August 24, 2020

SENT BY ELECTRONIC MAIL

Grassy Mountain Coal Project Joint Review Panel
Impact Assessment Agency
160 Elgin Street, 22nd Floor
Place Bell Canada
Ottawa, ON K1A 0H3

Attention: Alex Bolton, Chair, Joint Review Panel

Re: Benga Mining Limited
Grassy Mountain Coal Project
CEAA Reference No. 80101
Hearing Submission

Dear Mr. Bolton,

On June 25, 2020, the Joint Review Panel ("the Panel") determined that it had been provided with sufficient information for the Panel to hold a public hearing for the Grassy Mountain Coal Project ("the Project"). On June 29, 2020, the Panel issued a Notice of Hearing for the Project. In the Notice of Hearing, the Panel requested that Benga Mining Limited ("Benga") file its Hearing Submission on or before August 24, 2020. The attached document entitled "Hearing Submission" is in fulfillment of this requirement.

Benga trusts the provided information meets the expectations of the Panel and will be posted to the registry. Correspondence regarding this submission should be directed to the attention of Martin Ignasiak (Osler) and Mike Bartlett (Millennium EMS Solutions Ltd).

Sincerely,

<Original signed by>

Gary Houston, VP External Affairs
Benga Mining Limited

Coal Conservation Act Application Nos. 1844520, 1902073,
Environmental Protection and Enhancement Act Application No. 001-00403427, and
Water Act Application Nos. 001-00403428, 001-00403429, 001-00403430, 001-00403431,
Public Lands Act Application Nos. MSL160757, MSL160758, LOC160841, LOC160842, and LOC970943

Joint Review Panel
Impact Assessment Agency of Canada Reference No. 80101
Hearing Submission

Benga Mining Limited
Grassy Mountain Coal Project

August 2020

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1.0 INTRODUCTION

On June 29, 2020, the Joint Review Panel ("**JRP**" or "**Panel**") issued a Notice of Hearing for the Benga Mining Limited ("**Benga**") applications for the Grassy Mountain Coal Project ("**Project**"). The Notice of Hearing requires that Benga file a hearing submission. This is Benga's submission.

2.0 THE APPLICANT

The Project proposed by Benga is a steelmaking coal mine capable of producing a nominal 4.5 million clean tonnes per year. Benga is a Canadian company wholly owned by Riversdale Resources Limited ("**Riversdale**") which is owned by Hancock Corporation Pty Ltd ("**Hancock**"). Hancock became a shareholder of Riversdale in August 2018 and subsequently acquired all outstanding shares of Riversdale in May 2019. Hancock is a private company headquartered in Perth, Western Australia and is part of the Hancock group of companies (the "**Hancock Group**") who are collectively one of Australia's largest producers of iron ore and where they operate integrated mining, port and rail facilities at the Roy Hill iron ore operations. The Hancock Group also owns a 50% share of the Hope Downs iron ore operations.

3.0 THE PROJECT

The Project is located in southwest Alberta, approximately 150 km southwest of Calgary in the Crowsnest Pass and will cover areas within Townships 08 and 09 and Ranges 03 and 04, West of the 5th Meridian. The proposed steelmaking coal processing facility associated with the Project is planned to be located approximately 7 km north of the community of Blairmore. Approximately 55% of the Project is located on private lands acquired by Benga in 2013 while the remainder is on provincial Crown lands.

The Project will involve a high-quality steelmaking surface coal mine, a coal handling and preparation plant ("**CHPP**"), an overland conveyor system, which will parallel an existing access road and connect to a rail load-out facility and new rail connection to the existing Canadian Pacific line. The mine will be operated using conventional mining equipment, where the rock overlying the coal seams will be drilled, blasted and removed by excavators and loaded into haul trucks. Some of this waste rock will be stored at designated locations outside of the pit but as far as possible, this material will be placed in the mined-out area of the pit. In turn, the uncovered coal will be excavated and loaded into trucks and hauled to the CHPP for processing to create a high-value product. Once processed, the coal will be transported by a covered conveyor to the rail load out located adjacent to Blairmore and loaded directly into rail cars for transport to market.

The Project is located on a previously disturbed site from past mining activities that have not been properly rehabilitated. To the extent that these disturbed areas are within the proposed Project area, they will be remediated and reclaimed according to current standards and requirements. Thus, there exists a unique opportunity to have the Project site rehabilitated to a better state than currently exists.

The Project application and additional filings clearly demonstrate Benga's commitment to adopt industry best practice, as well as Benga's incorporation of ideas and technology to ensure that the Project is environmentally responsible and that issues specific to the location and Project are effectively managed. The feedback received from Indigenous communities and local stakeholders, particularly in respect of the environment and public safety,

has been pivotal in the development of the Project to this point and has informed many of the design decisions taken thus far. Some examples of these design choices include:

- selected train load-out location informed by community input;
- adopted state-of-the-art filtering and centrifuge drying in the CHPP to eliminate the need for a tailings dam and to maximize the recovery of the water used for processing;
- chose to locate ex-pit waste rock storage on high ground to minimize quantities of contact water and facilitate collection of this water for removal of selenium and other metals;
- chose to avoid and protect a historical indigenous site near the CHPP important to certain Indigenous communities;
- established a natural buffer zone along Blairmore and Gold creeks to minimize the risk of impact to the aquatic environment as well as leave migration routes for wildlife in the area; and
- blasting to occur primarily on weekdays during typical day-time hours and limited to smaller more localized blasts to reduce the amount of explosives used at any one time.

Finally, to be protective, Benga has proposed and committed to a number of contingency plans that can be implemented if needed to reinforce planned mitigations. It is important to reiterate that based on the water load balance modelling done for the Project, Benga does not expect that the contingencies included in the plans will be required; however, out of an abundance of caution, Benga is prepared to implement these contingency plans to protect health and the environment if deemed necessary through the Project's operational monitoring. Examples of these committed contingency plans include:

- the addition of an alternative selenium and nitrate removal processes using a gravel bed reactor;
- the addition of a mechanical water treatment plant such as the one built by Teck at Line Creek in British Columbia for the removal of selenium and nitrate; and
- the addition of a separate mechanical water treatment plant or bolt on facility to remove elevated levels of metals.

4.0 REGULATORY REVIEW

On September 29, 2014, Benga submitted its Project Description to the Alberta Energy Regulator ("**AER**"). The AER advised Benga, on November 21, 2014, that an environmental impact assessment ("**EIA**") would be required for the Project. The terms of reference ("**TOR**") were approved by the AER on March 19, 2015.

On March 26, 2015, Benga submitted its Project Description to the Impact Assessment Agency of Canada, then the Canadian Environmental Assessment Agency ("**Agency**"). On May 14, 2015, the Agency determined that an EA was required and commenced the EA review for the Project. The Agency released its draft Guidelines for the Preparation of an Environmental Impact Statement for the Project ("**Guidelines**") that same day. On June 13, 2015, the Agency finalized the Guidelines.

The integrated application for the Project was submitted to the AER and the Agency on August 12, 2016, which included the EIA. On August 16, 2018, a Joint Review Panel (JRP) was established by the Alberta and Federal Governments to conduct the review of the Project.

Benga has filed twelve addenda in response to requests for further information, which now form the record before the JRP. As a result, the JRP deemed the application complete and the evidentiary record sufficient to proceed to a hearing on June 29, 2020.

The following application numbers have been assigned to the Project:

- *Coal Conservation Act* Application No. 1844520 and 1902073;
- Environmental Protection and Enhancement Act Application No. 001-00403427;
- *Water Act* Application No. 001-00403428, 001-00403429, 001-00403430, 001-00403431;
- *Public Lands Act* Application No. MSL160757, MSL160758, LOC160841, LOC160842, LOC970943;
- AER Application No. 1902073; and
- Agency Reference No. 80101.

The Project is being assessed under the *Canadian Environmental Assessment Act, 2012*.[1] The Project will require applications under other federal and provincial legislation. Benga will file these applications in a timely manner and in most cases will do so after regulatory approval and ownership sanction of the Project. Other federal and provincial legislation that will require applications include, but are not limited to:

Federal

- *Fisheries Act*;
- *Species at Risk Act*; and
- *Explosives Act*.

Provincial

- *Alberta Dam Safety Regulation;*
- *Electrical Utilities Act;*
- *Historical Resources Act;*
- *Highways Development and Protection Act;* and
- *Municipal Government Act.*

The Project is located north of the town of Blairmore in the Crowsnest Pass region of Alberta. The integrated application submitted by Benga for the Project includes a Project footprint covering 1521 ha, which is comprised of approximately 55% private land owned by Benga and the remainder provincial Crown lands.

There are several land and resource use policies and regional planning initiatives applicable to the area covered by the proposed Mine Permit Boundary including:

[1] Letter from the Canadian Environmental Assessment Agency to Osler, Hoskin & Harcourt LLP on behalf of Benga Mining Limited re: Changes to Federal Legislation and implications for the Grassy Mountain Coal Project, Impact Assessment Agency Registry (August 12, 2019), Impact Assessment Agency of Canada, Registry Document No. 231 [Registry Doc 231].

- The Livingstone-Porcupine Hills Sub-Regional Integrated Resource Plan;
- The Crowsnest Corridor Local Integrated Resource Plan;
- The South Saskatchewan Regional Plan ("**SSRP**"); and
- The Approved Water Management Plan for the South Saskatchewan River Basin.

The SSRP, as amended in May of 2018, is the highest order of land use planning in Alberta for the region. The SSRP expressly acknowledges the potential for steelmaking coal within the region and it states:

> The metallurgical coal potential in the region is of significance in that the coal can be used in the steel-making process. For many developing or expanding countries, steel will be an essential component for infrastructure and Alberta's metallurgical coal could help meet those demands. Exploration and investment for coal near the Municipality of the Crowsnest Pass in the eastern portion of the region has increased over the past five years and demonstrates the future potential for coal development in the region. Ensuring opportunities for coal exploration and development in the region will create economic diversification opportunities and export markets for Alberta coal and mineral resources and will result in increased employment in the region.

5.0 PROJECT NEED

Benga completed an engineering feasibility study for the Project in October 2015 and remains committed to bringing the Project into the production phase. The Project has been designed to ensure its economic sustainability, such that employees and other stakeholders, including the local community and nearby Indigenous groups, can be confident that the Project will continue to operate and benefit the region throughout its 23-year life.

Benga has secured all critical contracts in respect of Canadian west coast export hubs for its high-quality product and remains in discussions with a number of potential customers in North Asia (*e.g.*, Japan, South Korea) and South America which are considered to be the markets for the high-quality product. Other markets that will likely purchase the product include Europe, South America, South East Asia, China, and India. The steelmaking coal product from the Project is low in impurities and Benga remains confident that the Project and its product will be well received into the market.

The strong growth of steelmaking coal demand is expected to be led by India and China. Similarly, other Asian, South American and African nations are also expected to be increasingly important contributors to global growth over the coming decade. As the steel intensity per capita of these countries increase, with greater demand for infrastructure, automobiles, machinery, buildings and other steel consuming industries, the ability to source high quality steelmaking coal from countries that can provide reliable supply, such as Canada, is of vital importance. In addition, Canada is also strategically positioned from a freight point of view for the Asian markets and the Project is located adjacent to major rail infrastructure providing access to an existing port in British Columbia.

6.0 PROJECT BENEFIT

The Project will produce up to 4.5 million clean metric tonnes (CMT) per year over the scheduled mine life of 23 years. Over the active mine life, a total of 167.6 million raw metric tonnes of coal will be produced at an average *in-situ* stripping ratio of 5.1 bank cubic metres ("**bcm**"). The average yield or recovery in the coal preparation

plant is expected to be 55%, which will result in a total recoverable coal volume of approximately 92.6 million CMT.

The initial capital expenditure for the Project is estimated to be $730 million. The Project will stimulate direct and indirect employment effects as well as induced employment effects in the regional and provincial economy through direct employment, the contracting of suppliers for the Project, and the spending by workers on goods and services in the Project area which will support the consumer goods and service sectors.

The construction phase of the Project is expected to support a $265 million in total GDP, including $192 million of labour income, in Alberta, as well as $70 million and $49 million in BC, respectively. In addition, the construction phase of the Project will support 1,660 person-years of total employment in Alberta and 475 person-years in BC. A representative year of operations is expected to support $95 million in total GDP, including $62 million in labour income, in Alberta, as well as $38 million and $27 million in BC, respectively. The operations phase of the Project will also support an annual total employment of 610 person-years in Alberta and 250 person-years in BC. To put it plainly, the Project will result in overall positive economic and fiscal effects within the regional study area, including within the Municipality of Crowsnest Pass, the Municipal District of Ranchland No. 66, as well as to the neighbouring communities of Sparwood, Elkford, and Fernie in British Columbia.

The development and ongoing operation of the Project will also contribute property taxes to both the Municipal District of Ranchland No. 66 and the Municipality of Crowsnest Pass, and will result in coal royalties payable to the provincial government, as well as corporate taxes to the provincial and federal governments. In turn, these royalties and taxes will expand the ability of the different levels of government to fund programs and initiatives in the regional study area and elsewhere.

The annual municipal tax payments to the Municipal District of Ranchland No. 66 and the Municipality of Crowsnest Pass are estimated to be $990,000 and $490,000, respectively. This translates to approximately $1.5 million annually in property taxes being contributed to the local governments, which amounts to nearly $35 million over the 23-year Project Life (present value of $11.2 million).

The Project is also estimated to provide an economic contribution in the way of Provincial and Federal income taxes and Provincial royalties. These taxes and royalties are projected to amount to $77 million annually (in 2019 dollars) or more than $1.7 billion cumulatively (present value of $500 million) over the 23-year Project life.

7.0 INDIGENOUS CONSULTATION

In June 2013, shortly after acquiring the Grassy Mountain properties, Benga began to undertake its extensive consultation and engagement activities with potentially affected Indigenous communities. The objective was to better understand the potential Project-related effects on Indigenous interests. The activities undertaken included, but are not limited to: sharing Project information, site tours, field work, Traditional Knowledge ("**TK**"), Traditional Ecological Knowledge ("**TEK**") and Traditional Use Studies, workshops, and open houses. These consultation activities have been ongoing throughout the EIA process and Benga will continue its consultation and engagement with Indigenous communities through the life of the Project.

The Project is located in Treaty 7 lands in Alberta and is also in the traditional lands of Métis represented by Métis Nation of Alberta Region 3. Additionally, several bands in British Columbia recognize the Crowsnest Pass as

their traditional lands as the area was a primary route for hunting on the plains of Alberta and trading with other communities. The AER has identified the Treaty 7 communities as potentially affected by the Project. The Agency has additionally identified Métis Nations of Alberta and British Columbia as well as other more remote communities in Alberta and several communities in British Columbia. Therefore, Benga has engaged with the following Indigenous communities in varying degrees regarding the Project:

- Piikani Nation
- Kainai Nation
- Siksika Nation
- Tsuut'ina Nation
- Stoney Nakoda Nation (Chiniki First Nation, Bearspaw First Nation and Wesley First Nation)
- Ktunaxa Nation Council
- Samson Cree Nation
- Ermineskin Cree Nation
- Louis Bull Tribe
- Montana First Nation
- Foothills Ojibway First Nation
- Shuswap Indian Band
- Métis Nation of Alberta Region 3
- Métis Nation of British Columbia Region 4

Based on feedback from the communities and guidance from the AER and Agency, Benga identified the Treaty 7 nations, Ktunaxa Nation Council and Metis Nation of Alberta Region 3 as those Indigenous communities potentially affected by the Project. To date, all of these Indigenous communities have completed TEK reports, which have been thoroughly reviewed, considered and factored into Project planning. These TEK reports have been provided to the JRP for its consideration as part of the Application and Addenda. Benga has also continued to consult and engage with the remainder of the Indigenous communities on the list through Project updates and meetings.

Benga's extensive consultation and engagement efforts are well-evidenced by the provision to the JRP of Project support letters from all of the Treaty 7 First Nations, as well as Métis Nation of Alberta. These letters are on the public registry as records #200, #207, #263, #299, #324 and #358. Benga is also working closely with Ktunaxa Nation Council to resolve final issues and hopes to reach that objective prior to the Hearing.

Nonetheless, Benga acknowledges that the JRP must fulfill its mandate by reviewing all information put before it in respect of the potential adverse environmental effects of the Project and how this may affect Indigenous communities' rights and interests. As such, in addition to Benga's extensive and ongoing consultation and engagement, Benga has assessed the potential effects on Indigenous communities. Benga's assessment focused on the following valued components ("**VC**"): (i) hunting and trapping; (ii) fishing; (iii) plant gathering; (iv) trails and travel-ways; (v) physical and cultural heritage; and, (vi) cultural and spiritual values. Benga acknowledges that predicted effects on wildlife, vegetation, water and air quality, aquatic ecosystems, noise, and other biophysical VC impact Indigenous VCs in both tangible and intangible ways. Similarly, these effects can act

synergistically on cultural and spiritual values to create intangible project effects on cultural and spiritual identity and community and individual well-being.

Benga is committed to fulfilling the terms, commitments, and additional mitigations outlined in the agreements it has reached with Indigenous groups and continues to be active working with each community. Key on-going activities include establishment of joint committee membership and mandates, communications protocols, baseline site surveys, and development of employment, training and contracting strategies. In addition, Benga, through its agreements with Indigenous communities has committed to implementing Environmental Stewardship Committees to oversee cultural monitoring programs, provide a focal point for feedback on environmental performance, and provide input and advice related to the Project reclamation.

8.0 HISTORY

The Project has undergone an extensive review spanning more than five years that has resulted in twelve addendums to the EIA as a result of feedback and questions received from Indigenous communities, stakeholders, governmental agencies and the JRP. The review process required considerable effort and expense by all those involved in developing and reviewing the Project EIA. The result of these efforts is an EIA that is comprehensive, inclusive and considerate of all concerns received, and entirely defensible. The materials filed to date in support of the Project are listed below:

Document	Registry Doc #	Date
EPEA, CCA, WA, PLA permit and licence applications[2] and supporting Environmental Impact Assessment (EIA)	42	August 15, 2016
Addendum 1 to the EIA	44	January 31, 2017
Addendum 2 to the EIA	53	October 16, 2017
Addendum 3 to the EIA	54	November 9, 2017
Addendum 4 to the EIA	55	November 27, 2017
Addendum 5 to the EIA	69	February 28, 2018
Addendum 6 to the EIA	70	April 30, 2018
Addendum 7 to the EIA	72	May 28, 2018
Addendum 8 to the EIA	89	October 24, 2018
Addendum 9 to the EIA	185	January 21, 2019
Addendum 10 to the EIA	251	September 9, 2019
Addendum 11 to the EIA	313	March 19, 2020
Addendum 12 to the EIA	360	June 22, 2020

[2] *Coal Conservation Act* Application Nos. 1844520, 1902073, *Environmental Protection and Enhancement Act* Application No. 001-00403427, and *Water Act* Application Nos. 001-00403428, 001-00403429, 001-00403430, 001-00403431, *Public Lands Act* Application Nos. MSL160757, MSL160758, LOC160841, LOC160842, and LOC970943

All of the above-referenced submissions and their supporting documents are available on the Agency registry. The summary above has been provided for ease of reference. In addition, Addendum 12 contains a cross reference index to facilitate location of information across all of the Addenda by subject area.

9.0 STAKEHOLDER CONCERNS

Although interested parties are not required to file their submissions until September 14, 2020, Benga is aware from its review of previous submissions by various stakeholders, including the requests for further information from the JRP, that the following issues have been raised by stakeholders. The following is meant to serve as a high-level summary of the key issues and the assessment and mitigation measures implemented by Benga to address these concerns:

9.1 Water Quantity

- Fundamentally, the only water that the Project will remove from the environment will be water that is left on the surface of the coal that leaves the site to market. This amounts to 3.3% of the clean coal that leaves the site or about 152,000 m^3/year.
- Benga has arranged for water licenses to extract water in the amount of 560,000 m^3/year or over 3 times the actual consumption. This is required to account for non-consumptive use such as recycling and re-using water in the CHPP.
- The Project will result in a shift of some water from Gold Creek to Blairmore Creek which is predicted to result in a modest reduction of surface flow in Gold Creek (maximum amount of ~10%). Based on the results of a detailed in-stream flow assessment, this will not have a significant effect on fish and their aquatic habitat.
- The water management system for the mine will include several storage ponds that can retain millions of cubic metres of water. Benga has committed to use this storage capability to improve conditions in Gold and Blairmore Creek by augmenting flows during very dry years if required based on on-going monitoring.
- Also due to the Project, the groundwater table will be lowered in the vicinity of the pit which will reduce the groundwater flow to Blairmore and Gold creeks. However, this water, which will be removed from the mine pit by pumping, will be returned to the creeks through the water management systems to result in a minimal net effect. Groundwater flow is expected to be restored to some extent once the open pits have been backfilled with rock and inundated by water.
- Lowering the groundwater table in the vicinity of the pit will have no discernable effect on wells or groundwater availability outside of the Mine Permit Boundary.

9.2 Water Quality – Keeping Clean Water Clean

- Most water pumped from the mine pit or intercepted on the site will not be negatively affected due to leaching of minerals from the mined rock.
- This water will be directed towards sedimentation ponds where any excess sediment will be removed using standard proven settling processes.
- Once tested and confirmed to be of suitable quality, this water will be returned to the environment through outflow points to Blairmore and Gold Creeks according to standard best practices for water management.

9.3 Water Quality – Contact Water

- Contact water is water that percolates across mined waste rock in the presence of air (oxygen) and leaches elements like selenium into the water. During operations and for some years after closure, contact water may also contain nitrate and ammonia left over from the blasting process.
- Selenium and nitrates in contact water is a well-known problem in other coal mines with similar geology in the region. However, Grassy Mountain will be one of the first mines to be designed from the beginning to deal with this problem and therefore has a tremendous advantage in this area over existing operations.
- Benga has committed to place as much waste rock as possible in the mined-out pit and below ground water levels where leaching of minerals will be negligible.
- For waste rock that must be placed outside the mine pit, Benga has chosen storage sites that are on high ground and steeper slopes rather than in valleys to minimize the amount of contact water and facilitate its collection.
- Ex-pit storage sites will be designed to promote movement of water out of the rock pile and into collection ditches and drainage to engineered "surge" ponds. Preparation of these sites will include grading to eliminate ponding, drainage ditches and where necessary selective sealing of fissures in the underlying rock. Again, Benga notes that this would not have been the case at many legacy mines where mine design was not conceived with capture of contact water in mind.
- Once collected in dedicated surge ponds, contact water will be directed to a Saturated Backfill Zone (SBZ). A SBZ is a mined out pit, which has been backfilled with waste rock and flooded. Benga will manage oxygen levels in the SBZ to promote natural biological processes which will remove dissolved nitrate and selenium from the water. These are the same biological process used in many commercial water treatment plants.
- In spite of the care taken in design of the ex-pit rock storage sites, Benga expects that a small percentage of contact water will escape to the ground water system. Benga has proposed to monitor ground water and if necessary, implement a ground water capture strategy to reduce selenium loading to the environment through this route. Benga notes that water moving through the ground will likely take months or decades to reach Blairmore or Gold Creeks during which time it is likely that any selenium or nitrate may attenuate through the same natural process that is proposed for the SBZ.
- The Grassy Mountain SBZ will be similar to the full-scale Saturated Rock Fill (SRF) that has been built in an existing mined-out and backfilled pit and put into operation by Teck at the nearby Elk Valley coal mine complex. Benga notes that in a December 2019 conference, Teck provided a graph of results from its SRF indicating selenium content in the effluent in the range of 10 ug/L[3] which is well within the 15 ug/L assumed in Benga's water modelling.
- To be conservative in its analysis Benga has made a number of safe assumptions in its water modelling to predict quantities of contact water and water quality that are generous and unlikely to be exceeded.
- Water residence time in the SBZ (time for biological action to occur) will be on the order of months when laboratory testing indicates that most nitrate and selenium is removed in a matter of days.

[3] *Klein R., S. Shaw and L. Karbashewski.* Removing Selenium and Nitrate using Saturated Rock Fills: From Concept to Full-Scale Operation. 26th Annual BC/MEND Metal Leaching/Acid Rock Drainage Workshop. Vancouver, BC. December 4-5, 2019, page 25. (Appendix A).

- Once treated in the SBZ, the contact water will be re-oxygenated and then tested to confirm it meets water quality parameters before being discharged into Blairmore Creek.
- No treated contact water will be discharged into Gold Creek and consequently selenium or nitrate levels are not projected to be significantly different than current background levels as a result of the Project.
- Concern has been raised that the small amount of selenium exiting the SBZ will be in the form of selenite rather than the less biologically active selenate form. Benga has proposed to implement an advanced oxygenation step in its water treatment system if required to reduce selenite to selenate. Benga notes that in a recent presentation by Teck on this issue relative to its Line Creek selenium treatment plant, a similar process has been successfully implemented[4].
- Levels of selenium and other water quality constituents in Blairmore Creek are predicted to remain at levels that will not significantly affect aquatic life based on the specific conditions of the creek.
- To accurately assess potential risks of predicted downstream change in water quality, particularly from selenium and sulphate which are predicted to exceed generic provincial water quality guidelines, site-specific toxicity testing was conducted using creek waters to identify safe concentrations of selenium and sulphate in lower Blairmore Creek given cumulative changes in toxicity-modifying factors. Protective, site-specific targets for selenium and sulphate in lower Blairmore Creek were proposed based on the results of these tests. Water quality is predicted to meet all provincial water quality guidelines in the Crowsnest River.
- In an abundance of caution, and recognizing that the water modelling is based on laboratory data, Benga has committed to install additional engineered selenium treatment systems such as gravel bed reactors or commercial treatment plants if they prove necessary to protect the environment. If the latter option is chosen, Benga notes that it may be similar to the existing Line Creek Selenium Treatment Plant used by Teck in its Elk Valley complex which has been demonstrated to produce effluent consistently below 15 ug/L *(i.e.*, lower than the assumption used in Benga's water modelling).[5]
- Benga has also committed to install a metals treatment plant based on proven water treatment technology to remove other metals such as cobalt and zinc if it is necessary.
- In summary, Benga has committed to a robust layered and adaptive approach to managing water quality.

9.4 Westslope Cutthroat Trout (Species at Risk)

- Westslope Cutthroat Trout (WSCT) is a species at risk in the area of the Project primarily caused by competition from non-native fish species in the region like brook trout and rainbow trout.
- Genetically pure WSCT exist in Gold Creek and to a lesser extent in Blairmore Creek because natural and man-made barriers in both creeks prevent the invasion of non-native species.
- Unfortunately, the same barriers that protect the WSCT from non-native species confine the local population to sub-optimal fish habitat conditions.

[4] *Davidson T.* Developing a Solution to Selenium Speciation. 26th Annual BC/MEND Metal Leaching/Acid Rock Drainage Workshop. Vancouver, BC. December 4-5, 2019, page 21.(Appendix A).

[5] *Davidson T.* Developing a Solution to Selenium Speciation. 26th Annual BC/MEND Metal Leaching/Acid Rock Drainage Workshop. Vancouver, BC. December 4-5, 2019, Page 21. (Appendix A).

- Because of the Project and research conducted by Benga, more is known now about the WSCT and the limitations of Blairmore and Gold creeks than ever before.
- As mentioned above, Benga does not foresee harm to the persistence and sustainability of the WSCT population to be caused by water quality. Some sources of food supply to the creeks will be lost when vegetation is cleared for the mine; however, it is not expected to result in significant changes that would affect WSCT survival.
- Benga has proposed a Fisheries Offset Plan that is intended to replace (counterbalance) changes to fish habitat and to improve overwintering conditions on Gold Creek which should help to stabilize and sustain the local population of WSCT.
- In proposing this Fisheries Offset Plan, Benga has consulted with the Department of Fisheries and Oceans, the Alberta Energy Regulator, Alberta Parks and Environment, and followed the recommendations of the Westslope Cutthroat Trout recovery strategy and action plan (2019 [proposed]), and will continue to consult and receive guidance and oversight from these provincial and federal regulators.
- It is expected that the WSCT population in Gold Creek will benefit from the Project's Fisheries Offset Plan.

9.5 Site Reclamation

- Benga has proposed a draft reclamation plan in its application which was substantially updated in July 2019 and included in Addendum 10.
- Finalization of the Plan and on-going modifications to adapt to experience and new ideas will be overseen by Alberta Environment and Parks and will be informed through consultation with Indigenous communities as required in agreements with certain communities.
- Benga has proposed a progressive strategy which will see reclamation begin on the waste rock disposal areas and some parts of the mine as early as year two of the Project operations.
- Final reclamation certificates will be granted by the Alberta Government only after the landscape has been returned to an equivalent capability.
- Benga will be required to post financial assurance under the *Coal Conservation Act* called the Mine Financial Security Program. This program, managed by the AER, ensures that sufficient financial assurance is held until reclamation certificates are issued for the entire site.

9.6 Wildlife

Similar to many development projects some wildlife habitat loss and changes in wildlife movement due to avoidance can be expected to occur, especially within the active mining area. However, through the Project's progressive reclamation and the implementation of extensive mitigation plans, it is expected that long-term Project effects on habitat availability, wildlife movement, mortality risk, wildlife abundance, and wildlife diversity will be effectively mitigated. Some key mitigations include:

- The progressive site reclamation plan will ensure early establishment of a variety of vegetation species and communities suitable for wildlife, and will encourage structural complexity within the forests.
- Forested buffers adjacent to creeks and linear corridors such as the access road will be preserved to provide habitat and connectivity around the site.

- The existing legacy mining disturbances will be incorporated into the development and reclamation plans for the project so that there is a net gain in habitat at the end of the Project.
- Pre-disturbance surveys will be conducted along the edges of all areas to be cleared during Project development to determine the occurrence of any important wildlife habitat features.
- Timing of vegetation clearing activities are planned outside the April 15 to August 15 period to avoid disrupting nesting migratory and resident songbirds and raptors.
- Pre-disturbance denning (bears, marten, *etc.*) and roosting (bats) surveys will be conducted prior to vegetation clearing and other high-disturbance activities.
- Wildlife crossing locations will be adopted (ravines, gullies) or constructed (underpasses, culverts) along the conveyor belt route to promote east-west movement of mammals. Monitoring of these crossings will be conducted and design alterations completed if crossing detection rates are not satisfactory.

9.7 Dust and Air Quality

Benga is proposing a mine that incorporates modern mining practices for controlling dust. As a result, Benga's air models, even taking into account the high winds in the area, show that "Dust" or "Total Suspended Particles" close to the mine permit boundary and in the townsite will be similar to dust levels currently experienced in the town of CNP. Some of the key dust mitigation strategies include:

- the coal processing plant will be contained within an enclosed area and all coal material handling will be *via* covered conveyors;
- dust generation from transferring coal from the conveyor to the stock pile will be minimized by the use of luffing stackers (those that can lower and raise their boom) which will minimize the drop height and drop time of the coal;
- fugitive dust generation will be minimized at the rail load-out, with full cladding on the sides of the load-out structure to create a wind shelter, a movable discharge chute of the bin located as close as practical to the coal within the rail cars, and tackifier (a type of varnish) sprayed onto the coal surface of the loaded rail cars;
- water is systematically applied to haul roads and to the plant access road to minimize dust using a water truck dedicated to this purpose;
- snow cover is retained on the road as a mitigative measure during the winter months, unless the cover would compromise the safety of vehicle operations; and
- an environmentally-friendly chemical dust suppressant (such as EnviroBind) will be used on roads, in addition to water, as necessary to further mitigate dust.

9.8 Noise

- Extensive noise modelling was conducted by Benga and as would be expected, noise levels around the mining area will be higher than they are today. However, models confirm that expected noise is below AER guidelines for all residential receptors.
- Noise monitoring during operations will be conducted by Benga to determine if the model predictions and effectiveness of the mitigation measures are correct.
- Follow-up activities, including complaint investigation will be managed and regulated in accordance with the AER's Directive 038.

9.9 Effect on Tourism

Benga considers that economic development, recreation and tourism are compatible and mutually supportive in the community and region.

- Diversification of the local economy beyond one industry, whether tourism or mining, provides stability to the community that supports local infrastructure and investment by the municipality.
- A larger local economy, based on combined effect of tourism and mining, creates more opportunities for the service sector and supports more local businesses like restaurants and hotels. These service businesses in turn make the region a more attractive tourist destination.
- CNP is already a desirable community but improving its standing as a tourist destination also helps Benga to attract talented employees to the region which is good business.

Benga looks forward to addressing these issues further at the hearing. Benga has been granted the opportunity to respond to parties' submissions by no later than September 28, 2020. Benga expressly reserves its right to further respond to these issues, including by providing further evidence, if necessary, in its response to be filed September 28, 2020.

10.0 OUTCOME

Benga requests the approval to construct, operate and reclaim the Project. Benga has submitted applications that meet all applicable regulatory requirements and has proposed mitigations and provided commitments that will reasonably minimize the potential environmental and social effects associated with the Project. If approved, Benga will develop the Project in a safe, orderly, efficient, economic and environmentally responsible manner. As such, Benga believes that the Project is in the public interest and Benga expects the outcome of the hearing will result in the JRP coming to the same determination with any conditions imposed being consistent with those that have been placed upon similar projects in the region.

From a timing perspective, Benga would like to receive approvals in time to begin construction activities in the summer and fall of 2021. Alberta and the local region have been experiencing depressed economies in recent years which has been exacerbated in 2020 by the COVID-19 crisis. Economic activity in the form of a significant construction project in the Crowsnest Pass area will go a long way to returning people to work and building confidence. Benga is ready to take the next step and would welcome the opportunity to fill the economic gap that currently exists.

11.0 WITNESSES

The initial witness panel members of Benga will be Mr. Gary Houston and Mr. Mike Bartlett. Benga will provide the names of further witnesses after it has reviewed the submissions of the other parties that will be filed on or before September 14, 2020.

APPENDIX A

Removing Selenium and Nitrate using Saturated Rock Fills: From Concept to Full-Scale Operation

Teck Resources Ltd.
Liz Karbashewski, Manager Applied R&D

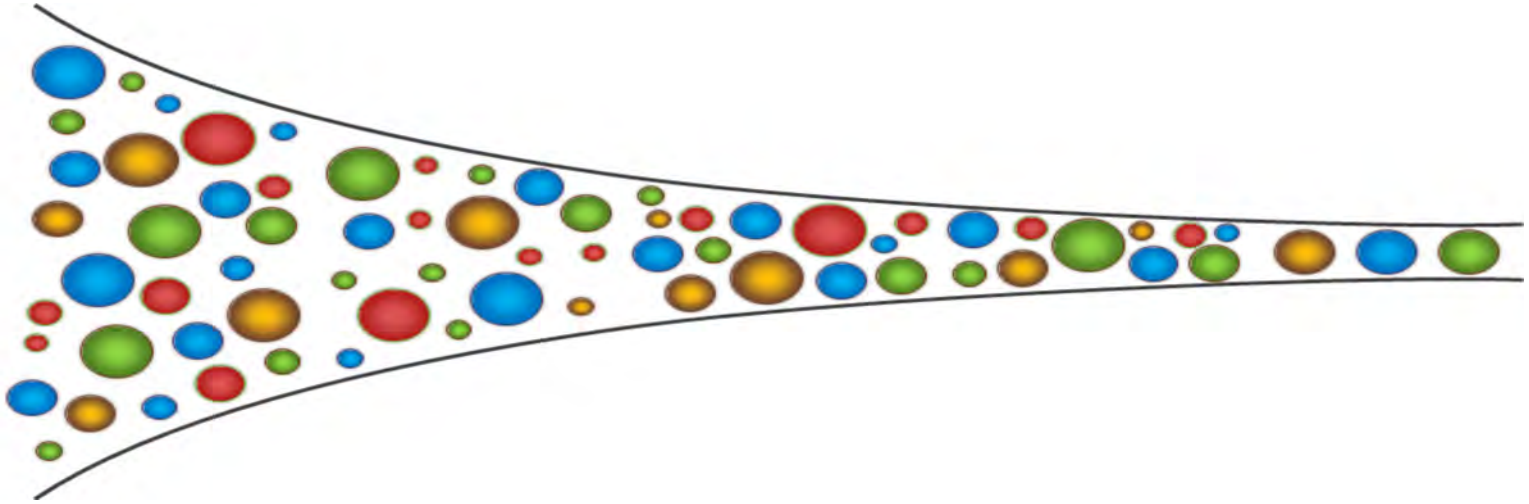
SRK Consulting (Canada) Inc.
Rob Klein, Senior Consultant (Environmental)
Shannon Shaw, Principal Consultant (Geochemistry)

December 5, 2019

Teck

Overview of Teck R&D Stage Gate Process

Resolve technical uncertainty at the smallest scale possible to manage cost and risk, and advance the most promising technologies in a timely manner



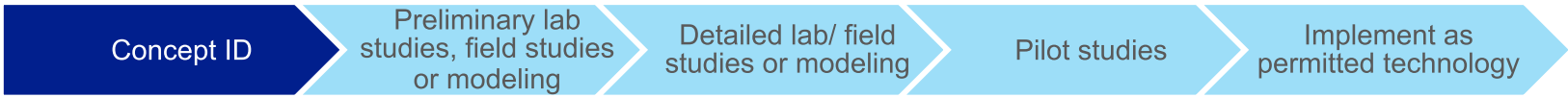
Concept ID → Preliminary lab studies, field studies or modeling → Detailed lab/ field studies or modeling → Pilot studies → Implement as permitted technology

Selenium Management Approaches

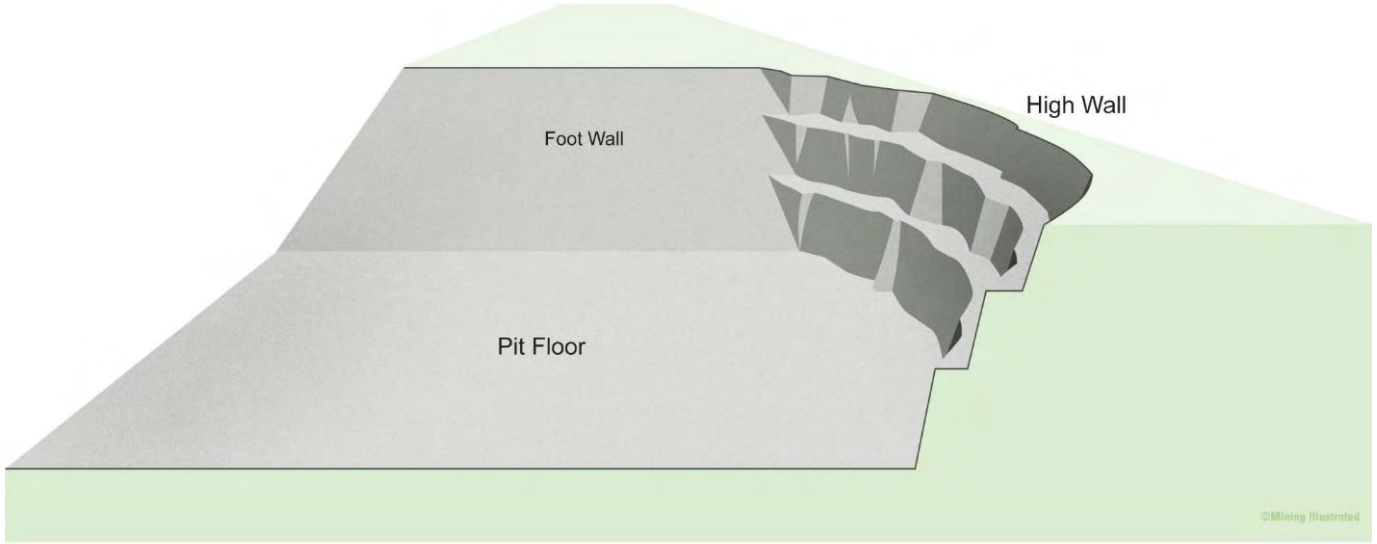
Numerous potential technologies were identified by internal and external groups that could be used to manage water quality in the Elk Valley

- Source control
- Tank-based water treatment
- *In situ* water treatment
- Fundamental studies

SRFs were identified as a candidate for further study.

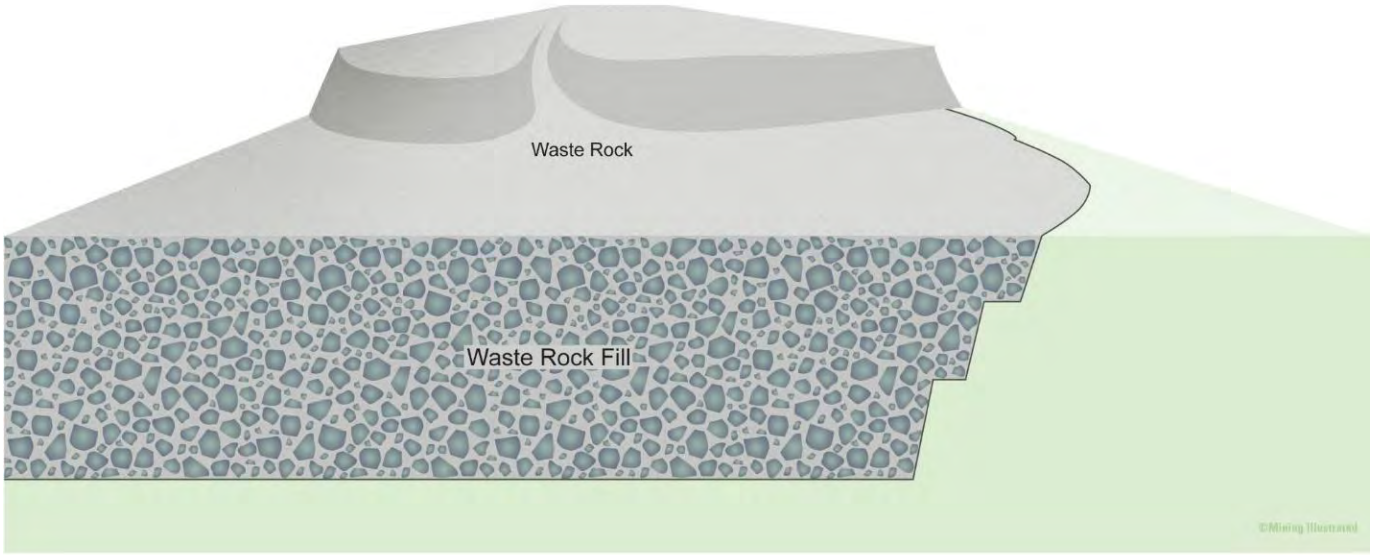


What is a Saturated Rock Fill?
Start with a fully contained pit



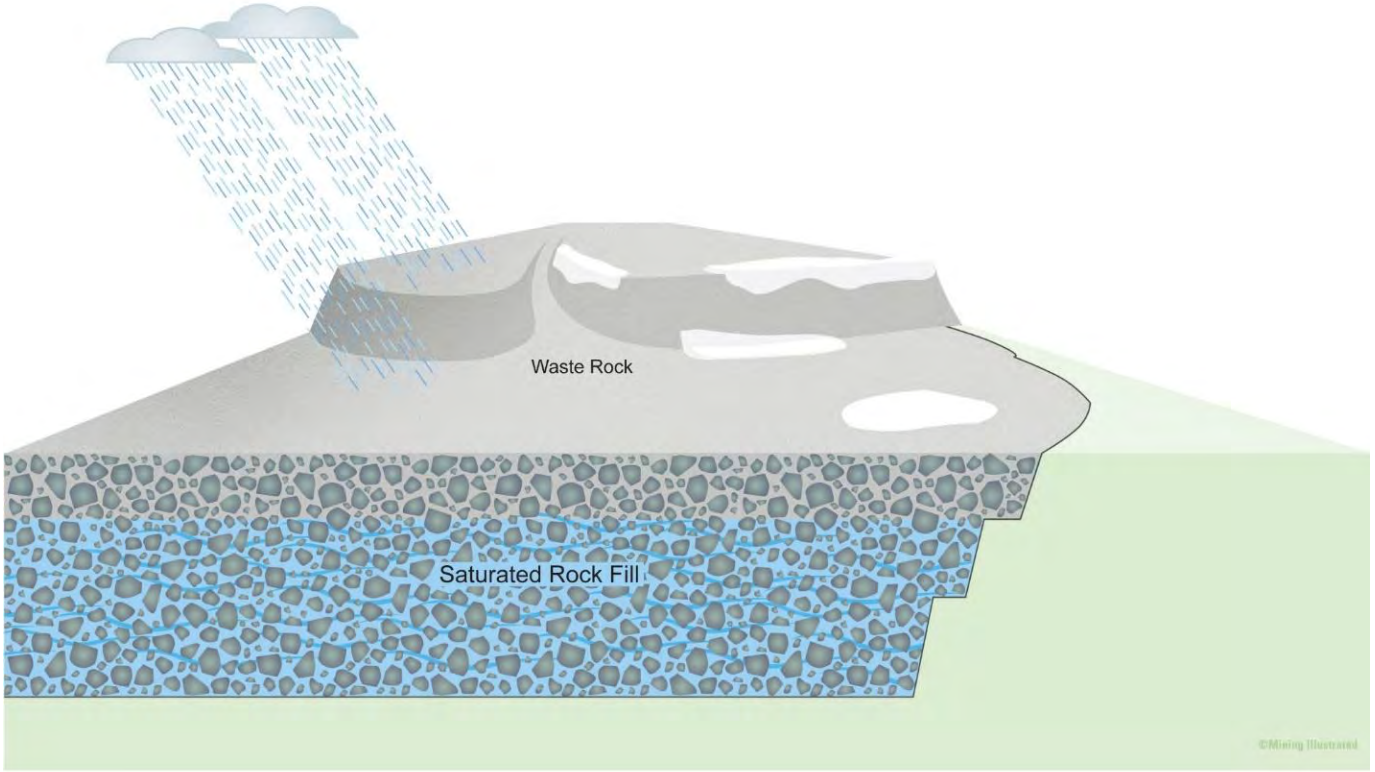
What is a Saturated Rock Fill?

Fill that pit with waste rock



What is a Saturated Rock Fill?

The pit then holds water from precipitation



What is a Saturated Rock Fill?

Partially Backfill Pit

What is a Saturated Rock Fill?

Fully Backfilled

How do they work?

The saturated portion supports a microbial community capable of nitrate and selenate reduction.

Occurs through anaerobic respiration where microbes use nitrate and selenate instead of oxygen as electron acceptors to gain energy from carbon oxidation.

When they are reduced, they are removed from the water

1. Concept Identification

2009-2011

Mode of Se release is oxidative dissolution of pyrite.

- Strong correlation between sulphate and selenium

Early SRF sampling results had similar sulphate concentrations to surface waters around the Elk Valley, but with lower selenium

Why do backfilled pits have lower selenium?

2. Preliminary Studies

2011-2012

Key question:

- What causes lower selenium in SRFs and do we have a suitable number of SRFs?

Approach:

- Inventory and sampling of existing SRFs

Risk management:

- Lab and desktop work only

Teck

Concept ID | **Preliminary lab studies, field studies or modeling** | Detailed lab/ field studies or modeling | Pilot studies | Implement as permitted technology

2. Preliminary Studies - Results

2011-2012

What causes lower selenium in SRFs?

- Microbiology capable of Se and NO_3 removal present

Do we have a suitable number of SRFs?

- Several locations in the Elk Valley where this technology would be applicable and could be studied
- Lower Se and NO_3 in numerous SRFs

Concept ID | **Preliminary lab studies, field studies or modeling** | Detailed lab/ field studies or modeling | Pilot studies | Implement as permitted technology

3. Detailed Studies

2012 - 2014

Key question:

- How fast does Se removal occur and what mechanisms are at work?

Approach:

- Detailed lab studies replicating field conditions
- Push-pull tests at multiple wells

Risk management:

- Small tests (<10 m^3) paired with lab testing

Concept ID | Preliminary lab studies, field studies or modeling | **Detailed lab/ field studies or modeling** | Pilot studies | Implement as permitted technology

3. Detailed Studies - Results
2012 - 2014

How fast?

- Biological Se and NO_3 removal rates are meaningful

What mechanisms are at work?

- Selenium removal is likely to occur via:
  - biological reduction of Se(VI) to Se(IV),
  - abiotic adsorption, and
  - further reduction to elemental Se(Se(0))

Teck

Concept ID | Preliminary lab studies, field studies or modeling | **Detailed lab/ field studies or modeling** | Pilot studies | Implement as permitted technology

4. Pilot Studies

2015

Key question:

- How much water can be conveyed and how permanent is removal?

Approach:

- Dedicated SRF drilling with material collection for lab studies
- Geophysics and hydraulic testing

Risk management:

- All remobilization testing done in the lab

Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

4. Pilot Studies - Results

2015

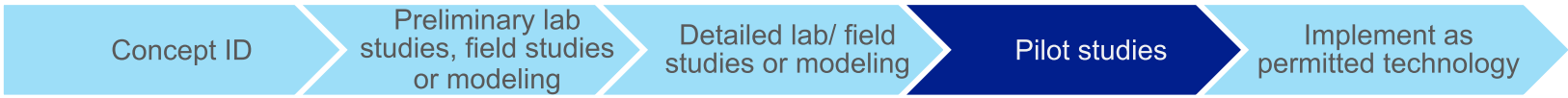
How much water can be conveyed?

- SRFs have hydraulic conductivities capable of conveying mine-scale volumes of water (10's of thousands m^3/d)

How permanent is removal?

- Management of dissolved oxygen in SRFs is important as it can remobilize attenuated selenium

- Overly reducing conditions did not remobilize selenium and trace element release is unlikely



5. Pilot Studies

2016

Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

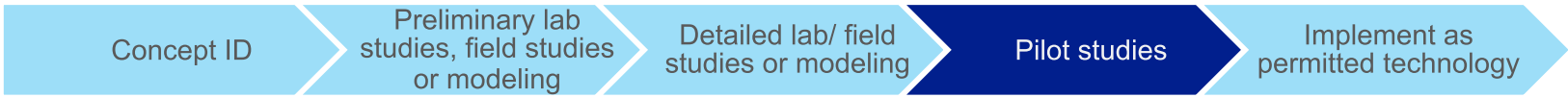
5. Pilot Studies - Results

2016

Can SRFs remove Se and NO_3 in the field?

- Yes, >90% Se and NO_3 removed
- No unexpected water chemistry

Results indicated that it should be possible to treat mine scale volumes of water – recommended trialing at a full scale



6. Full Scale Trial
2017-2018

Key Question

- Can SRFs reliably treat mine-scale quantities of water?

Approach

- 10,000 m^3/d capacity
- Predicted Influent:
  - ~30 mg/l Nitrate
  - ~100 ug/l Se

Teck

Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

6. Full Scale Trial

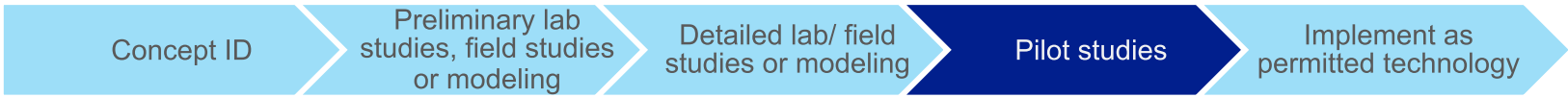
Risk Management - Operations

Buffer pond with 24 hour capacity as well as an onsite laboratory

Storage capacity onsite for off-spec effluent

Experienced operations team

Extensive monitoring (55 locations, 13,000 water samples, >1 million data points)



6. Full Scale Trial

Risk Management - Risk Register

Assessed risks of

- Full Scale Trial specifically
- Technology in general

- Involved all the key technical specialists and stakeholders

Teck

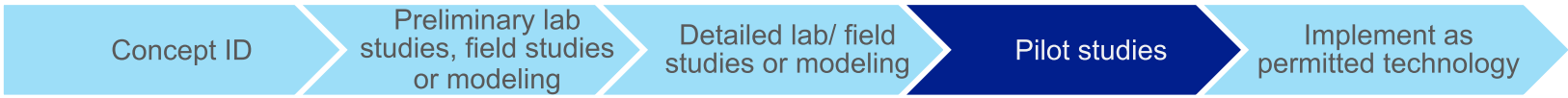
Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

6. Full Scale Trial

Risk Management – External Oversight

Expert Advisory Panel

- 8 person team of experts provide technical oversight
  - Enviromin Consulting
  - Geosyntec Consulting
  - Montana State University
  - O'Kane Consultants
  - SRK Consulting (Canada) Inc.
  - Teck Applied R&D team
  - University of Saskatchewan



6. Full Scale Trial

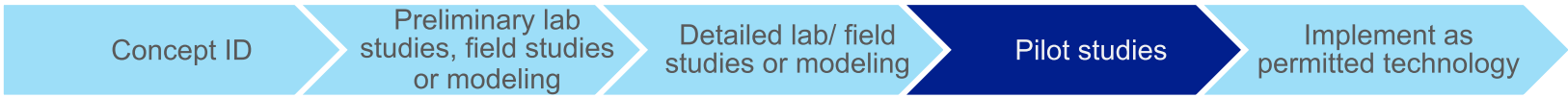
Risk Management – External Oversight

Independent Peer Review

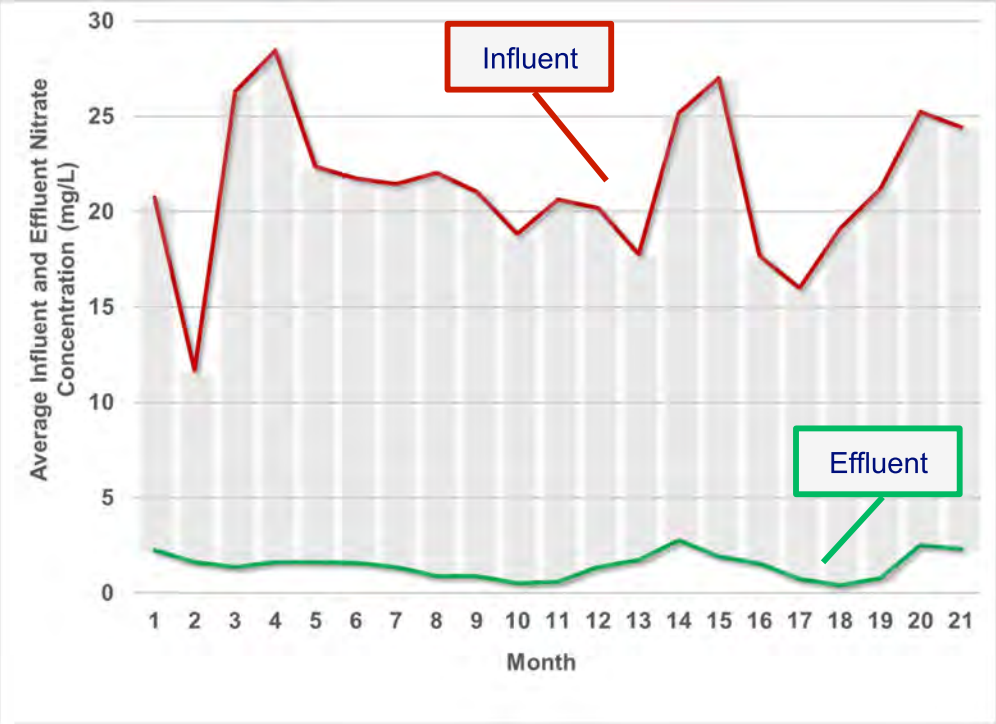
- Week-long review of results by 4 independent experts after trial conclusion

Regulatory Engagement

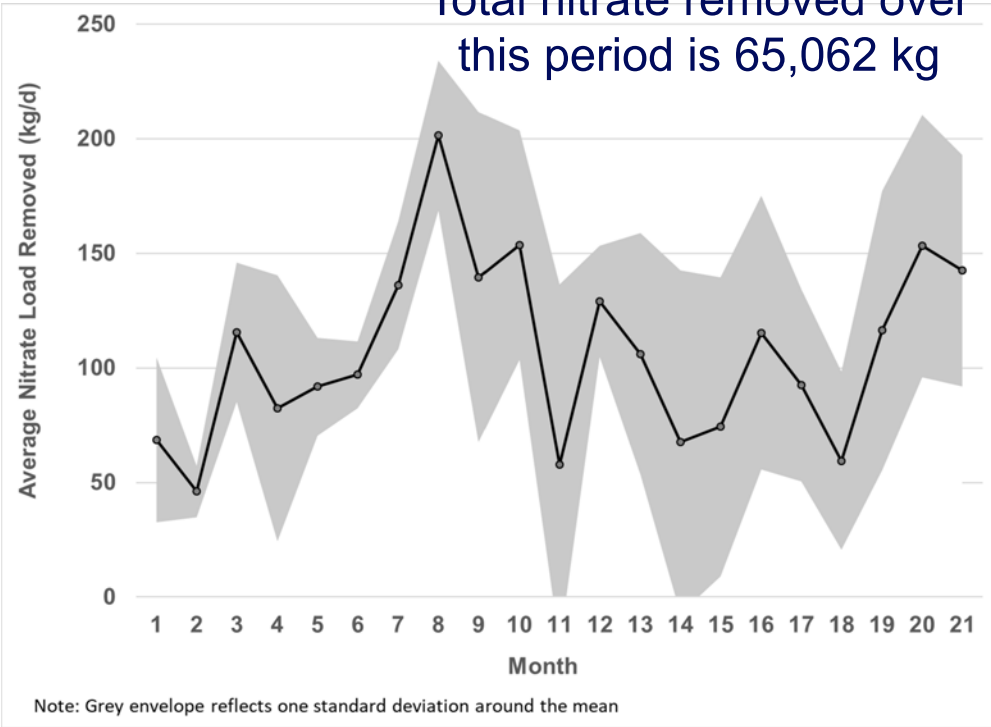
- Early and often



6. Full Scale Trial Results - Nitrate removal



Total nitrate removed over this period is 65,062 kg

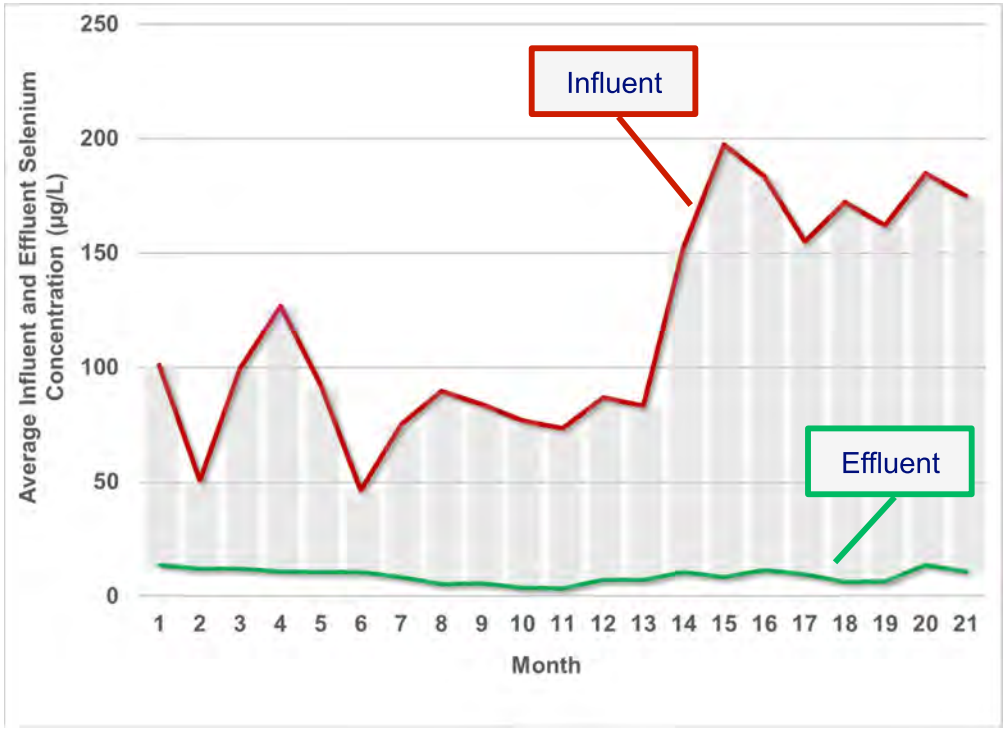


Note: Grey envelope reflects one standard deviation around the mean

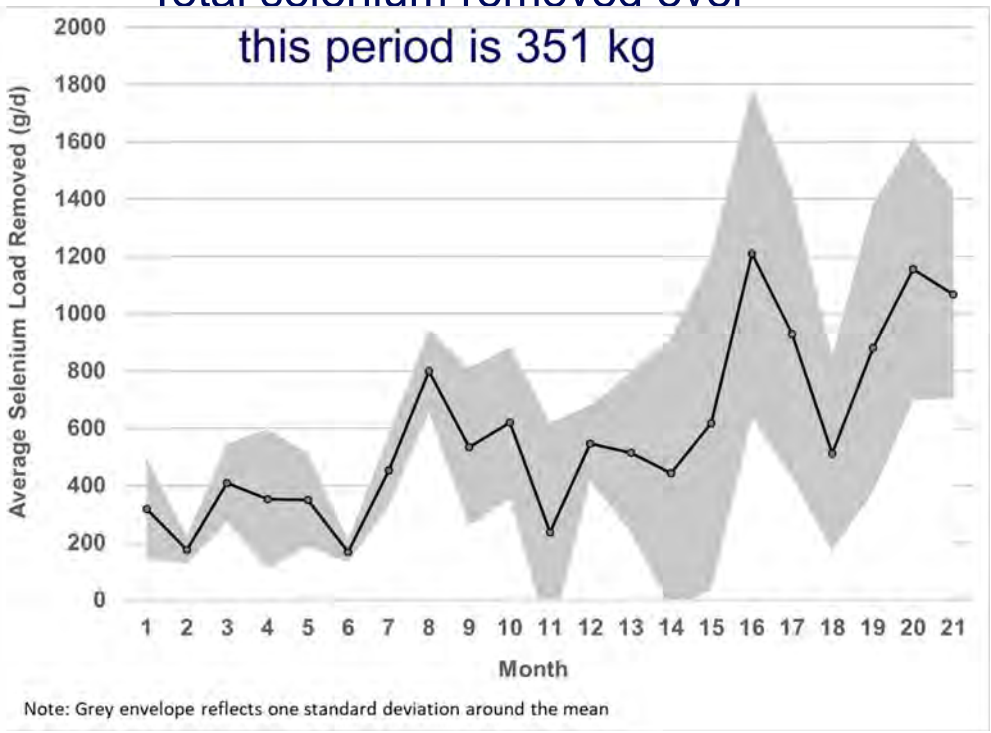
Teck

Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

6. Full Scale Trial Results – Selenium removal



Total selenium removed over this period is 351 kg



Note: Grey envelope reflects one standard deviation around the mean

Teck

Concept ID | Preliminary lab studies, field studies or modeling | Detailed lab/ field studies or modeling | **Pilot studies** | Implement as permitted technology

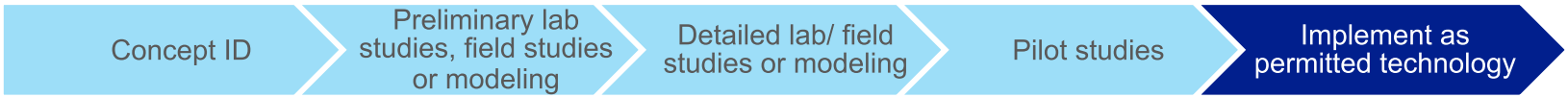
Conclusions and Next Steps

R&D stage gating of development allowed Teck to manage risk.

After 2 years and almost 4 million m^3 of water, Teck has demonstrated that SRF technology can safely remove Se and NO_3 at a meaningful scale.

Next Steps

- Expansion to 20,000 m^3/d capacity
- Continued R&D on remaining uncertainties
- Use of Adaptive Management Process to adapt to low velocity risks
- Trigger Action Response Plans embedded in operational management
- Peer Reviewed Publications



Questions?

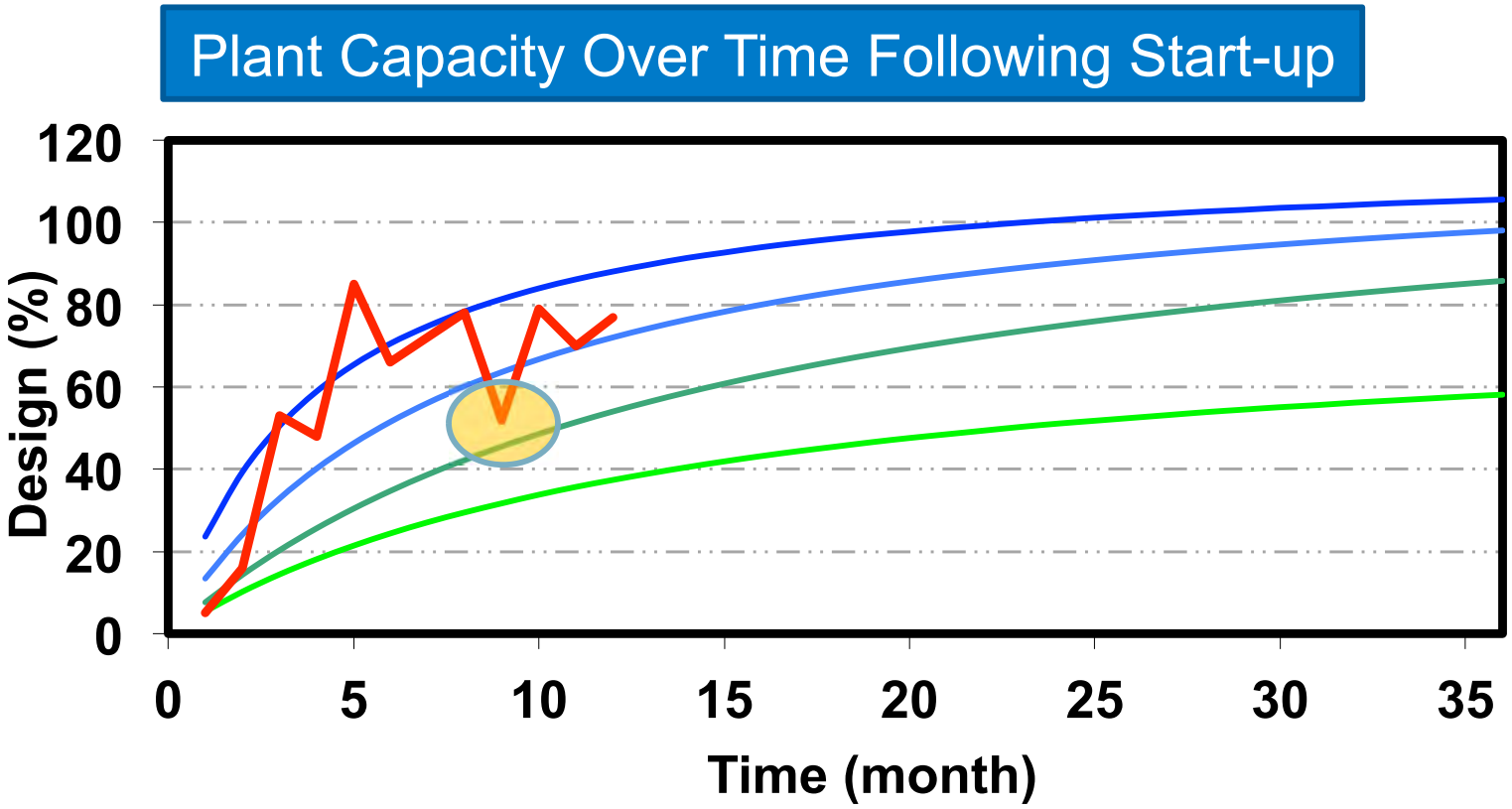
Developing a Solution to Selenium Speciation

Thomas Davidson

MEND 2019 Presentation

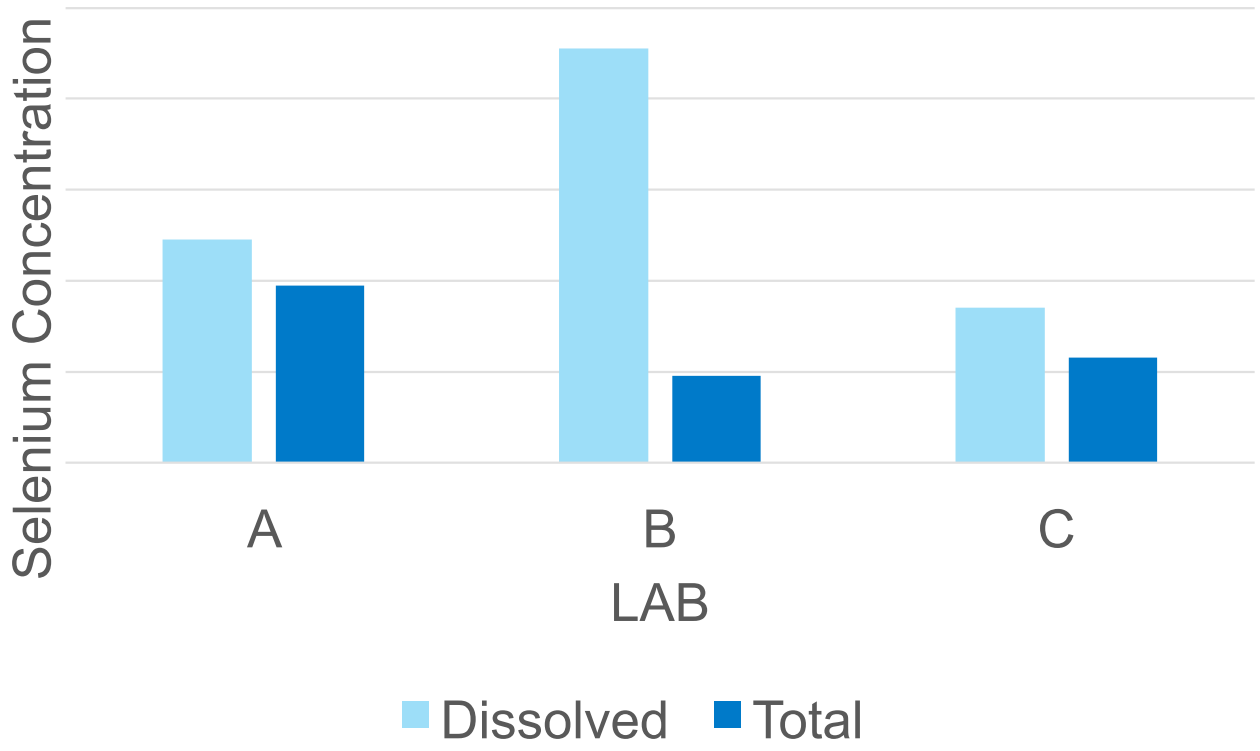
December 5, 2019

Normal Start-Up

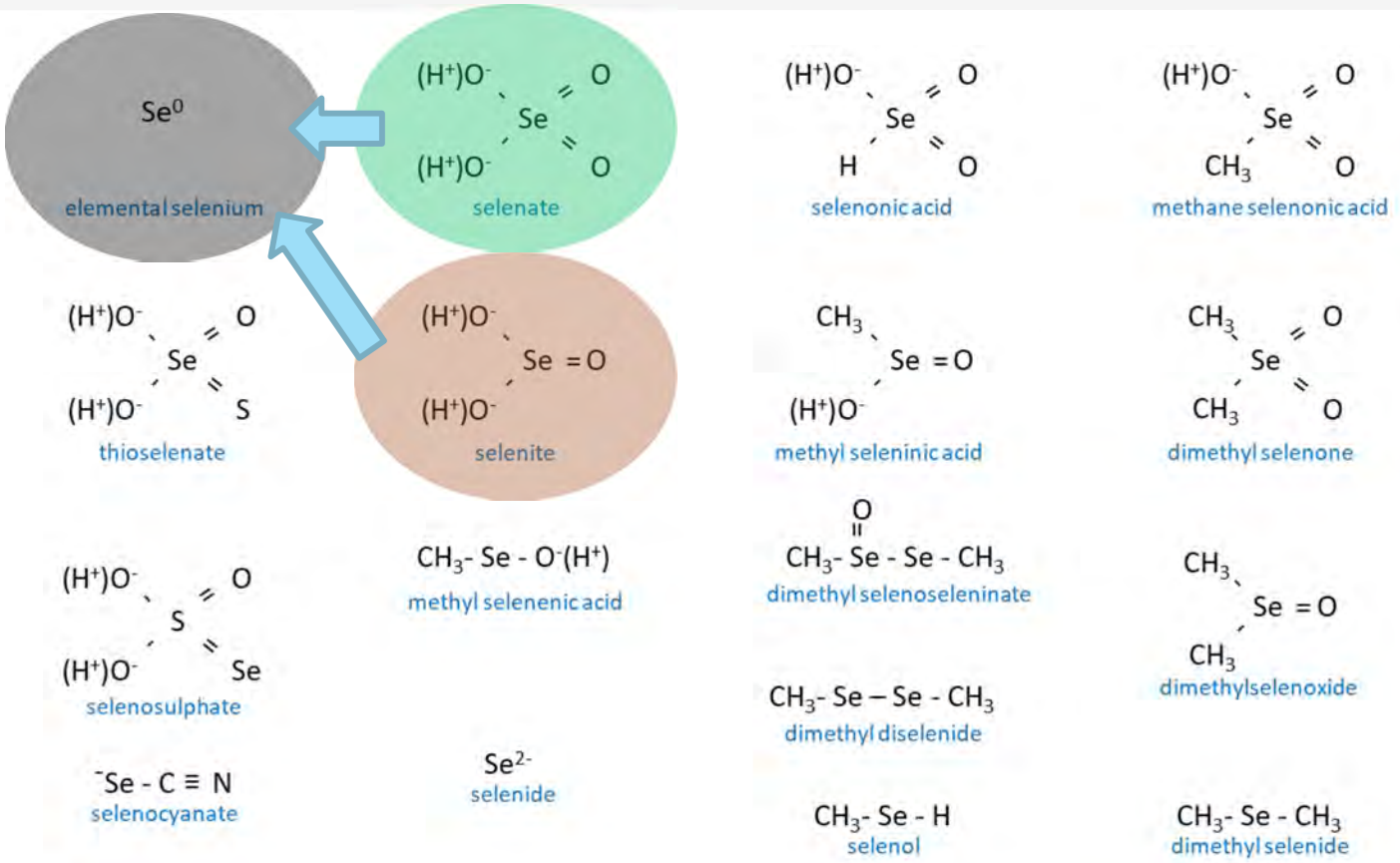


Terry McNulty, October 1998, Mining Engineering

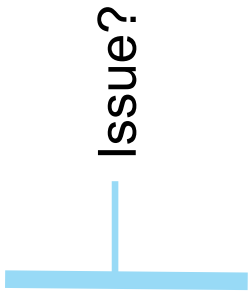
What's Up With Our Selenium Assays?



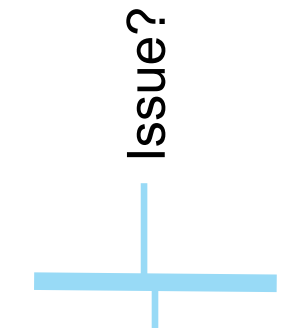
What is Selenium Speciation?



Start the Timeline



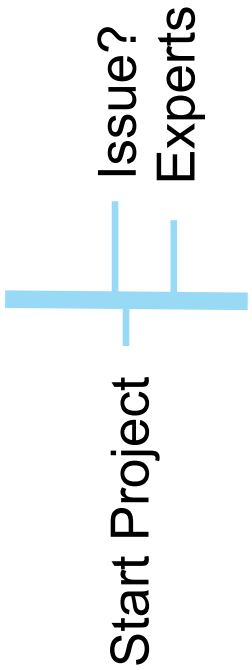
Project Starts



Project Goals

- Quantify the impact of Se Speciation
- Identify and implement solutions

Gather the Experts

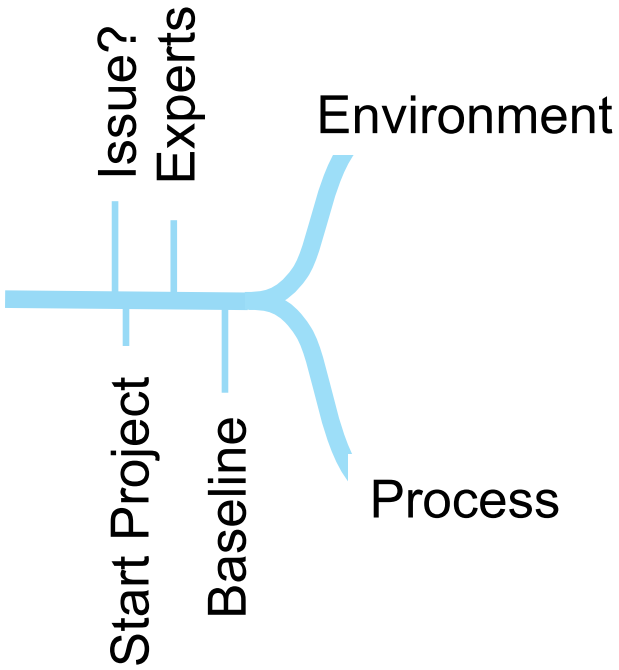


Expert in:

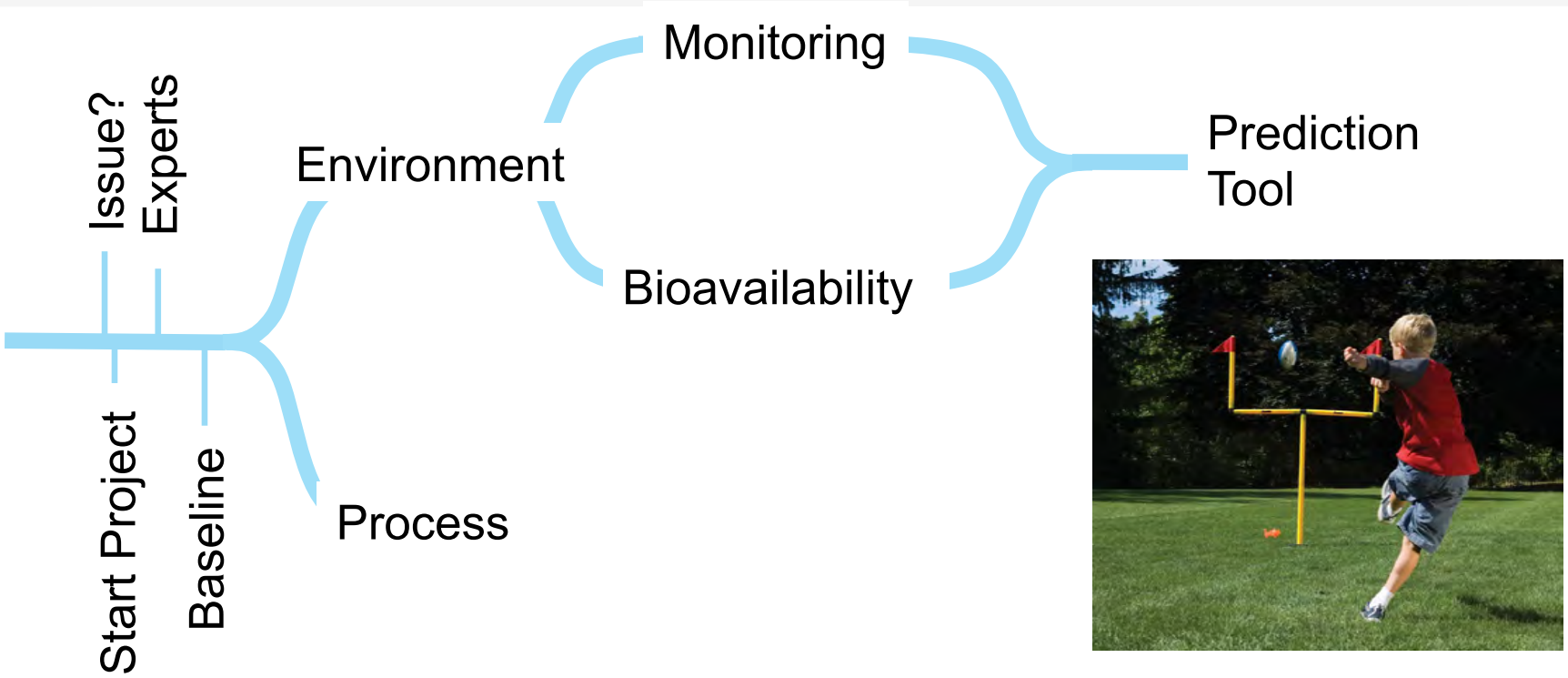
- Selenium speciation
- Bioaccumulation
- Environment monitoring
- Analytical methods
- Chemistry
- Biology
- Piloting
- Process engineering
- Project management
- Operations

Baseline Workshop

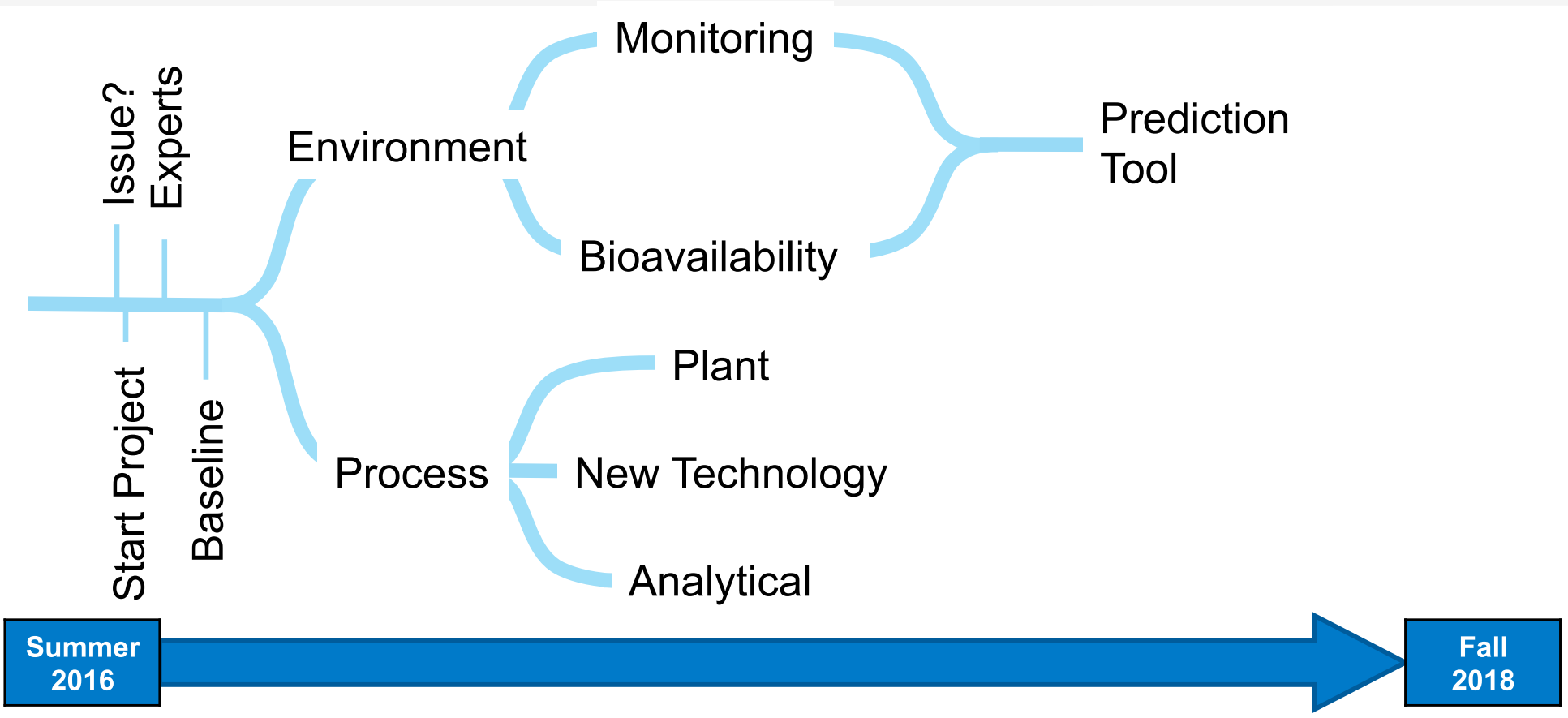
Brainstorm and Classify



Set the Goal Posts and Keep Score

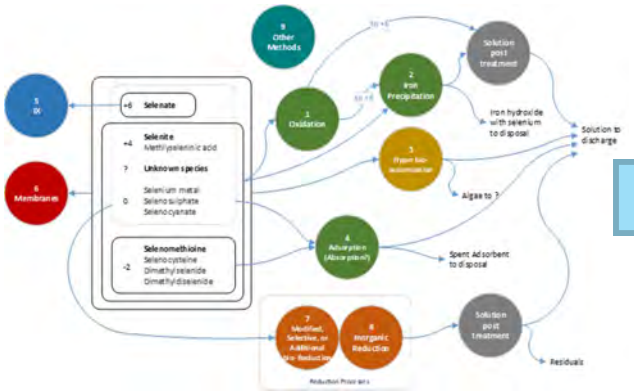


Process Work Packages



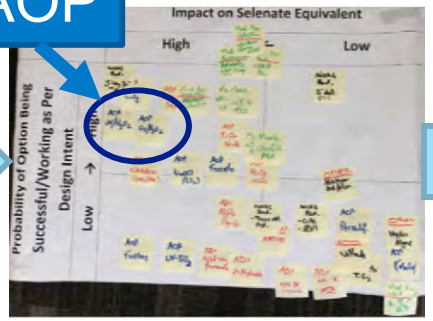
How do you distill down the options?

Ideas



Ranking

AOP



Probability of success vs

- Level of impact
- Speed to implement
- Cost

SWOT

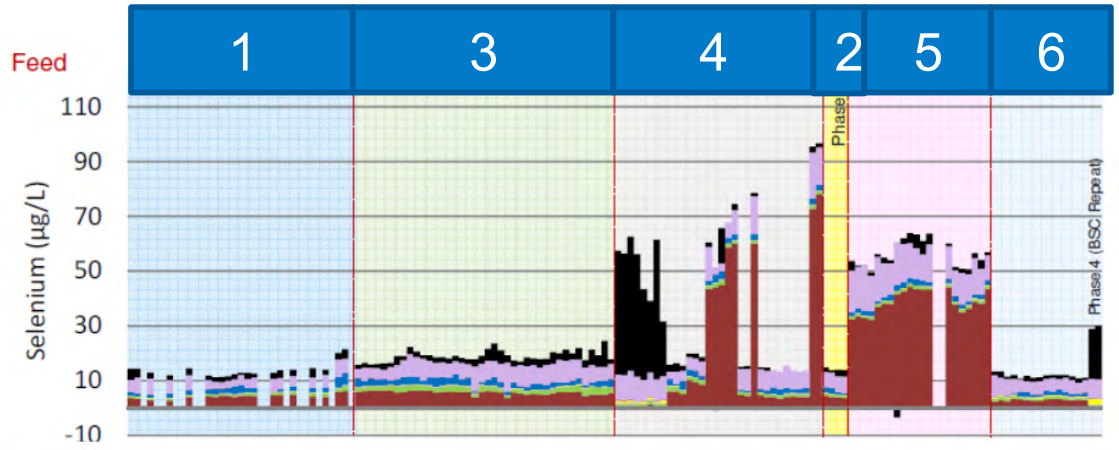
Strengths	Weaknesses
Opportunity	**Threats**

Bench Scale and Piloting

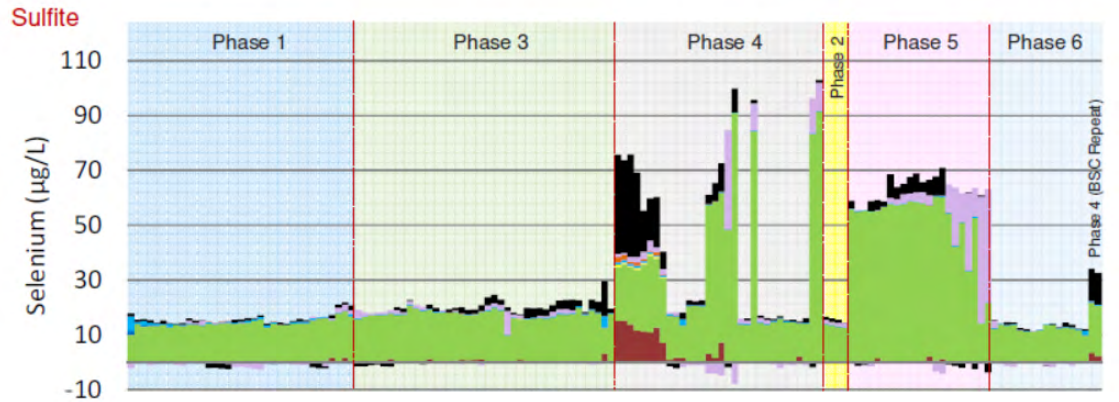
Advanced oxidation process (AOP)

Pilot Results: Green is Good

Pilot Feed Se Speciation

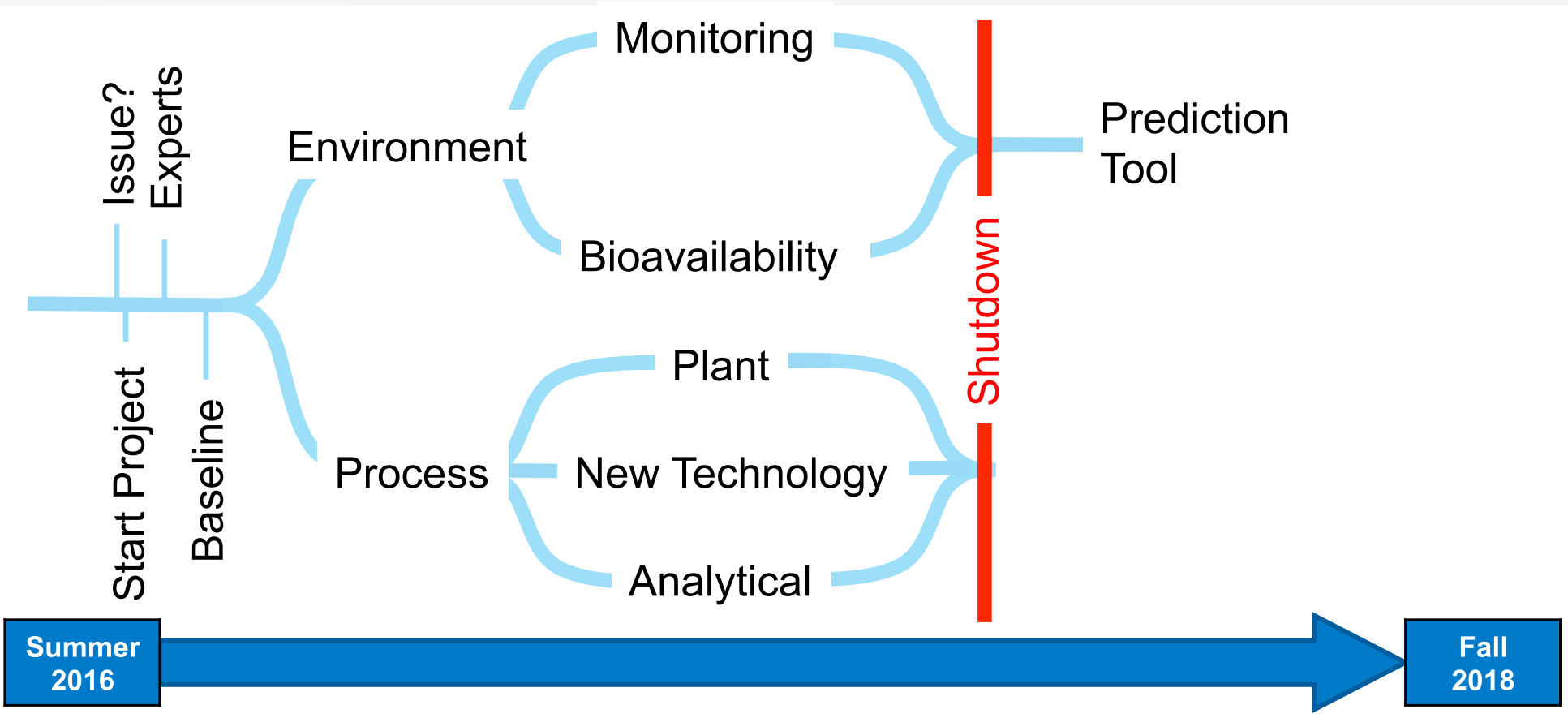


Pilot Effluent Se Speciation

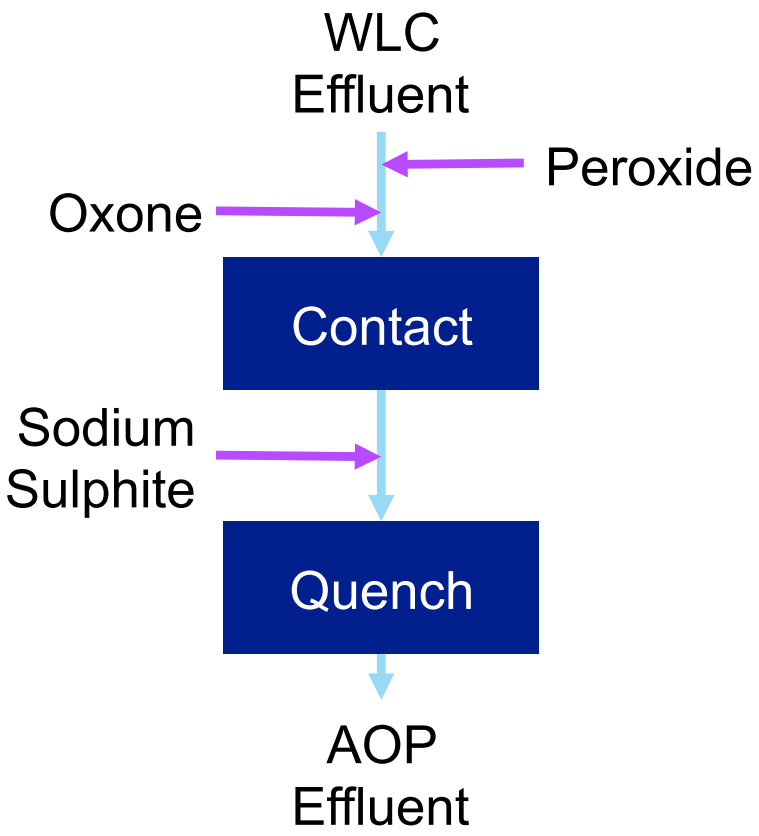


Teck

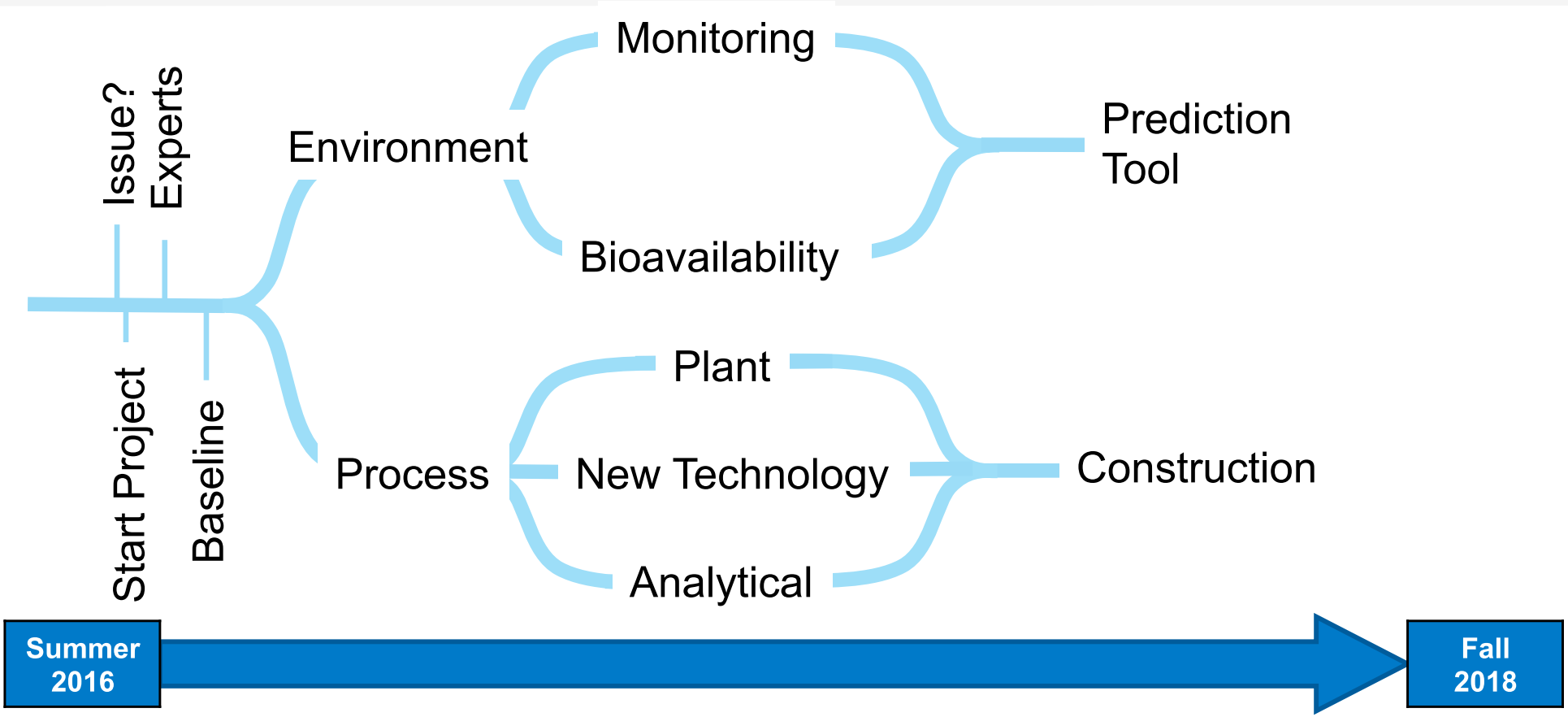
Decision to Shutdown



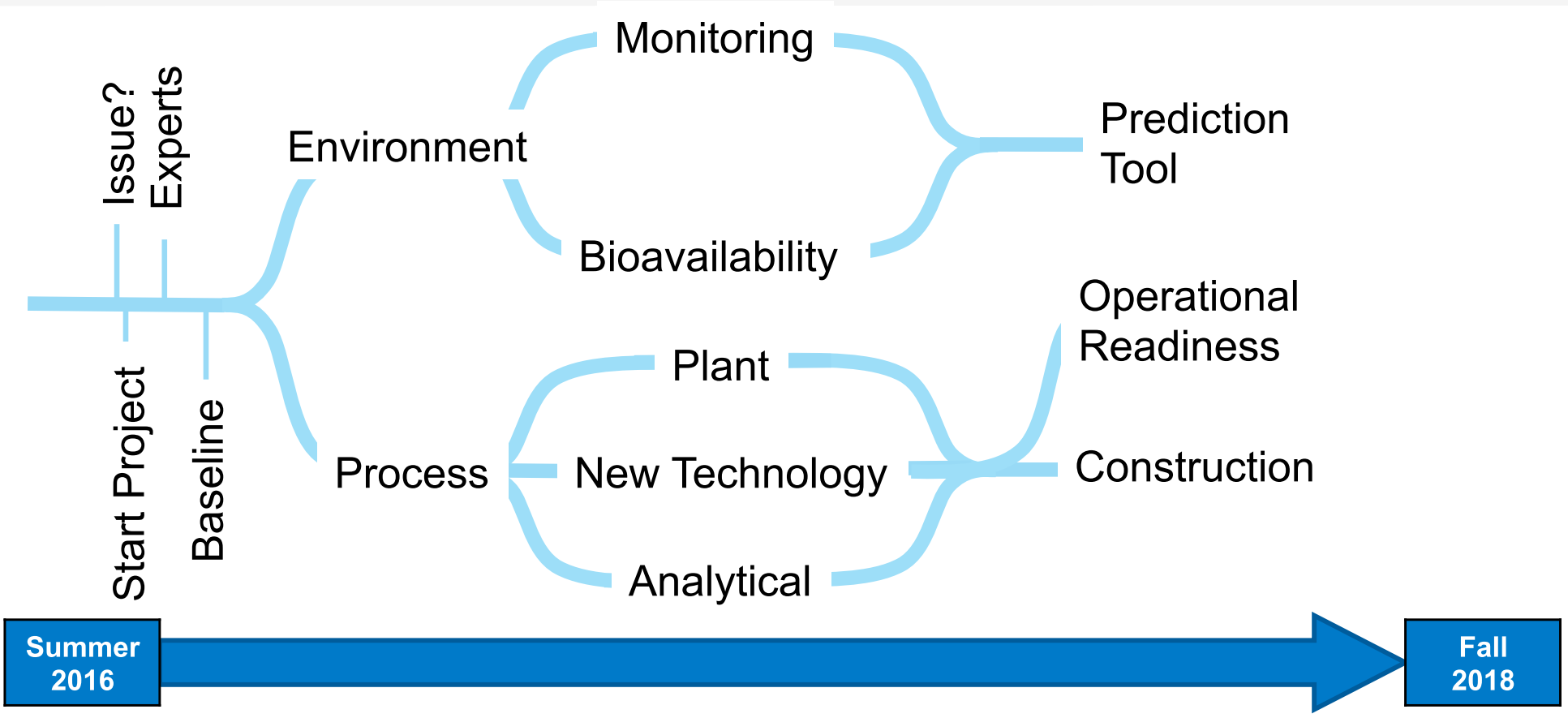
Design, Permit, and Build



Need to Design and Build

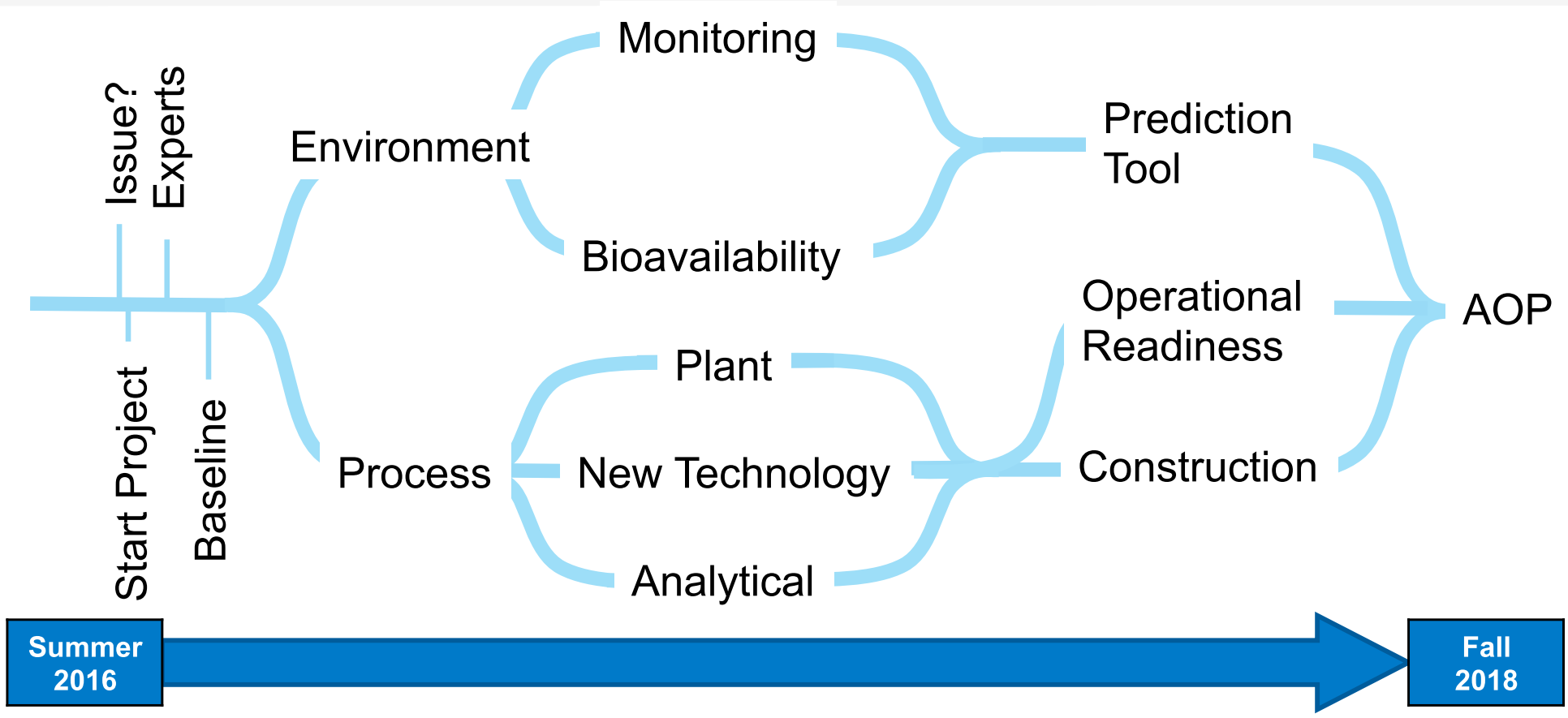


Everybody Forgets About Operations Readiness

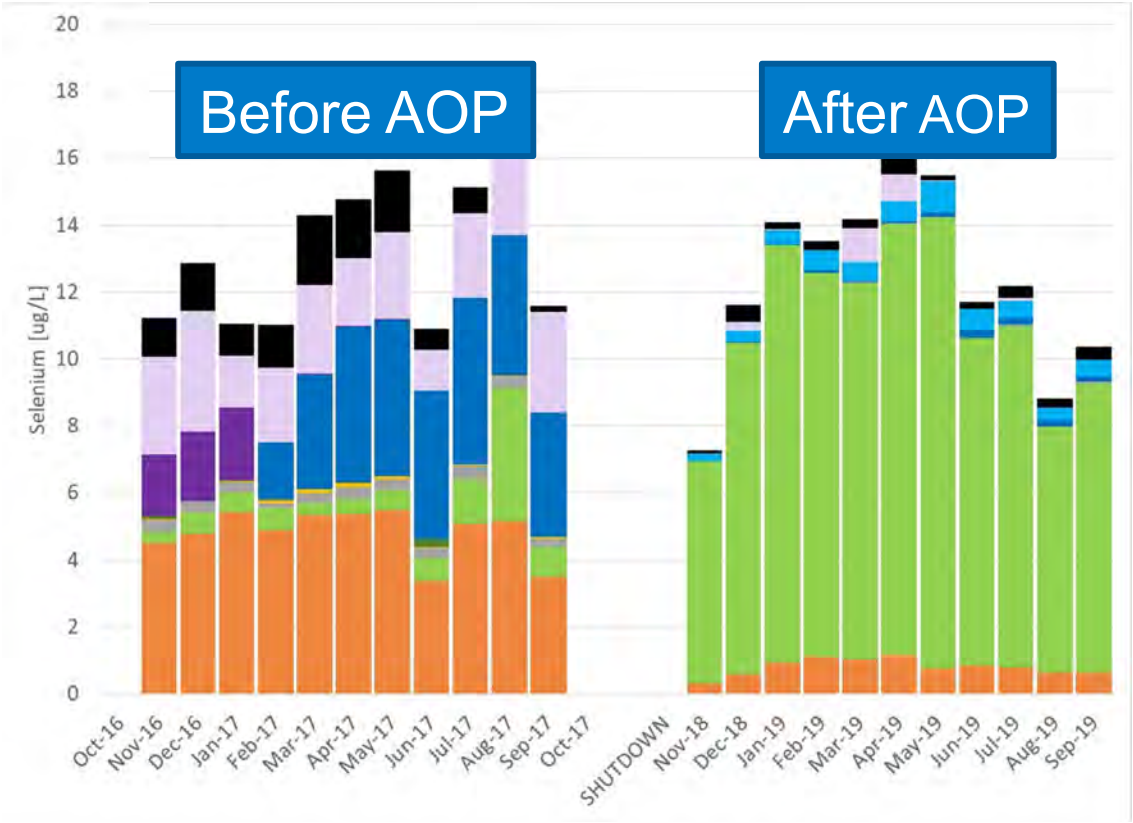


Operational Readiness is Project Management for Operations

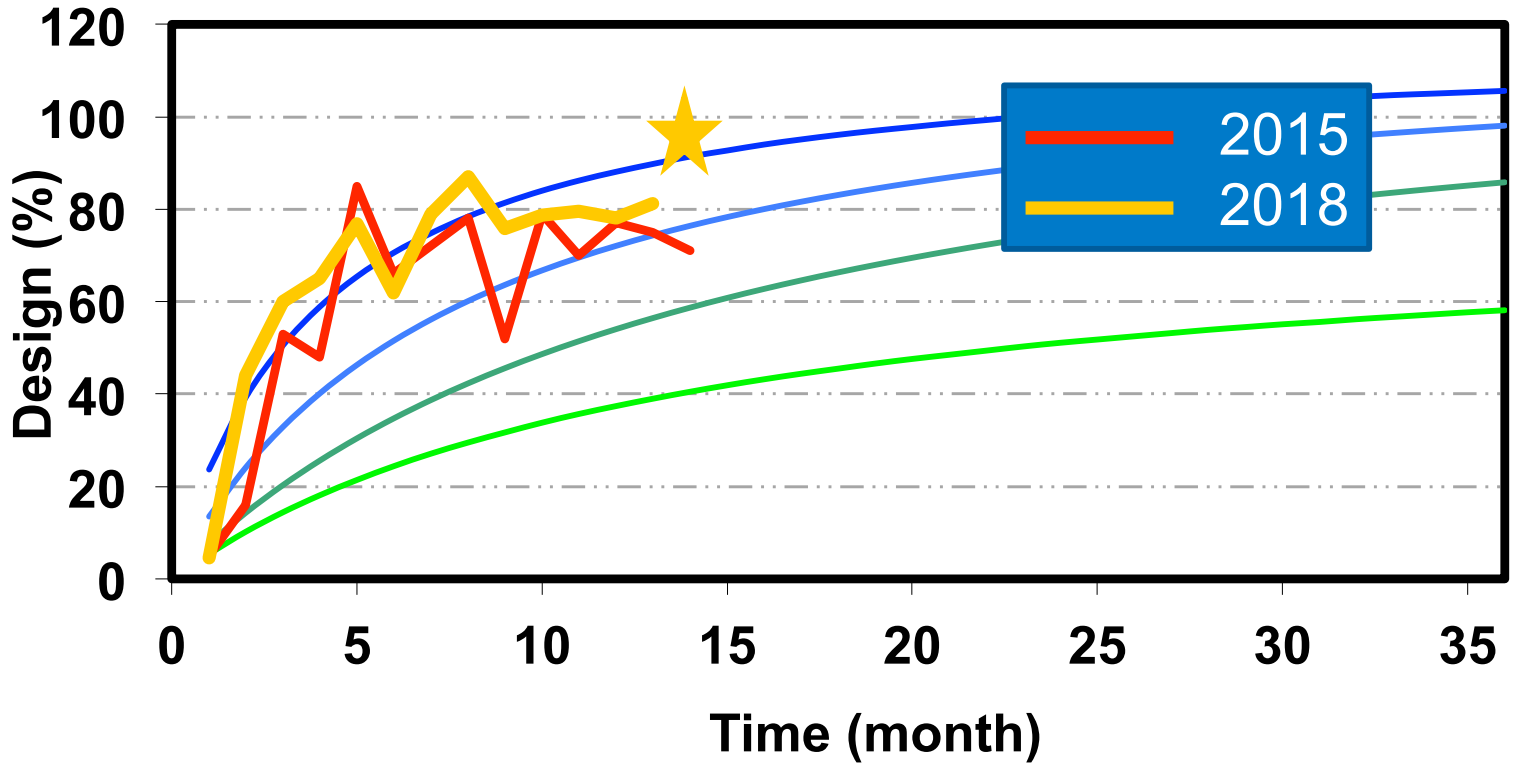
Put it All Together



Pre versus Post AOP



2018 AOP vs 2015 Start-Up



Why were we Successful?

Extensive and Robust Monitoring Program

Clear Goals

Broad Engagement

Opened up the black box

- Selenium Speciation Analytical Methods
- Bioavailability
- Bioreactors Operation

Thank you