects including the JAB Antelope ISR project, the Lost Creek ISR project, and the Lost Soldier project.

The Sheep Mountain Project is located in the northern portion of the Great Divide Basin. Boberg (1979) states, that this geologic province is estimated to contain at least 270 million pounds of uranium resources and is the least exploited Wyoming basin known to contain uranium.





## SECTION 24: OTHER RELEVANT DATA AND INFORMATION Radiometric Equilibrium

Radiometric equilibrium conditions are discussed in the 2006 RPA report in Section 14, Data Verification, in which the author concludes of the Sheep Mountain Project in part;

"Production records are public knowledge and Scott Wilson RPA has no reason to believe that the equivalent uranium values reported are not consistent with the mineralization in general, although, because of the nature of mineralization and disequilibrium, local variations will be observed. Scott Wilson RPA is also of the opinion that the historical work was carried out under industry standards prevalent at that time."

RPA further discusses the data available to them at the time including results from verification drilling which did not yield any high grade samples and from historic data including some 223 samples for which there was gamma equivalent closed can analyses and chemical assays. This discussion concludes;

"Although the data exhibit high variability, there does not appear to be a significant bias and Scott Wilson RPA is of the opinion that the  $eU_3O_8$  values are appropriate for use in the resource estimate."

During the 2009 drilling program a state-of-the-art geophysical logging tool, USAT was employed to further examine radiometric equilibrium conditions (BRS, 2010). This technique was used since past drill programs had reported difficulty in sample recovery from coring and this method would ensure a direct comparison of gamma equivalent values and direct uranium measurements via the USAT tool from downhole logging.

The following table provides a direct comparison of the equivalent gamma and direct USAT measurement of *in situ* uranium values for the five drill holes completed in the Congo Pit in 2009. Note that the measurements reflected various mineralized zones vary in depth from 24.5 to 464 feet from the surface. The disequilibrium factor (DEF) was calculated for each mineralized intercept and summarized for each drill hole. A DEF factor of 1 indicates that radiometric equilibrium exists. DEF factors less than 1 indicate a depletion of uranium with respect to gamma equivalent measurements and a DEF factor greater than 1 indicates an enrichment of uranium values with respect to gamma equivalent values. The DEF from 45 mineralized intercepts from the 2009 drilling ranged from a low factor of 0.73 to a high factor of 2.07 with an average value of 1.05. Although this data indicates the potential for radiometric enrichment, a conservative DEF of 1 was used in the resource calculations.

Drill Hole	From	То	Thk	e U <sub>3</sub> O <sub>8</sub> (gamma)	GT Gamma	U <sub>3</sub> O <sub>8</sub> (USAT)	GT USAT	DEF
Congo 1	24.5	26.5	2	0.063	0.126	0.054	0.108	0.857
	58	60	2	0.05	0.1	0.061	0.122	1.220
	68	71	3	0.087	0.261	0.078	0.234	0.897
	71	77	6	0.031	0.186	4ft @ .096	0.384	2.065
	79.5	81	1.5	0.046	0.069	0.059	0.0885	1.283
	115	119	4	0.049		Not run		
sum/average					0.742		0.9365	1.262
Congo 2	56.5	58.5	2	0.271	0.542	0.264	0.528	0.974
	74.5	76.5	2	0.183	0.366	4'@.137	0.548	1.497
	95	98	3	0.06	0.18	0.048	0.144	0.800
	118.5	120.5	2	0.103		Not run		
	213	216	3	0.09	0.27	0.066	0.198	0.733
	219.5	222.5	3	0.183	0.549	0.169	0.507	0.923
	236	239	3	0.114	0.342	0.111	0.333	0.974
	464	466.5	2.5	0.035	0.0875	0.035	0.0875	1.000
sum/average					2.3365		2.3455	1.004
Congo 3	52	65	13	0.073	0.949	0.071	0.923	0.973
	79	81	2	0.028		Not run		
	90	94.5	4.5	0.097	0.4365	3'@.115	0.345	0.790
	96	101	5	0.107	0.535	0.117	0.585	1.093
	117.5	121.5	4	0.08	0.32	6' @ .05	0.3	0.938
	124	126.5	2.5	0.027	0.0675	0.031	0.0775	1.148
	154	156.5	2.5	0.134	0.335	0.131	0.3275	0.978
	172.5	178	5.5	0.044	0.242	0.04	0.22	0.909
sum/average					2.885		2.778	0.963
Congo 4	49	52.5	3.5	0.028	0.098	0.023	0.0805	0.821
	88	89.5	1.5	0.023		Not run		
	91	94	3	0.05		Not run		
	100	101.5	1.5	0.029		Not run		
	104.5	109	4.5	0.134	0.603	0.149	0.6705	1.112
	113	114.5	1.5	0.028		Not run		
	132.5	136	3.5	0.072	0.252	0.073	0.2555	1.014
	166.5	169.5	3	0.088	0.264	0.099	0.297	1.125
	207.5	214	6.5	0.061	0.3965	0.054	0.351	0.885
sum/average					1.6135		1.6545	1.025
Congo 5	131.5	133.5	2	0.054	0.108	0.041	0.082	0.759
	143	146	3	0.025		Not run		
	153	158.5	5	0.076	0.38	0.07	0.35	0.921
	160	167	7	0.151	1.057	0.162	1.134	1.073
	172.5	179	6.5	0.07	0.455	0.066	0.429	0.943
	199.5	206.5	7	0.047	0.329	0.041	0.287	0.872
	219	222.5	3.5	0.027		Not run		
	267.5	272	4.5	0.051	0.2295	0.043	0.1935	0.843
	293.5	297	3.5	0.062	0.217	0.071	0.2485	1.145
	303.5	305.5	2	0.075	0.15	.5'@ .062	0.31	2.067
	311	316.5	5.5	0.056	0.308	0.076	0.418	1.357
	325	335	10	0.126	1.26	7.5'@.143	1.0725	0.851
sum/average					4.4935		4.5245	1.007

 Table 24.1 - Comparison of Radiometric Equilibrium based on Gamma and USAT Logging

## Ground Water Conditions

The Crooks Gap area regional hydrology, as determined by the Platte River Basin Water Plan, includes two separate formations or groups of formations that qualify as potentially productive for groundwater. The Quaternary aquifer system has both an alluvial and non-alluvial division. This is considered to be a discontinuous but major aquifer in the State of Wyoming. It is undetermined at this time whether this surface aquifer exists in the project area.

The second aquifer in the Crooks Gap area is the Tertiary Aquifer System. The System in the Crooks Gap region is comprised of the Fort Union and Battle Spring Formations. The Platte River Basin Water Plan describes the aquifer as comprised of complex inter-tonguing fluvial and lacustrine sediments. This is also classified as a major aquifer for the State of Wyoming.

Mining will occur in the Battle Spring Formation. Historic data indicates that sustained dewatering of the Sheep Underground mines required approximately 200 gpm, but that the cone of depression is limited in area and will not impact surface water sources in the area.

## **SECTION 25: INTERPRETATION AND CONCLUSIONS**

The preferred alternative for the development of the Sheep Mountain Project is an open pit and underground conventional mine operation with on-site mineral processing featuring an acid heap leach and solvent extraction recovery facility. The preferred alternative begins the operation with the open pit and heap leach facility and brings the underground mine into operation 4-5 years later such that the forecasted end of mining for both the open pit and underground coincide. This approach defers a substantial amount of initial capital, minimizes risk, and allows for a gradual startup of site activities while maximizing resource recovery. Having the end of mining coincide for both operations optimizes the fixed costs of personnel and facilities.

The Sheep Mountain Project if implemented would be profitable under current economic conditions. Under the base case (preferred alternative and \$65 per pound selling price) the project is estimated to generate an IRR of 35% before taxes and has an NPV of over 118 million dollars US at a 10% discount rate.

The technical risks related to the project are low as the mining and recovery methods are proven. The mining methods recommended have been employed successfully at the project in the past. Successful uranium recovery from the mineralized material at Sheep Mountain and similar project such as the Gas Hills has been demonstrated via both conventional milling and heap leach recovery.

Risks related to permitting and licensing the project are also low as the project is a brown-field development located in a state which tends to favor mining and industrial development. The project will also provide substantial revenues to both Fremont County and the State of Wyoming in addition to providing long term employment for the region and has been well received locally. The project development is timed well with respect to the market, and substantial increases in financial return may be realized in what is being forecast as a rising market.

## **SECTION 26: RECOMMENDATIONS**

- 1. It is recommended that development of the project be supported and that significant effort be directed at environmental permitting. Through 2014 Titan has estimated cost related to permitting the mine and mineral processing operations with the State of Wyoming, US BLM, and US NRC to be in excess of 4.3 million dollars. The author concurs with this estimate. This is the single most important item in moving the project forward.
- 2. It is the author's opinion that there is significant promise in the development of alternative underground mining methods. Current CAPEX and OPEX are based on traditional drill and blast methods which are highly labor and capital intensive. The general areas for significant improvement of the underground operations would include:
  - a. Hydraulic Mining Based on limited testwork in the existing Sheep decline the host formation appears amenable to this method and further testing is recommended. This could improve costs and safety of operations and would be applicable at least to the development decline and development drifts which are not in mineralized material. With proper control of solutions it may also be applicable for work in mineralized zones.
  - b. Mechanical Upgrading Some testing has been completed using both the ablation methodology which in being developed in Casper, Wyoming and attrition scrubbing which is a proven commercial technique. Both methods have promise as they could operate underground and return 80% or more of the total mined volume as backfill in the mine while shipping a concentrated product to the surface for mineral processing.
  - c. Budgetary estimate \$500,000 to investigate both alternatives.
- 3. Although the current project has significant mineral resources and reserves, there are two areas with potentially significant resources which have not been developed.
  - a. A mineral resource estimate has been completed for the Sun Mc area but no mine design efforts have been made to date. Budgetary estimate for preliminary mine design: \$100,000.
  - b. The Bev claims have known historic mineral resources and confirmatory drilling completed in 2011 verified the mineralization. However, a compliant mineral resource estimate for this area has not been completed and is not included in the current mineral resource estimate. Budgetary estimate for mineral resource estimation: \$50,000. Once the mineral resource has been defined preliminary mine planning should be completed. Budgetary estimate for preliminary mine design: \$100,000.

## **SECTION 27: REFERENCES**

Previous Reports:

Beahm, D. L., David H. Scriven, D. H., McNulty, T.P., Sheep Mountain Project 43-101 Mineral Resource and Reserve Report, April 8, 2010.

BRS Inc. (BRS), Beahm, Sheep Mountain Project 43-101 Mineral Resource Update Report, March 1, 2011.

BRS, Inc. (BRS), Beahm, D.L., Sheep Mountain Mines Pre-Feasibility Study, April, 2010.

Irwin, R., Evaluation of the ISL Potential of a Part of the Northern Crooks Gap District Freemont County WY: Internal Report 1998

Pathfinder Mines Corporation (PMC), Sheep Mountain Evaluation, Internal Report, September, 1987.

R and D Enterprises, Inc. (RDE), *Sheep Mountain Uranium Project, Fremont County, WY, USA, Column Leach Studies*, February 21, 2011.

Roscoe Postle Associates Inc. (RPA), Wallis, S. and D. Rennie, *Technical Report on the Sheep Mountain Uranium Project, Wyoming*, October 10, 2006.

Roscoe Postle Associates Inc. (RPA), Wallis, S., Technical Report on the Sheep Mountain Uranium Project, Wyoming, January 10, 2005.

US Energy Corp., Healey, C., Wilson, J., 2006 Resource Study Sheep Mountain Project, June 2, 2006.

Western Nuclear Inc., Douglas, S., Ore Reserve Estimates, 1981.

Western Nuclear Inc., Proposed Congo Pit and all Anticipated Extensions, 1981.

Watts Griffis & McQuat (WGM), Valuation of US Uranium Limited: Internal Report 1999

Western Nuclear Inc., Wyoming DEQ Permit to Mine # 381C, 1980.

Western Nuclear Inc., Oliver, D., Ore Reserve Estimates, 1985.

Wilson, J.C., 2005 Drilling Report Sheep Mountain Project Fremont County, Wyoming 2005

Publications Cited:

Boberg, W. W., Applied Exploration and Uranium Resources of Great Divide Basin, Wyoming, AAPG Bulletin, volume 63, 1979.

IRS, 2004, Publication 535, Business Expenses.

National Uranium Resources Evaluation (NURE), Casper Quadrangle, Wyoming, September, 1982.

Rackley, Ruffin I., AAPG Bulletin 56, Environment of Wyoming Tertiary Uranium Deposits, 1972.

Stephens, James G., *Geology and Uranium Deposits at Crooks Gap, Fremont County Wyoming,* Contributions to the Geology of Uranium, Geological Survey Bulletin 1147-F, 1964.

Wyoming Water Development Commission, Platte River Basin Water Plan, May 2006.

Personal Discussions:

McNulty, T. P., Discussion of Uranium Recovery, February, 2012.

## APPENDIX A GT CONTOUR MAPS



# APPENDIX A1 GT CONTOUR MAPS CONGO OPEN PIT






































## APPENDIX A2 GT CONTOUR MAPS SHEEP UNDERGROUND


































# APPENDIX A3 GT CONTOUR MAPS SUN MC AREA

























# APPENDIX MINING CLAIMS

# ACTIVE CLAIMS

Run Date: 03/08/2012 09:00 AM

# Admin State: WY Geo State: WY

#### TITAN URANIUM USA INC 2510 E 15TH ST STE 7 CASPER, WY 82609-4111

Serial No. Claim Name/Number Lead Serial No. Disposition WMC169165 PAYDIRT #6 WMC169160 ACTIVE WMC169160 PAYDIRT #7 ACTIVE WMC169166 WMC169175 WMC169177 GOLDEN GOOSE #2 ACTIVE GOLDEN GOOSE #33 WMC247087 WMC247090 ACTIVE WMC247103 KEY #5C WMC247087 ACTIVE PAYDIRT #13C WMC247087 WMC247108 ACTIVE WMC247120 SUN #3C WMC247087 ACTIVE SUN #4C WMC247087 WMC247121 ACTIVE WMC247130 SUNDOG #17C WMC247087 ACTIVE WMC247131 SUNDOG #18C WMC247087 ACTIVE WMC247132 SUNDOG #19C WMC247087 ACTIVE SUNDOG #21C WMC247087 WMC247134 ACTIVE WMC247135 SUNDOG #22C WMC247087 ACTIVE WMC247141 ZEB #1C WMC247087 ACTIVE WMC247142 ZEB #2C WMC247087 ACTIVE ZEB #3C WMC247087 WMC247143 ACTIVE WMC247144 ZEB #4C WMC247087 ACTIVE PAYDIRT # 12D WMC248330 WMC248331 ACTIVE KEY #1D WMC248330 ACTIVE WMC248332 WMC248330 WMC248333 KEY #2D ACTIVE KEY #3D WMC248330 WMC248334 ACTIVE WMC248335 KEY #4D WMC248330 ACTIVE WMC248336 KEY #7D WMC248330 ACTIVE WMC260773 SM #1 WMC260773 ACTIVE WMC260773 WMC260774 SM #2 ACTIVE WMC260773 WMC260775 SM #3 ACTIVE SM #4 WMC260773 WMC260776 ACTIVE WMC260777 SM #5 WMC260773 ACTIVE WMC260773 SM #7 WMC260778 ACTIVE WMC260779 SM #8 WMC260773 ACTIVE SM #9 WMC260773 WMC260780 ACTIVE WMC260781 SM #10 WMC260773 ACTIVE SM #11 WMC260773 WMC260782 ACTIVE WMC260783 SM #12 WMC260773 ACTIVE WMC260773 SM #13 WMC260784 ACTIVE WMC260785 SM #14 WMC260773 ACTIVE SM #15 WMC260773 WMC260786 ACTIVE SM #16 WMC260773 WMC260787 ACTIVE WMC260773 WMC260738 SM #17 ACTIVE SM #19 WMC260773 WMC260789 ACTIVE SM #20 WMC260773 WMC260790 ACTIVE SM #21 WMC260773 WMC260791 ACTIVE WMC260792 SM #24 WMC260773 ACTIVE

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Page 1 of 4

CUSTOMER ID: 2287670

55

# ACTIVE CLAIMS

Run Date: 03/08/2012 09:00 AM

Page 2 of 4

Serial No.	Claim Name/Number	Lead Serial No.	Disposition
WMC260793	SM #25	WMC260773	ACTIVE
WMC260794	SM #26	WMC260773	ACTIVE
WMC260795	SM #27	WMC260773	ACTIVE
WMC260796	SM #28	WMC260773	ACTIVE
WMC261466	CHRISTIE 4-E	WMC261466	ACTIVE
WMC261467	CINDY 1-D	WMC261466	ACTIVE
WMC261468	GOLDEN GOOSE 1-D	WMC261466	ACTIVE
WMC261469	GOLDEN GOOSE #4-D	WMC261466	ACTIVE
WMC261470	HIGHLAND NO. 4-D	WMC261466	ACTIVE
WMC261471	HIGHLAND NO. 5-D	WMC261466	ACTIVE
WMC261472	HIGHLAND 6-D	WMC261466	ACTIVE
WMC261473	HIGHLAND 7-D	WMC261466	ACTIVE
WMC261474	NH 1-D	WMC261466	ACTIVE
WMC261475	NH 2-D	WMC261466	ACTIVE
WMC261476	NH 3-D	WMC261466	ACTIVE
WMC261477	NH 4-D	WMC261466	ACTIVE
WMC261478	KEY 6-D	WMC261466	ACTIVE
WMC261479	KEY 8-D	WMC261466	ACTIVE
WMC261480	LOUISE NO. 1-D	WMC261466	ACTIVE
WMC261481	MIKE-A	WMC261466	ACTIVE
WMC261482	POORBOY #1D	WMC261466	ACTIVE
WMC261489	SUN 5-D	WMC261466	ACTIVE
WMC261490	SUNDOG 2-D	WMC261465	ACTIVE
WMC261491	SUNDOG 20-D	WMC261466	ACTIVE
WMC261492	SUSAN JAMES 4-D	WMC261466	ACTIVE
WMC261495	TREY JR. 1-D	WMC261466	ACTIVE
WMC261496	ZEB 5-D	WMC261466	ACTIVE
WMC261497	ZEB 6-D	WMC261466	ACTIVE
WMC266756	BEV-1	WMC266756	ACTIVE
WMC266757	BEV-2	WMC266756	ACTIVE
WMC266758	BEV-3	WMC266756	ACTIVE
WMC266759	BEV-4	WMC266756	ACTIVE
WMC266760	BEV-5	WMC266756	ACTIVE
WMC266761	BEV-6	WMC266756	ACTIVE
WMC266762	BEV-7	WMC266756	ACTIVE
WMC266763	BEV-8	WMC266756	ACTIVE
WMC266764	BEV-9	WMC266756	ACTIVE
WMC266765	BEV-10	WMC266756	ACTIVE
WMC266766	BEV-11	WMC266756	ACTIVE
WMC266767	BEV-12	WMC266756	ACTIVE
WMC266768	BEV-13	WMC266756	ACTIVE
WMC266769	BEV-14	WMC266756	ACTIVE
WMC266770	BEV-15	WMC266756	ACTIVE
WMC267695	JK # 3	WMC267693	ACTIVE
WMC267700	JK # 9	WMC267693	ACTIVE
WMC267706	JK # 15	WMC267693	ACTIVE
WMC267709	JK # 18	WMC267693	ACTIVE
WMC275870	NEW SHEEP #1	WMC275870	ACTIVE

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# ACTIVE CLAIMS

Run Date: 03/08/2012 09:00 AM

Page 3 of 4

Serial No.	Claim Name/Number	Lead Serial No.	Disposition
WMC280500	SM #6	WMC280444	ACTIVE
WMC280501	SM #18	WMC280444	ACTIVE
WMC280502	SM #22	WMC280444	ACTIVE
WMC280503	SM #23	WMC280444	ACTIVE
WMC297414	SNOBALL 1	WMC297414	ACTIVE
WMC297415	SNOBALL 2	WMC297414	ACTIVE
WMC297416	SNOBALL 3	WMC297414	ACTIVE
WMC297417	SNOBALL 4	WMC297414	ACTIVE
WMC297418	SNOBALL 5	WMC297414	ACTIVE
WMC297419	SNOBALL 6	WMC297414	ACTIVE
WMC297420	SNOBALL 7	WMC297414	ACTIVE
WMC297421	SNOBALL 8	WMC297414	ACTIVE
WMC297422	TREY 1	WMC297414	ACTIVE
WMC297423	TREY 2	WMC297414	ACTIVE
WMC299462	JAMIE 1	WMC299462	ACTIVE
WMC299463	JAMIE 2	WMC299462	ACTIVE
WMC299464	JAMIE 3	WMC299462	ACTIVE
WMC299465	JAMIE 4	WMC299462	ACTIVE
WMC299466	JAMIE 5	WMC299462	ACTIVE
WMC299467	JAMIE 6	WMC299462	ACTIVE
WMC299468	JAMIE 7	WMC299462	ACTIVE
WMC299469	JAMIE 8	WMC299462	ACTIVE
WMC299470	JAMIE 9	WMC299462	ACTIVE
WMC299471	JAMIE 10	WMC299462	ACTIVE
WMC299472	JAMIE 11	WMC299462	ACTIVE
WMC299473	JAMIE 12	WMC299462	ACTIVE
WMC299474	JAMIE 13	WMC299462	ACTIVE
WMC299475	JAMIE 14	WMC299462	ACTIVE
WMC299476	LAST CHANCE 1D	WMC299462	ACTIVE
WMC300863	FRANKIE-1	WMC300863	ACTIVE
WMC300864	JAMIE-15	WMC300863	ACTIVE
WMC300865	JAMIE-16	WMC300863	ACTIVE
WMC300866	JAMIE-17	WMC300863	ACTIVE
WMC300867	JAMIE-18	WMC300863	ACTIVE
WMC300868	JAMIE-19	WMC300863	ACTIVE
WMC300869	JAMIE-20	WMC300863	ACTIVE
WMC300870	JAMIE-21	WMC300863	ACTIVE
WMC300871	JAMIE-22	WMC300863	ACTIVE
WMC300872	JAMIE-23	WMC300863	ACTIVE
WMC300873	JAMIE-27	WMC300863	ACTIVE
WMC300874	JAMIE-28	WMC300863	ACTIVE
WMC300875	JAMIE-29	WMC300863	ACTIVE
WMC300876	JAMIE-30	WMC300863	ACTIVE
WMC300877	JAMIE-31	WMC300863	ACTIVE
WMC300878	JAMIE-32	WMC300863	ACTIVE
WMC300879	JAMIE-33	WMC300863	ACTIVE
WMC303878	BEV-16	WMC303878	ACTIVE
WMC303879	BEV-17	WMC303878	ACTIVE

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# ACTIVE CLAIMS

Run Date: 03/08/2012 09:00 AM

Page 4 of 4

Serial No.	Claim Name/Number	Lead Serial No.	Disposition
WMC303880	BEV-18	WMC303878	ACTIVE
WMC303881	BEV-19	WMC303878	ACTIVE
WMC303882	BEV-20	WMC303878	ACTIVE
WMC303883	BEV-21	WMC303878	ACTIVE
WMC303884	BEV-22	WMC303878	ACTIVE
WMC303885	BEV-23	WMC303878	ACTIVE
WMC303886	BEV-24	WMC303878	ACTIVE
WMC303887	BEV-25	WMC303878	ACTIVE
WMC303888	BEV-26	WMC303878	ACTIVE
WMC303889	BEV-27	WMC303878	ACTIVE
WMC303890	BEV-28	WMC303878	ACTIVE
WMC303891	BEV-29	WMC303878	ACTIVE
WMC303892	BEV-30	WMC303878	ACTIVE
WMC303893	BEV-31	WMC303878	ACTIVE
WMC303894	BEV-32	WMC303878	ACTIVE
WMC303895	BEV-33	WMC303878	ACTIVE
WMC303896	BEV-33A	WMC303878	ACTIVE
WMC303897	BEV-34	WMC303878	ACTIVE
WMC303898	BEV-34A	WMC303878	ACTIVE
WMC303899	BEV-35	WMC303878	ACTIVE
WMC303900	BEV-36	WMC303878	ACTIVE
WMC303901	BEV-37	WMC303878	ACTIVE
WMC303902	BEV-38	WMC303878	ACTIVE
WMC303903	BEV-39	WMC303878	ACTIVE
WMC303904	BEV-40	WMC303878	ACTIVE
WMC303905	BEV-41	WMC303878	ACTIVE
WMC303906	BEV-42	WMC303878	ACTIVE
WMC303907	FRANKIE-2	WMC303878	ACTIVE
WMC303908	FRANKIE-3	WMC303878	ACTIVE
WMC303909	SM-8A	WMC303878	ACTIVE
WMC304801	NEW SHEEP 2	WMC304801	ACTIVE
WMC305054	CARRIE-1	WMC305054	ACTIVE
WMC305055	CARRIE-2	WMC305054	ACTIVE
WMC305056	CARRIE-3	WMC305054	ACTIVE
WMC305057	CARRIE-4	WMC305054	ACTIVE
WMC305058	CARRIE-5	WMC305054	ACTIVE
WMC305059	CARRIE-6	WMC305054	ACTIVE
WMC305060	JAMIE-24	WMC305054	ACTIVE
WMC305061	JAMIE-25	WMC305054	ACTIVE
WMC305062	JAMIE-26	WMC305054	ACTIVE
Number of ACTIVE cases:	179		

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# Title Chain for State Lease #15536 All Sec. 16, T28N, R92W – 640ac.

1/16/54	Lease to Tom Marshall
8/11/54	Surrender of mineral lease by Hepburn Armstrong
	(apparently Armstrong had an interest. There is no record in the state file)
8/31/54	Option agreement between Hepburn Armstrong and Tom Marshall
12/15/54	Assignment by Tom Marshall to Hepburn Armstrong. Armstrong gives a
	2.5% overriding royalty to Marshall. Marshall only has royalty if
	Armstrong produces.
7/8/55	Marshall gives his 2.5% overriding royalty to Hepburn Armstrong.
8/1/55	Assignment of lease by Armstrong to Wyo. Uranium Corp. Armstrong
	owns Wyo. Uranium Corp. No mention of override reservation so it
	probably expired.
4/26/56	Lease and option agreement between Wyo. Uranium Corp. and Phelps
	Dodge Corp. Wyo. to receive 75% of net profit only if Phelps Dodge
	produces ore. Agreement was not signed.
5/8/56	same as above. Agreement was signed. State sent a letter to Phelps
	Dodge and Wyo. Uranium stating that the State has no statute authority to
	pay any overriding royalty. Letter was dated 6/12/56. This lease expired
	as there was no action by either party during the term of lease.
10/11/57	Wyo. Uran. Corp. assigned the lease to Green Mtn. Uran. Corp.
1/16/64	State gave lease to Green Mtn. Uranium Corp.
11/17/67	Green Mtn. assigns lease to Continental Uranium Co. of Wyo.
6/6/72	Continental assigns lease to Western Nuclear
1/16/74	State gives lease to Western Nuclear
11/6/84	State renews lease to Western Nuclear
1/2/94	State gives lease to Pathfinder Mines. Western did not assign the lease so
	they must have dropped it, or it expired for non-payment.
10/30/98	Pathfinder assigns the lease to US Energy & Crested Corp.
1/2/04	State awards lease to US Energy and Crested Corp.
4/30/07	US Energy and Crested Corp. assign lease to Uranium One (see enclosed
	record page)

# **OPINION OF TITLE TO THE LEASE**

Uranium One must be considered the Leaseholder of Record of State Mineral Lease #15536. All past interest of record has passed by statute to the present leaseholder.

I, Dave Young, certify that I have examined the file of record at the State of Wyoming Land Office in Cheyenne, and the above summary is an accurate record of the title interest as it is represented in that file.

Dave Going 12/10/07

STATUS SHEET FOR LEASE # 0-15536 All, Sec. 16, T28N, R92W

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# **ASSIGNMENTS**

LESSEE OF RECORD	WORKING INTEREST HOLDERS	OVERBIDING ROVAL TY

DATED	ASSIGNOR/INT.	ASSIGNEE	INT/CONV.	INT/RETD.	LAND ASSIGNED	APPROVED
10-30-98	Pathfinder Mines Corporation 100%	U.S. Ehergy Corp. and Crested Corp. 877 North 8th West Riverton, WY 82501	100%	None	All Lease	11-16-98
4-30-07	U.S. Energy Corporation and Crested Corp.	Uranium One Ventures USA, Inc. 3801 Automation Way Suite 100 Fort Collins, CO 80525	100%	None	All Lease	7-2-07

# STATUS OF LEASE 0-15536 AS OF JULY 2, 2007

# Leasehold Interest

Uranium One Ventures USA, Inc. 100%

P.L. #23 Amended April 6, 2000

# STATE OF WYOMING URANIUM MINING LEASE

THIS INDENTURE OF LEASE ENTERED INTO THIS <u>2nd</u> day of <u>January</u>, 20<u>04</u>, A.D. by and between the STATE OF WYOMING, acting by and through its Board of Land Commissioners (Board), party of the first part, hereinafter called and lessor, and

U.S. Energy Corporation and Crested Corp. party of the second part, hereinafter called the lessee.

Section 1 - <u>PURPOSES</u> The lessor, in consideration of the rents and royalties to be paid and the covenants and agreements hereinafter contained and to be performed by the lessee, does hereby grant and lease to the lessee the exclusive right and privilege to prospect, mine, extract and remove from any lode, lead, vein or ledge, or any deposit, and dispose of all uranium in the following described lands, to-wit:

640.00 All Section 16, Twp. 28N, Rg. 92W, 6th p.m.

consisting of <u>640.00</u> acres, more or less, <u>Fremont</u> county, together with the right to construct and maintain thereon all works, buildings, plants, waterways, roads, communication lines, power lines, tipples, hoists, or other structures and appurtenances necessary to the full enjoyment thereof, subject however, to the conditions hereinafter set forth;

Section 2 - <u>TERM OF LEASE</u>. This lease unless terminated at an earlier date as hereinafter provided, shall remain in force and effect for a term of ten (10) years beginning on the <u>2nd</u> day of <u>January</u>, 20 <u>04</u> and expiring on the <u>1st</u> day of <u>January</u>, 20 <u>14</u>.

Section 3. In consideration of the foregoing, the lessee covenants and agrees as follows:

A. <u>BOND</u> - When actual operations for uranium the mineral is to be commenced and for operating thereafter, a bond shall be furnished in an amount determined by the Director of the Office of State Lands and Investments to be advisable in the premises. The operating bond shall preferably be a corporate surety bond, executed by the lessee, the surety being authorized to do business in the State of Wyoming. Other bond may be furnished on consent of the Office of State Lands and Investments if the lessee is unable to obtain a corporate surety bond as per Chapter 21 of the rules of the Board of Land Commissioners. The State will require two executed copies of the bond, therefore as many additional copies should be made as will be required by the lessee and the bonding company.

B. <u>PAYMENTS</u> - To make all payments accruing hereunder to the Director of the Office of State Lands and Investments, 122 West 25th Street, Herschler Building, 3<sup>rd</sup> Floor West, Cheyenne, Wyoming 82002-0600.

C. <u>RENTALS</u> - Prior to the discovery of commercial quantities of uranium in the lands herein leased, to pay to the lessor in advance, beginning with the effective date hereof, an annual rental of ONE DOLLAR (\$1.00) PER ACRE OR FRACTION THEREOF PER YEAR for the 1<sup>st</sup> through the 5<sup>th</sup> years inclusive and TWO DOLLARS (\$2.00) PER ACRE OF FRACTION THEREOF PER YEAR for the 6<sup>th</sup> through 20<sup>th</sup> years inclusive, THREE DOLLARS (\$3.00) per acre or fraction thereof per year for the 21<sup>ST</sup> through 30<sup>TH</sup> years inclusive, and FOUR DOLLARS (\$4.00) PER ACRE OR FRACTION THEREOF for any year beyond the 30<sup>th</sup>

lease year; provided, however, that if the said lands are not on a commercial mining basis and so operated at the end of two (2) years from the date hereof, such rental may be increased at the option of the lessor, to such an amount as the lessor may decide to be fair and equitable. After the discovery of commercial quantities of uranium in the lands herein leased to pay to the lessor in advance, beginning with the first day of the lease year succeeding the lease year in which commercial discovery was made, an annual rental of TWO DOLLARS (\$2.00) PER ACRE OR FRACTION THEREOF PER YEAR through and including the  $20^{th}$  year of the lease term, THREE DOLLARS (\$3.00) PER ACRE OF FRACTION THEREOF for the  $21^{st}$  through  $30^{th}$  years, and FOUR DOLLARS (\$4.00) PER ACRE THEREAFTER.

Annual rentals on all leases shall be payable in advance for the first year and each year thereafter. No notice of rental due shall be sent to the lessee. If the rental is not received in this office on or before the date it becomes due, Notice of Default will be sent to the lessee and a penalty of \$1.00 per acre or fraction thereof, for late payment will be assessed.

After initial submission of the increased annual rental required by the lease upon the discovery of uranium in paying quantities, lessees are exempt from submission of subsequent annual creditable lease annual rentals for so long as annual royalties paid meet or exceed the required annual rental amount. The annual rental shall be held for a credit on annual royalty in any year the annual royalty does not equal the required annual rental (minimum royalty) amount. Any credit amount used in making up the difference in royalty paid and the minimum lease royalty due must be paid within thirty (30) days following the next lease anniversary date to continue the lease. The Office shall notify lessees of any minimum royalty amount due after the lease anniversary for which a shortfall occurs.

The lessee is not legally obligated to pay either the rental or the penalty, but if the rental and penalty are not received in this office within thirty (30) days after the Notice of Default has been received by the lessee, the lease will terminate automatically by operation of law. Termination of the lease shall not relieve the lessee of any obligation incurred under the lease other than the obligation to pay rental or penalty. The lessee shall not be entitled to a credit on royalty due for any penalty paid for late payment of rental on an operation lease.

D. <u>ROYALTY</u>. Royalties shall be based on the total arms-length consideration received for uranium products sold for shipping point, a royalty of five percent 5% of the quantity or gross realization value of the uranium/ $U_3O_8$  (uranium ore  $U_3O_8$ , other) Lessee shall pay to lessor:

After a lease becomes an operating lease, the Board of Land Commissioners may reduce the royalty payable to the State as to all or any of the lands, formations, deposits, or resources covered by the lease, if it determines that such a reduction is necessary to allow the leases to undertake operations or to continue to operate with a reasonable expectation that the operations will be profitable. Such a reduction in royalty periods to the State shall in all cases be conditioned upon the cancellation of all cost-free interests in excess of 5% and the reduction of all other cost-free interests in the same proportion as the State's royalty is reduced. The Board may also make other requirements as a condition to the reduction in royalty.

E. LESSOR MAY TAKE ROYALTY IN KIND. At any time and from time to time lessor may at its option notify the lessee that lessor desires its royalty proceeds to be paid by the delivery of lessor's royalty share of lease attributable uranium production volumes in-kind, and lessee agrees upon receipt of such notice within 60 days to begin to deliver production inkind. Such production shall be good and merchantable uranium products at the process facility location.

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F. MONTHLY PAYMENTS AND STATEMENTS. Unless a different time or method of payment is agreed to by the Board, lessee shall make payments in full on or before the twentieth (20th) day of the calendar month succeeding the month of production of all minerals mined and removed from the land; and to furnish sworn monthly statements therewith showing in tons or cubic yards the amount of all ore mined and removed; and such other pertinent information as may be requested of its lessees by the lessor. These statements are to be subject to verification by examination of the relevant books and records of the lessee.

# G. WORKINGS.

(1) All mining operations and workings shall be conducted in such a manner so as to remove all commercial quantities of minerals so far as is economically possible in the deposits worked; that all shafts, inclines and tunnels shall be well timbered (when good mining practice requires timbering); that all underground timbering placed in the mines and necessary to the preservation of the property and safety of the workmen shall be kept in good condition and repair and at no time shall such timbering be removed unless all of the commercial quantities of ore has been removed or such removal will in no way or manner interfere with or prevent future mining operations in the land; that at the expiration of this lease, or earlier termination thereof, all underground timberings shall become the property of the lessor without compensation therefore to the lessee; that all parts or workings when the ore is not exhausted and for good reasons not being worked shall be kept free of water and debris; that underground workings will be protected against fire and flood, and creeps and squeezes will be checked without delay; and to leave such pillars as may be necessary to support the cover and protect the slopes, air courses, manways and hauling roads.

(2) That all open or strip-mining operations shall be conducted so as to remove all commercial quantities of minerals so far as is economically possible in the deposits worked; that all waste material mined and not removed from the premises shall, as mining progresses, be used to fill the pits and leveled unless consent of the lessor is otherwise obtained, so that at the expiration, surrender, or termination of the lease, the land will reasonably approximate its original configuration and with a minimum of permanent damage to the surface; that all roads and bridges built and necessary to the mining operations on the land shall, upon expiration, forfeiture or surrender of the said lease, become the property of the lessor.

H. MAPS AND REPORTS. Upon demand, to furnish the Director, Office of State Lands and Investments, with copies or blueprints of all maps of underground surveys of leased lands made or authorized by the lessee, including engineer's field notes, certified by the engineer who made such survey; and to make such other reports pertaining to the production and operations by the lessee as may be called for by the lessor.

Copies of all electrical, gamma-ray neutron, resistivity or other types of subsurface log reports obtained by or for lessee in conducting operations on the leased premises shall be submitted to the State Geologist as required by W.S. 36-6-102.

I. <u>TAXES AND WAGES - FREEDOM OF PURCHASE</u>. To pay, when due, all taxes lawfully assessed and levied under the laws of the State of Wyoming upon improvements and values produced from the land hereunder, or other rights, property or assets of the lessee; to accord all workner and employees complete freedom of purchase, and to pay all wages due workner and employees as required by law.

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J. <u>STATUTORY REQUIREMENTS AND REGULATIONS</u>. To comply with State statutory requirements and valid regulations thereunder.

# K. ASSIGNMENT OF LEASE - MINING AGREEMENTS.

(1) Lessee may assign the entire lease with the write consent of lessor, but not any one or more of the minerals which his less might include, except by assignment of the entire lease.

If at the time of assignment, this lease is non-(2)producing, assignor may deduct from the total consideration received, the reasonable, actual costs incurred by such assignor, in the acquisition and development of the leasehold assigned, remitting thereafter, one-half (%) of the residual consideration to the Lessor.

Lessee shall submit a signed copy of any mining agreement (3) entered into affecting the possessory title to any of the land hereby leased for approval by the lessor.

(4) All overriding royalties to be valid must have the approval of the Board and be noted on the executed lease. The Board reserves the exclusive right of disapproval of such overriding royalties when in its sole opinion they become excessive and hence are detrimental to the proper development of the leased lands.

L. DELIVER PREMISES IN CASE OF FORFEITURE. Subject to the provisions of Section 6 hereof, to deliver the leased lands with all permanent improvements thereon, in good order and condition, in case of forfeiture of this lease, but this shall not be construed to prevent the removal, alteration or renewal of equipment and improvements in the ordinary course of operations.

M. DILIGENCE IN DEVELOPMENT. This lease is granted with the express understanding that prospecting, mining and the recovery of the commercial quantities of minerals in the above described lands shall be pursued with diligence, and if at any time the lessor has reasonable belief that the operations are not being so conducted, it shall so notify lessee in writing, and if compliance is not promptly obtained and the delinquency fully satisfied, it may then, at the end of any lease year, declare this lease terminated. Any improvements that the lessee may have placed on the property shall be disposed of pursuant to Section 6 of this lease.

# Section 4. GENERAL COVENANTS.

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A. Subject to the rules and regulations governing multiple use and development of sub-surface resources, the lessee shall have the right to enter upon, occupy and enjoy such surface areas of the described tract as are necessary for mining, and the construction of all buildings and other surface improvement incidental to the work contemplated by this lease.

The lessee shall fully protect the rights of any agricultural and grazing leases which have heretofore or may hereafter by granted by erecting cattle guards or gates and keeping closed gates in all fences in which openings are or may be made, and for protection of stock grazing thereon to fence or close all holes, pits, shafts, tunnels, or open cuts in which injury might be sustained, and shall not contaminate any living water upon the land so as to make it injurious to livestock.

Should the lessee or any person holding from, by or under the lessee, in any operation on said premises under this lease, destroy or injure any crop, building or other improvements of any tenant, lessee, purchaser or other person holding under the State, the lessee agrees to fully indemnify all such injured parties in such sum or sums as may be mutually agreed upon by the respective parties, or as may be fixed by appraisers appointed by each party. If agreement is impossible the Board of Land Commissioners may fix the amount of such indemnity after inspection and Hearing.

Mining operations shall not be conducted nearer than two hundred (200) feet from any productive oil or gas well without consent of the oil and gas lessee or operator. Lessee shall not disturb any existing road or roads now on said lands nor roads leading to or from any mine or well or well location without first providing adequate and suitable roads in lieu thereof. Lessee shall fully indemnify any other sub-surface lessee for any injury or damages resulting from negligent or unauthorized operations hereunder. 

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B. <u>Relinquishment and Surrender or Forfeiture</u> of this lease shall be in conformance to Section 13 (Relinquishment or Surrender) of the Rules and Regulations Governing the leasing of Uranium adopted by the Board of Land Commissioners and the State Loan and Investment Board, effective JANUARY 3, 2000.

C. As to mine and personnel safety, all mining operations on these premises shall be subject to the supervision of any official or agency of the State of Wyoming having jurisdiction under the laws of such State.

D. During the proper hours and at all times during the continuance of this lease the lessor or its representatives shall be authorized to go through any of the shafts, openings or working on the premises, and to examine, inspect and survey the same and to make extracts of all books and weigh sheets which show in any way the output from the land.

E. It is expressly understood and agreed that the mining rights and privileges hereunder shall extend to and include uranium/ $U_3O_8$ , and that no rights or privileges respecting coal, oil and gas, oil shale, bentonite, leonardite, zeolite, sand and gravel, or rock crushed for aggregate are granted or intended to be granted by this lease. The lessee shall promptly notify the lessor of the discovery of any minerals upon the leased premises which can be produced in commercial quantities.

F. This lease is granted for the purposes as herein set forth only under such title as the State of Wyoming now holds in and to the minerals that may be found in or under the above described lands, and if it is subsequently divested of same, no liability shall be incurred by virtue of this lease for any loss or damage to the lessee; nor shall any claim for refund of rents or royalties theretofore paid be made by said lessee, its successors or assigns, or be allowed by lessor.

In the event the possession or occupancy of said leased premises is denied or contested, the lessor shall have the right, but not the obligation, and at lessor's election, to undertake to place said lessee in possession by process of law or otherwise, or to defend him in such occupancy.

# Section 5. THE LESSOR EXPRESSLY RESERVES.

Disposition of Surface. The right to lease, grant rights-of-way across, sell or otherwise dispose of the surface of the land embraced within this lease and to lease, sell, or otherwise dispose of any sub-surface resource not covered by this lease, under existing laws or laws hereafter enacted, or in accordance with the rules of the Board of Land Commissioners insofar as the surface is not necessary for the use of the lessee in mining operations.

Section 6. <u>APPRAISAL OF IMPROVEMENTS</u>. Upon the expiration of this lease or earlier termination thereof pursuant to surrender of forfeiture, or if such land be leased to another other than the owner of the improvements thereon, the lessee agrees that the improvements shall be disposed of pursuant to Title 36, W.S. 1977 as to State and School Lands and Title 11, W.S. 1977 as to State Loan and Investment Board Lands. In the event that within ninety (90) days after the expiration of this lease, or earlier termination thereof pursuant to surrender or forfeiture there is no new lessee of said lands, or of the part thereof on which Lessee has caused improvements to be made, then lessee may, within the sixty (60) day period next succeeding said ninety (90) days, cause to be removed from said lands any improvements theretofore made thereon by lessee, provided that lessee shall repair any damage to the land caused by such removal.

Section 7. FORFEITURE CLAUSE. In the vent that the Board, after notice and hearing, shall determine that the lessee has procured this lease through fraud, misrepresentation or deceit, then and in that event this agreement, at the option of the lessor, shall cease and terminate and shall become ipso facto null and void and all improvements upon said land or premisses under the terms of this lease shall forfeit to and become property of the State of Wyoming.

In the event that the lessee shall fail to make payments of rentals and royalties as herein provided, or make default in the performance or observance of any of the terms, covenants and stipulations hereof, or of the general regulations promulgated by the Board of Land Commissioners and in force on the date hereof, the lessor shall service notice of such failure or default, either by personal service or by registered mail upon the lessee and if such failure or default continues for a period of thirty (30) days after the service of such notice, then and in that event the lessor may at its option, declare a forfeiture and cancel this lease, whereupon all rights and privileges except those granted in Section 6 hereof, obtained by the lessee hereunder shall terminate and cease and the lessor may re-enter and take possession of said premises or any part thereof, but these provisions shall not be construed to prevent the exercise by the lessor of any legal or equitable remedy which the lessor might otherwise have. A waiver of any particular cause of forfeiture shall not prevent the cancellation and forfeiture of this lease for any other cause of forfeiture or for the same cause occurring at any other time.

Section 8. <u>HEIRS AND SUCCESSORS IN INTEREST</u>. It is further agreed that each obligation hereunder shall extend to and be binding upon and every benefit hereof shall inure to the heirs, executors, administrators, successors of or assigns of the respective parties hereto.

Section 9. This lease is issued by virtue of and under the authority conferred by Title 36, W.S. 1977 as to the State and School Lands and Title 11, W.S. 1977 as to State Loan and Investment Board Lands and amendments thereto.

Section 10. Sovereign Immunity. The State of Wyoming and the lessor do not waive sovereign immunity by entering into this lease, and specifically retain immunity and all defenses available to them as sovereigns pursuant to Wyoming Statute § 1-39-104(a) and all other state laws.

IN WITNESS WHEREOF, this lease has been executed by lessor and lessee effective on the day and year first above written.

LESSOR, STATE OF WYOMING, Acting by and through its BOARD OF LAND COMMISSIONERS AND STATE LANDS AND INVESTMENT BOARD

SEAL

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Office of State Lands and Investments

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CORPORATE SEAL

Board Approved:

Examined by:

LESSEE: President, U.S. Energy Corp

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# LEASE NO. \_0-15536

# TYPE OF LEASE Uranium

NAME OF LESSEE U.S. Energy Corporation and Crested Corp.

ADDRESS 877 North 8<sup>th</sup> West Riverton, WY 82501

EXPIRATION DATE OF LEASE January 1, 2014

AMOUNT OF RENTAL \$2,560.00

COUNTY Fremont

FUND Common School

BOND

# 15536

P.L. #23 Amended April 6, 2000

# STATE OF WYOMING URANIUM MINING LEASE

THIS INDENTURE OF LEASE ENTERED INTO THIS <u>2nd</u> day of <u>January</u>, 20<u>04</u>, A.D. by and between the STATE OF WYOMING, acting by and through its Board of Land Commissioners (Board), party of the first part, hereinafter called and lessor, and

U.S. Energy Corporation and Crested Corp. "" UTUN One, party of the second part, hereinafter called the lessee.

Section 1 - <u>PURPOSES</u> The lessor, in consideration of the rents and royalties to be paid and the covenants and agreements hereinafter contained and to be performed by the lessee, does hereby grant and lease to the lessee the exclusive right and privilege to prospect, mine, extract and remove from any lode, lead, vein or ledge, or any deposit, and dispose of all uranium in the following described lands, to-wit:

640.00 All Section 16, Twp. 28N, Rg. 92W, 6<sup>th</sup> p.m.

consisting of <u>640.00</u> acres, more or less, <u>Fremont</u> county, together with the right to construct and maintain thereon all works, buildings, plants, waterways, roads, communication lines, power lines, tipples, hoists, or other structures and appurtenances necessary to the full enjoyment thereof, subject however, to the conditions hereinafter set forth;

Section 2 - <u>TERM OF LEASE</u>. This lease unless terminated at an earlier date as hereinafter provided, shall remain in force and effect for a term of ten (10) years beginning on the <u>2nd</u> day of <u>January</u>, 20 04 and expiring on the 1st day of <u>January</u>, 20 14.

Section 3. In consideration of the foregoing, the lessee covenants and agrees as follows:

A. <u>BOND</u> - When actual operations for uranium the mineral is to be commenced and for operating thereafter, a bond shall be furnished in an amount determined by the Director of the Office of State Lands and Investments to be advisable in the premises. The operating bond shall preferably be a corporate surety bond, executed by the lessee, the surety being authorized to do business in the State of Wyoming. Other bond may be furnished on consent of the Office of State Lands and Investments if the lessee is unable to obtain a corporate surety bond as per Chapter 21 of the rules of the Board of Land Commissioners. The State will require two executed copies of the bond, therefore as many additional copies should be made as will be required by the lessee and the bonding company.

B. <u>PAYMENTS</u> - To make all payments accruing hereunder to the Director of the Office of State Lands and Investments, 122 West 25th Street, Herschler Building, 3<sup>rd</sup> Floor West, Cheyenne, Wyoming 82002-0600.

C. <u>RENTALS</u> - Prior to the discovery of commercial quantities of uranium in the lands herein leased, to pay to the lessor in advance, beginning with the effective date hereof, an annual rental of ONE DOLLAR (\$1.00) PER ACRE OR FRACTION THEREOF PER YEAR for the 1<sup>st</sup> through the 5<sup>th</sup> years inclusive and TWO DOLLARS (\$2.00) PER ACRE OF FRACTION THEREOF PER YEAR for the 6<sup>th</sup> through 20<sup>th</sup> years inclusive, THREE DOLLARS (\$3.00) per acre or fraction thereof per year for the  $21^{ST}$  through  $30^{TH}$  years inclusive, and FOUR DOLLARS (\$4.00) PER ACRE OR FRACTION THEREOF for any year beyond the  $30^{th}$ 

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LEASE NO. 0-15536

TYPE OF LEASE Uranium

to uranium one NAME OF LESSEE U.S. Energy Corporation and Crested Corp.

877 North 8<sup>th</sup> West Riverton, WY 82501 ADDRESS

EXPIRATION DATE OF LEASE January 1, 2014

AMOUNT OF RENTAL \$2,560.00 = \$4.00 / AC

COUNTY Fremont

FUND Common School

BOND