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Companies Announcement Office  
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## PRE-DEVELOPMENT ACTIVITIES AT LANCE SET TO RAMP-UP

### Highlights

- **Commencement of a second low-pH field demonstration to operationally verify optimised process chemistry, ion exchange resins and solids handling method**
- **Laboratory tests indicate that oxidant addition in fresh (unmined) areas enhances uranium recovery rates**
- **Laboratory tests also confirm that low-pH solutions with oxidant can extract uranium from unmined areas at rates consistent with the 2018 Feasibility Study assumptions**
- **An ion exchange resin that improves uranium loading has been identified for further testing with the field demonstration**
- **Existing ponds to be utilised for solids management during the second field demonstration**
- **Licence amendments are being prepared for the use of oxidants and for the use of the existing ponds for solids management with future production operations**
- **Peninsula is well-funded to rapidly advance Lance towards a low-capital resumption of production**

Peninsula Energy Limited (ASX:PEN) (**Peninsula or Company**) is pleased to provide an update on the current activities at the Company's flagship Lance Uranium Project, located in Wyoming, USA (**Lance, the Project, or the Site**). The laboratory phase of optimisation test work has been completed and a second low-pH field demonstration has commenced to confirm laboratory results in the field at a near to commercial scale. Over the next 12 to 18 months, Peninsula will focus on key site-specific technical, process development and optimisation activities to fully prepare Lance as the only commercial low pH In-Situ (ISR) operation in the US.

Peninsula is well funded to advance Lance with a cash holding of approximately US\$12 million at 30 June 2020, no term debt and forecast net cash margins of between US\$6 million and US\$8 million for CY2021 from its uranium sales contract book.

Managing Director / CEO, Mr Wayne Heili said, *"Developments in the uranium market over the recent past have been highlighted by limited global production and restraint of mid to long term purchasing activities by end-users, which indicates a strong likelihood of increasing price and purchasing activity over the coming months and years. Peninsula will use its strong balance sheet to sensibly progress Lance with the advantage of knowing that if markets warrant, we could make an investment decision in parallel to the optimisation workstreams and be in commercial production within a six-month timeframe."*

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Peninsula Energy Limited – ABN 67 062 409 303

Suite 22, 44 Kings Park Road, West Perth WA 6005 | PO Box 8129, Subiaco East WA 6008

Phone: +61 (0) 8 6263 4461 | Fax: +61 (0) 8 6263 4444

*“The US domestic uranium industry needs to focus on innovative means to economically produce uranium for the domestic and global nuclear fuel markets. We believe that the test programs we have designed and will conduct over the coming 12 to 18 months will generate long term value and benefits for our Project and for our shareholders.”*

### **Lance Project Low pH ISR Background**

Lance was licensed and constructed by Peninsula’s wholly-owned US subsidiary Strata Energy Inc (**Strata**), and commercial operations commenced in 2015.

A large JORC Compliant uranium mineral resource remains at Lance<sup>1</sup>. However, commercial operations were suspended mid-year in 2019 to allow the on-site team to focus on preparing for a transformation of the Project process chemistry applications. Over the past year, the Strata team successfully obtained the necessary amendments to its regulatory authorisations which allow Lance to operate using a low pH ISR process in addition to the originally authorised alkaline ISR process.

Approximately 57% of uranium produced globally in 2019 was extracted via the low pH ISR process. Companies which utilise this process populate the lowest quartile of cash costs for global uranium producers. Importantly, Lance is the only US-based uranium project authorised to use this industry leading method.

Laboratory extraction tests using a low pH solution have been conducted on Lance core samples since early 2017. The test protocols were designed to simulate the successful low pH ISR processes utilised in Australia and Kazakhstan.

Initial agitation leach tests with low pH solutions at Lance produced positive results which led to a programme of column leach tests being conducted in 2018 and 2019. Column leach tests require a significantly longer time duration and are more costly than agitated leach tests, however, the design of the column test is regarded as more representative of the in-situ environment.

Overall, the laboratory testing results indicated that a low pH process would significantly benefit the Lance production rates while also potentially improving the overall project cost profile.

A feasibility study was issued in September 2018 (the **2018 FS**), which supported this conclusion.

The laboratory work was further validated in CY2019 by the positive results of a field leach trial (**FLT**) conducted in an already mined area of Lance. The FLT focused on the impact of the acidification and neutralisation stages on mining and aquifer restoration, rather than technical optimisation. Subsequently, the Company has evaluated the technical performance of the FLT and has concluded the following:

- 1. Low pH ISR has been demonstrated to increase the resource recovery rates in an area at Lance that was previously mined to effective depletion using alkaline ISR processes**
- 2. The operating cost and uranium recovery assumptions utilised in the 2018 Low pH Feasibility Study were reasonable and could be substantiated through the results of the FLT**
- 3. The FLT was not operated to the economic endpoint of uranium recovery**
- 4. Groundwater restoration can be effectively accomplished following active low pH ISR operations**
- 5. Fine solids are generated during the process of lowering and raising the aquifer pH. The removal of the solids from the process stream could enhance the overall performance of the uranium extraction and recovery systems**

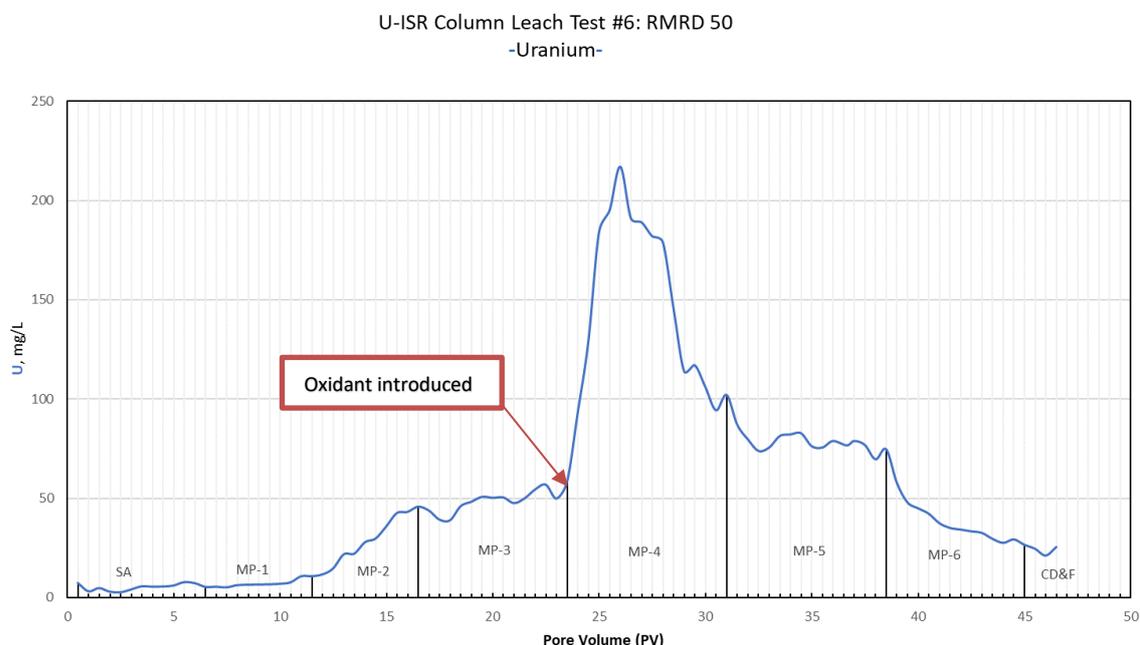
Following the completion of the CY2019 FLT, Peninsula undertook an evaluation of the entire body of low pH research and technical work which had been completed. It was recognised that an emphasis was placed on demonstrating the improvement in recovery and grades over the alkaline chemistry and that little laboratory work had been completed on core samples obtained from fresh areas that were not affected by previous alkaline ISR operations. The Company determined that additional laboratory testing could provide valuable insight into potential process optimisation concepts.

### **Additional Column Leach Studies in 2020 – Unmined Areas**

To further investigate the use of low pH lixiviates (ISR leach solutions), Strata collected fresh core samples from an area that had not been impacted by alkaline ISR production operations (now the MU1A area). Side by side columns were prepared to explore differences in “soft” (slow) and “hard” (rapid) start-up acidification procedures and the subsequent acid requirements. Care was taken to ensure core was not unnecessarily exposed to the atmosphere during preparation of the test columns.

While the “hard” acidification procedure, the standard process in all prior testing, delivered better results, neither column generated results that were comparable to previous column tests. A hypothesis was developed that the introduction of an oxidant may be necessary to effect rapid uranium dissolution when the mineral is not previously oxidised by alkaline mining.

Extending the duration of the test, a controlled amount of oxidant was introduced to the feed stream of the soft acidification column test. There was an immediate positive response as the uranium grade quadrupled. This is illustrated in the following chart which presents the test results of uranium grade (mg/L U) against the processed volumes (pore volume). Oxidant was first introduced during test mining phase #4 (MP-4).



**Figure 1: Uranium grade (mg/L U) quadrupled after the introduction of an oxidant**

Oxidant was introduced in the later stages of the second column (which had higher acid concentrations) producing a similar effect. In both tests, the uranium grade reached its peak level within five pore volumes of the initial introduction of the oxidant. Both tests were operated for an extended period due to inefficient leach chemistries prior to introducing an oxidant.

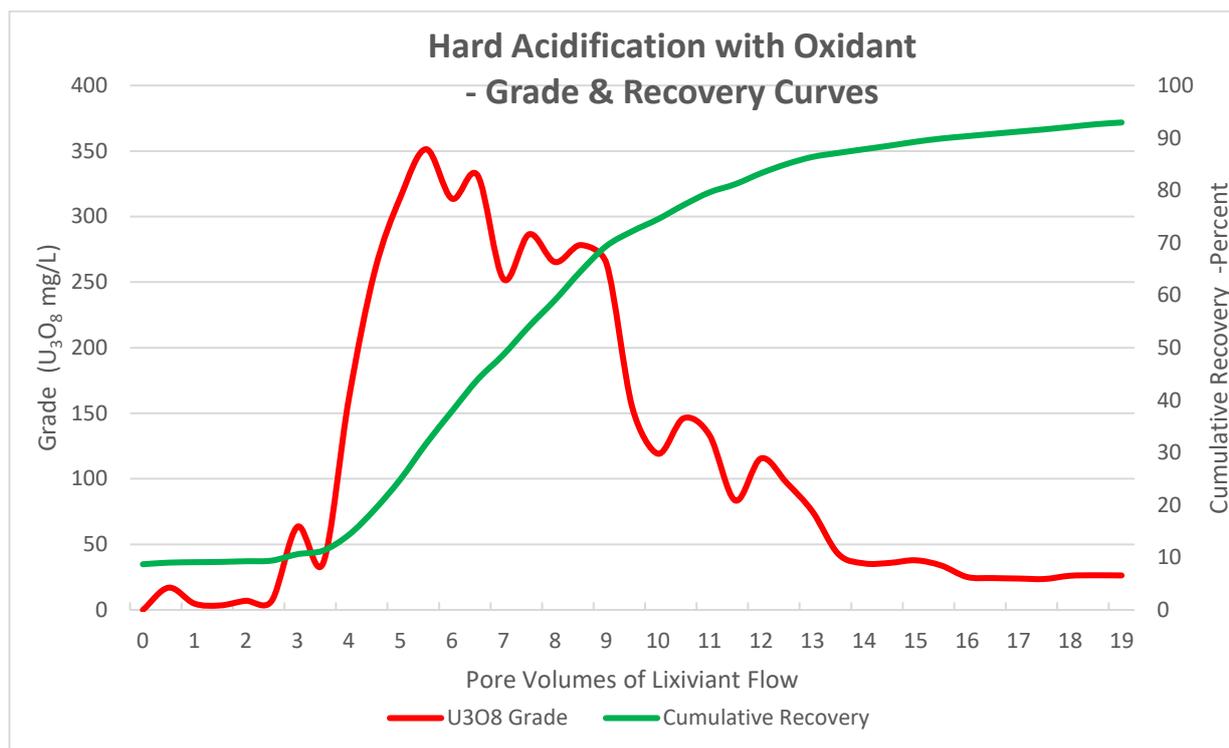
The general conclusion derived from these tests was that in the absence of pre-oxidation of the core samples (which occurred in previously mined areas under the alkaline method), additional oxidant is required for effective low pH leaching, even though the system contains ample iron (ferric iron is an oxidant which is essential in the low pH leach system).

Additional column leach studies were designed to assess the impact of the addition of an oxidant from the commencement of leaching. The Site team collected fresh core samples from test holes located within an undeveloped area of the planned Mine Units #3 and #4. The Site team was diligent when collecting these samples to prevent any incidental pre-oxidation of the core samples. Two side by side

column tests were prepared to again compare the effects of soft and hard start up acidification procedures, but in these tests, oxidant was introduced with the feed stream from commencement.

Uranium concentrations and recovery rates derived from these two tests provide meaningful and encouraging results. The hard acidification test with oxidant again outperformed the soft acidification test with respect to uranium grade and recovery. The hard acidification test with oxidant yielded recovery rates of 50% after 7 pore volumes, 88% after 14 pore volumes, and 93% upon the test completion at 19 pore volumes. The test yielded a peak grade of 351 mg/l U<sub>3</sub>O<sub>8</sub> and an average grade of 120 mg/l U<sub>3</sub>O<sub>8</sub>.

A chart of the uranium grade and recovery performance of the most recent hard acidification column test follows (**Figure 2**).



**Figure 2: Uranium grade and Recovery results from column test using fresh core from an unmined area and using oxidant from the start**

These results have been compared to the 2018 FS assumptions as presented in **Figure 3 and Figure 4**. Most critically, the recovery curves for both are comparable within the bounds of reasonable test variation. Both the FS and the column test result show a recovery level of approximately 90% after 14 PV's of flow.

The peak and average grade obtained in the column test are substantially higher than the FS levels, as expected, and reflect the higher grade core sample used compared to the average grade modelled in the FS. Higher grade areas of ore bodies are expected to deliver higher grade uranium solutions but recovery rates can vary, so having this particular test on a higher grade sample of Lance ore confirming the FS model is encouraging.

The 2018 FS model assumptions with respect to acid consumption were also strongly validated by the recent column tests. The acid requirement projection used in the FS was 58 pounds of sulfuric acid per pound of recovered U<sub>3</sub>O<sub>8</sub>. The hard acidification test result was 55 pounds per pound and the soft acidification test result was 50 pounds of acid per pound of recovered U<sub>3</sub>O<sub>8</sub>. Additional acid and additional processed PV's would be required in the soft acidification test to achieve a comparable overall uranium recovery level.

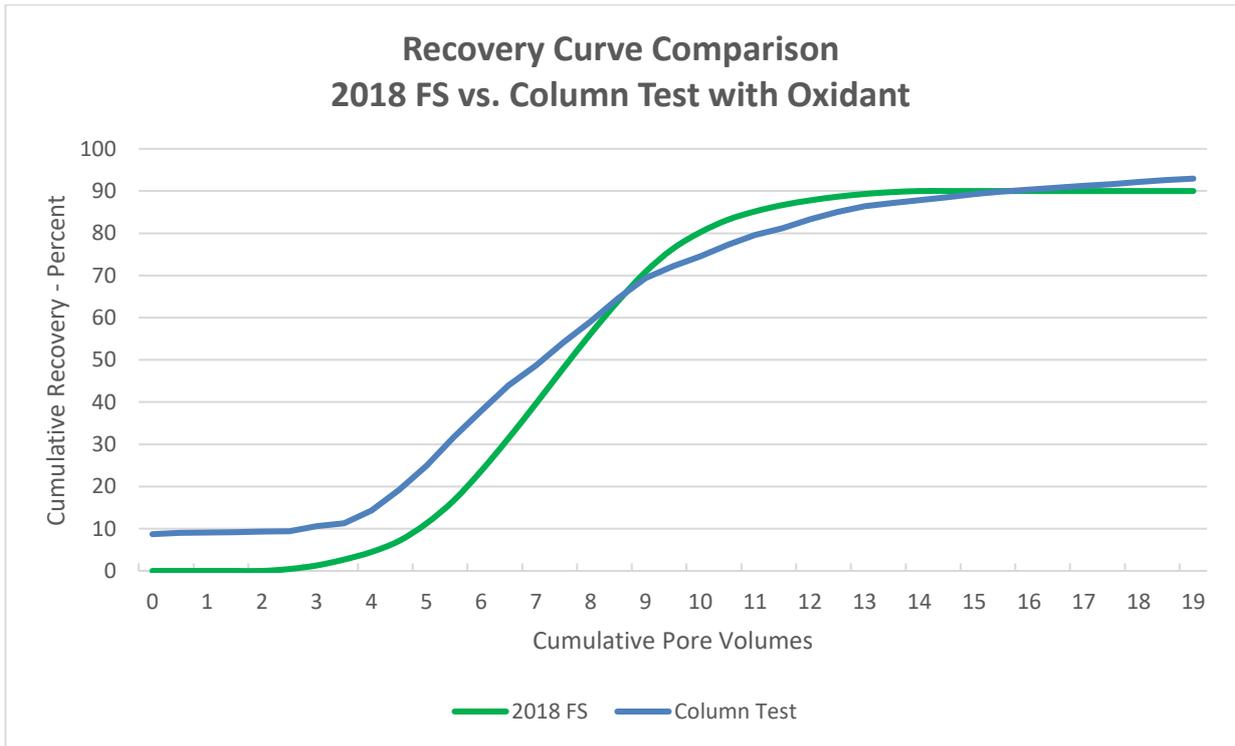


Figure 3: Uranium Recovery Curve Comparisons

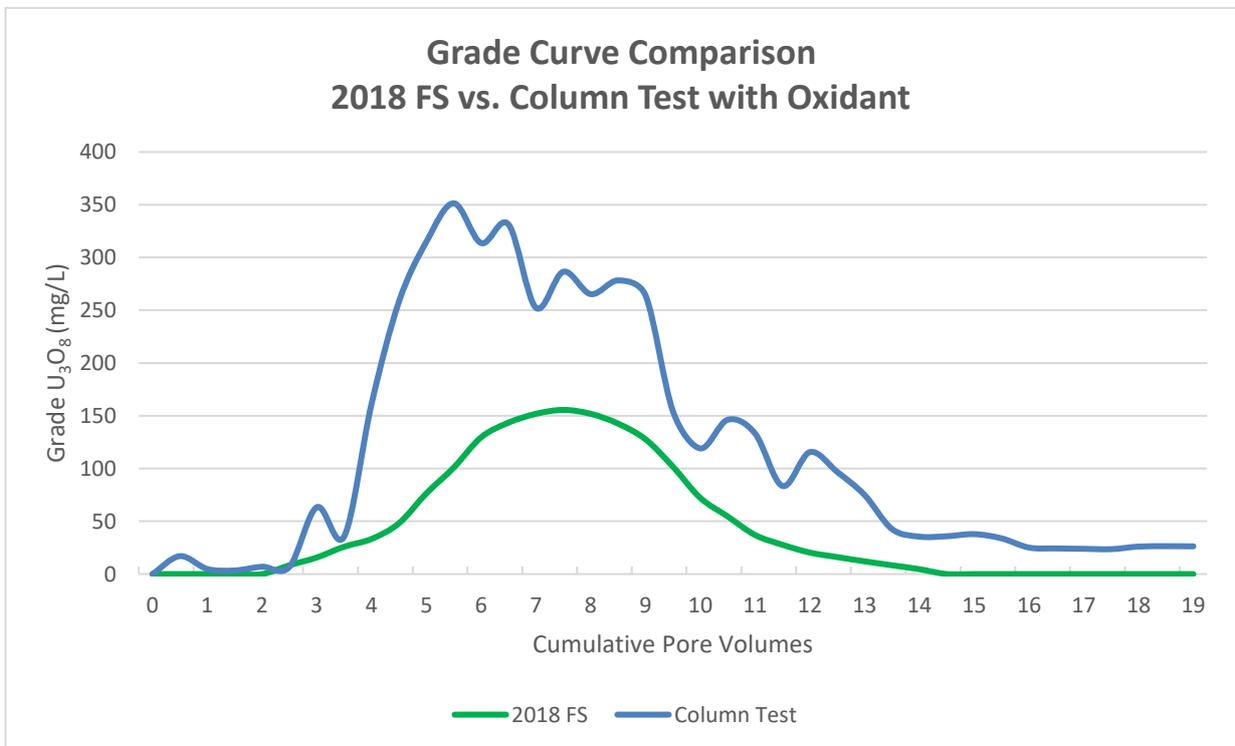


Figure 4: Uranium grade curve comparisons

### **Ion Exchange Resin Performance**

Ion exchange resin performance is affected by high levels of dissolved and suspended solids in feed solutions. Resin manufacturers produce a large selection of resin types tailored to meet the variable and demanding needs of industry. Changing from an alkaline to a low pH ISR process alters the resin requirements for the process plant at Lance. The actual performance of the ion exchange uranium recovery system during the CY2019 FLT indicated the need to focus additional research attention on this important processing step.

During the past year, a multitude of laboratory scale resin loading and elution (resin stripping) tests have been conducted on a wide selection of commercially available resins, using synthetic, lab generated and field-generated uranium-rich low-pH solutions. The laboratory test work has led to the selection of a preferred resin type for use in future commercial production operations.

The selected resin has the potential to positively impact the operating costs at Lance by achieving higher resin loading factors under the actual operating conditions. The Company intends to confirm the resin performance criteria as a component of the second low pH field demonstration

### **Second Field Demonstration**

A second low pH field demonstration recently commenced and will operate over the next 12 to 18 months in an unmined area of Mine Unit 1 (**MU1A**). MU1A contains an estimated resource of 44,000 pounds U<sub>3</sub>O<sub>8</sub>. Resources contained in MU1A have been reviewed by a Competent Person and are compliant with JORC Code 2012<sup>1</sup>. The 2019 FLT successfully demonstrated the potential for low pH mining, recovery and groundwater restoration in an area that was previously operated using alkaline ISR methods. Introduction of an oxidant was not required for the success of the FLT completed in CY2019 as the trial area was previously oxidized during alkaline ISR operations.

During the June quarter, a drill rig was remobilised to site following the easing of COVID-19 restrictions to complete the installation of mining and monitor wells for the MU1A field demonstration. MU1A wellfield preparation activities were completed in early July 2020.

On 20 July 2020, wellfield circulation in MU1A commenced to establish baseline operating conditions. Acidification of the trial area commenced on 4 August 2020.

In addition to preparing the wells for the field demonstration, scaled down ion exchange columns were constructed to match the anticipated flow rates of the MU1A trial area. Resins of the type selected from laboratory testing will be loaded into the columns for evaluation during the demonstration.

The primary objective of the MU1A low pH field demonstration is to confirm the optimal operating conditions as indicated by the laboratory studies. MU1A will be used to:

- **Demonstrate the effectiveness of oxidant addition with the low pH lixiviant.**
- **Demonstrate the use of existing ponds as the preferred, lowest cost option of managing solids typically encountered during the acidification process at low pH ISR operations**
- **Demonstrate the use of the preferred ion exchange resin under low pH operating conditions using uranium rich solutions sourced from MU1A; and**
- **Continue to evaluate other value accretion optimisation concepts for future low pH commercial operations, including activities aimed at increasing the uranium concentration level supplied to ion exchange columns and recovery of sulphuric acid to reduce future acid requirements and costs**



**Figure 5: Constructed Ion Exchange Test Columns for MU1A Field Demonstration**

### **Regulatory**

License amendment applications are being prepared for the use of oxidants with the low-pH ISR process and for the use of the ponds for solids management in future operations. Current licences and permits for Lance allow use of oxidants and the ponds during the limited scale field demonstration without amendments. The Company can also commence low-pH operations without these process enhancements, which were not described in the original low-pH amendment approvals. Starting in previously mined areas where oxidant is not necessary will allow time for the completion of the desired licence amendments prior to commencing production activities in new mining units.

The Company expects completion of these identified licence amendment activities by mid to late CY2021.

Yours sincerely

**Wayne Heili**  
**Managing Director / CEO**

*This release has been approved by the Managing Director / CEO.*

### **For further information, please contact**

Peninsula Energy  
+61 8 6263 4461

or

Citadel-MAGNUS  
Michael Weir - +61 402 347 032  
Cameron Gilenko - +61 466 984 953

## **About Peninsula Energy Limited**

Peninsula Energy Limited (PEN) is an ASX listed uranium mining company which commenced in-situ recovery operations in 2015 at its 100% owned Lance Projects in Wyoming, USA. Following a positive feasibility study, Peninsula is embarking on a project transformation initiative at the Lance Projects to change from an alkaline ISR operation to a low pH ISR operation with the aim of aligning the operating performance and cost profile of the project with industry leading global uranium production projects.

### **Competent Persons Statement**

The information in this announcement that relates to Exploration Results, Mineral Resources or Ore Reserves at the Lance Projects is based on information compiled by Mr Benjamin Schiffer. Mr Schiffer is a Registered Professional Member of the Society of Mining, Metallurgy and Exploration (Member ID #04170811). Mr Schiffer is a professional geologist employed by independent consultant WWC Engineering. Mr Schiffer has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'.

### **1 Detailed Classified JORC-Compliant Resource Estimate, Lance Projects: U<sub>3</sub>O<sub>8</sub>**

<b>Resource Classification</b>	<b>Tonnes Ore (M)</b>	<b>U3O8 kg (M)</b>	<b>U3O8 lbs (M)</b>	<b>Grade (ppm U3O8)</b>
Measured	3.4	1.7	3.7	487
Indicated	11.1	5.5	12.1	495
Inferred	36.2	17.2	37.8	474
<b>Total</b>	<b>50.7</b>	<b>24.4</b>	<b>53.6</b>	<b>479</b>

JORC Table 1 included in an announcement to the ASX released on 14 November 2018: "Revised Lance Projects Resource Tables". Peninsula confirms that it is not aware of any new information or data that materially affects the information included in this announcement and that all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.