Exhibit A

BEFORE THE ENVIRONMENTAL MANAGEMENT COMMISSION

| | |
|---|---|
| ILUKA RESOURCES (NC) LLC | ) |
| Petitioner. | ) |

**AFFIDAVIT OF CHARLES STILSON**

1. My names is Charles Stilson. I am the Project Manager for Iluka Resources (NC) LLC ("Iluka") on the Aurelian Springs Mineral Sands Mine. I have worked for Iluka and its affiliates for fourteen years. In that time, I have held the positions of mine engineer, senior mine engineer, technical manager and mine manager. I am a registered professional engineer in the State of Virginia.

2. Iluka has a record of sustainability and environmental stewardship at its mining operations, including its Old Hickory and Concord sites in Sussex County, Virginia and its Brink site in Greensville County, Virginia. Iluka is committed to full compliance with all applicable laws and regulations, as well as to open and meaningful engagement with stakeholders. Iluka has already begun to engage with stakeholders in Halifax County.

3. In accordance with North Carolina's mining laws and regulations, Iluka must obtain a mining permit before it can begin mining operations at Aurelian Springs. By regulation, an application for a mining permit must include the following information: (1) size of the mine, including acreage for tailings ponds; (2) measures to be taken to insure against landslides; (3) a reclamation plan, including the general methods to be used in reclamation and methods for rehabilitating settling ponds. 15A N.C. Admin. Code 05B.0104(a) & (b).

4. In order to prepare a mining permit application and reclamation plan, Iluka must make a preliminary determination of the location and size of dams that it will construct for the purpose of sectioning portions of the mining pit for the storage of mine tailings. The size and number of dams within the pit will affect the acreage of tailings ponds. Additionally, redeposit of tailings in the pit and grading of topsoil from the dams on top of the mine tailings will be part of the reclamation plan. Throughout the mining process, Iluka's ability to proceed with mining and reclamation will depend on whether the necessary dams are in place.

5. The number and size of the dams used will depend in part on whether Iluka must obtain permits, due to the cost and time required to obtain a permit. Further, Iluka's operations plan will depend in part on the flexibility it has to construct new dams as necessary to adapt to site conditions.

6. As a result, Iluka is currently making decisions that will affect the efficiency of its operations throughout the life of the project.

7. In preparing to submit its mining permit application, Iluka has engaged in preliminary discussions with the Department of Environment & Natural Resources Division of Energy, Mineral and Land Resources, including staff from the Mining Program, the Erosion and Sedimentation Program, and the Dam Safety Program. The exhibits attached to this affidavit are

true and correct copies of correspondence exchanged between Iluka and the Division of Energy, Mineral and Land Resources.

Executed this 22nd day of April, 2014.

Charles Stilson

STATE OF NORTH CAROLINA )
)
COUNTY OF HALIFAX )

Signed and sworn to before me this day by Charles Stilson.

Date: 22 April 2014

Official Signature of Notary

Linda Sue Nyborg, Notary Public
Printed Name of Notary

My Commission Expires: 26 May 2015

[Official Seal or Stamp]

LINDA SUE NYBORG
Notary Public, North Carolina
Halifax County
My Commission Expires
26 May 2015

# Draft Impoundment Design Guidelines

Guidelines for a typical mine tailings/reclamation impoundment are as follows:

- Typical impoundment areas vary from 2 to 7 acres in size.
- Constructed outer embankment walls will have side slopes of 2:1 with a top width of 15 feet.
- One foot of freeboard between the water or slurry surface and top of embankment will be maintained at all times.

Embankments will be monitored and surveyed during construction to ensure that approved slope angles and dimensions are met.

Embankment footprints will be inspected prior to construction. Where seeps are evident, a blanket or toe drain will be installed to transport water away from the toe area. On the surface, positive drainage will be maintained to drain runoff away from toe areas.

The criteria listed below are to serve as design guidelines that will ensure that impoundments are constructed such that they are below the G.S 143-215.25A size criteria. In the future if it is found that these criteria do not provide definitive guidance, they may have to be altered as agreed to by the NCDENR Division of Energy, Mineral and Land Resources and Iluka Resources, Inc. (Iluka).

G.S 143-215.25A(6) applies to impounding structures less than 25 feet in height or that have an impoundment capacity of less than 50 acre-feet, unless the Department determines that failure of the dam could result in loss of human life or significant damage to property below the dam.

A minimum of at least 2 feet of freeboard will be maintained for surface impoundments unless open channel spillways are provided. In lieu of open channel spillways, the freeboard for surface impoundments may be reduced to 1 foot if weirs and trash racks designed to handle a 50-year storm event are part of the surface impoundment design. The design for each surface impoundment required at the facility will be developed based on the site-specific conditions and material availability.

Waste material tailings of clay, quartz sands and gravel will serve as backfill for the mine cells, mimicking pre-mining topographic features. After being pumped back to the mined-out cells, the tailings are allowed to settle and dewater. The topsoil containment berms will then be graded across the mined areas as top dressing for the final reclamation contouring. Due to the high clay content of the ore, the final grades of some reclamation areas might be approximately 20% to 30% higher than the pre-mining contours.

**General**

For the purpose of this text, “in-situ ground” is understood to be unmined ground or undisturbed ground below an excavation. The integrity of in-situ ground shall not be disturbed by excavation, backfilling or scarification (except for keyway cuts).

Documents titled “Form to determine if a dam is governed by the Dam Safety Law of 1967” and the “Dam Hazard Classification Form” will be submitted to the NC Dam Safety Program in order to receive approval that a dam safety permit is not required.

**Impoundment Construction Sequence**

Whenever practical, impoundments will be constructed such that impoundments at lower elevations are constructed first. This will not always be practical, and impoundments may be constructed in any sequence. Regardless of constructions sequence, all impoundments will be constructed according to the above-listed design criteria.

**Overview**

There will be three design criteria to determine if an impoundment is considered exempt. Each impoundment will be designed and constructed in accordance with one or more of the criteria as applicable. Diagram 1 is used to help demonstrate when the different design criteria apply to particular structures.

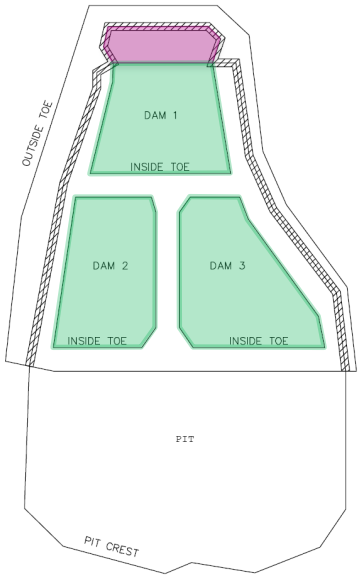
*Criterion 1*

The first criterion is to be used when any portion of an impoundment is built on umnined ground. In Diagram 1, this criterion would apply to:

- the north portion of Dam 1 (constructed entirely on unmined ground);
- the western portion of Dams 1 and 2 (constructed partially on unmined ground above the pit crest and partially within the pit); and
- the eastern portion of Dams 1 and 3 (constructed partially on unmined ground above the pit crest and partially within the pit).

Impoundments that meet the first criteria must be constructed so that they are less than 25 feet in height and contain less than 50 acre-feet of capacity above in-situ (unmined) ground.

**Diagram 1:**




For height and volume calculation purposes, the lowest in-situ ground point will be determined as follows:

Where the inside toe of the berm falls on unmined in-situ ground, the lowest inside toe intercept with in-site ground will be used. See magenta-shaded area of Diagram 1.

Where the inside toe of the berm falls within the mined-out pit (where the pit crest falls within the constructed berm), the lowest point on the pit crest will be used. See green-shaded area of Diagram 1.

For impoundments that have part of the inside toe fall on unmined ground and part of the inside toe fall within the pit (Dam 1, for example), the lowest elevation from 1 and 2 above will be used.

Volume calculations will be from this lowest reference point to the maximum pool level within the impoundment.

*Criterion 2*

The second criterion is to be used when any portion of an impoundment is shared by another, previously constructed impoundment. This criterion applies when the proposed impoundment is to be constructed at a higher elevation than the previously constructed adjacent impoundments.

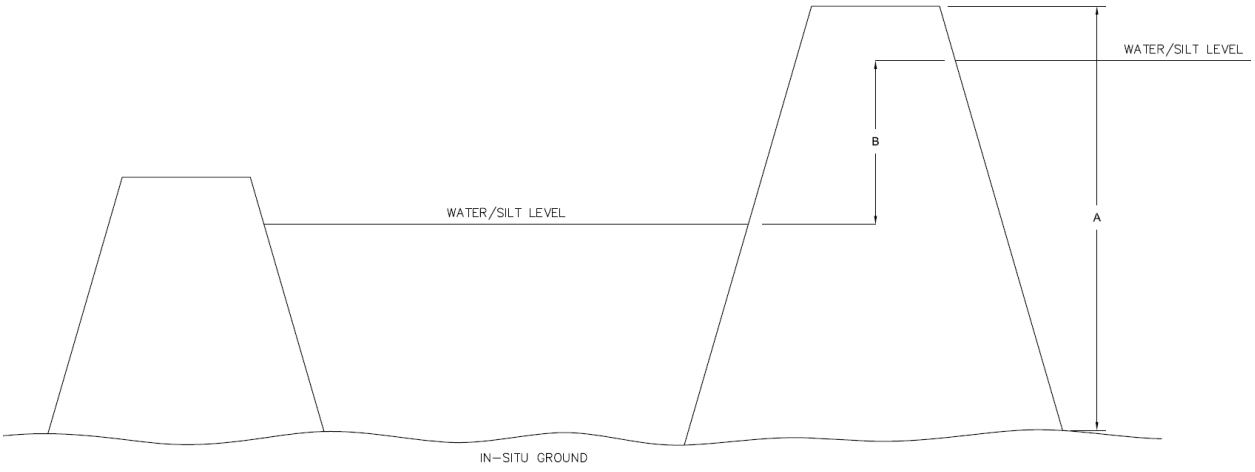
In Diagram 1, this criterion could apply to wall of Dam 1 that abuts Dam 2 and Dam3 (assuming that Dams 2 and 3 were constructed prior to Dam 1).

Impoundments that meet the second criteria and have dimension “A” less than or equal to 40 feet must be constructed so that dimension “B” is less than 25 feet (see Diagram 2). Impoundment volume must be less than 50 acre-feet using the depth “B” in the calculation.

Impoundments that meet the second criteria and have dimension “A” greater than or equal to 40 feet must be constructed so that dimension “B” is less than 15 feet (see Diagram 2). Impoundment volume must be less than 50 acre-feet using the depth “B” in the calculation.

Under no circumstances will these structures be constructed to a height of 25 feet or more above the pre-mined natural ground elevation.

**Diagram 2:**




Dimension A is the total wall height above in-situ ground. It is measured from the crest to the lowest inside toe intercept with in-situ ground.

Dimension B is the relative difference in impoundment elevations. It is measured from the pool elevation in the impoundment to the lowest pool elevation in any adjoining impoundment

*Criterion 3*

The third criterion is to be used when any portion of an impoundment is built within the pit and the embankment faces the open pit. This criterion does not apply if the impoundment height is less than 25 feet and total containment capacity is less than 50 acre-feet relative to the lowest inside toe intercept with in-situ ground.

In Diagram 1, these criteria could apply to the walls of Dams 2 and 3 that abut the pit (assuming that Dam 1 was previously constructed).

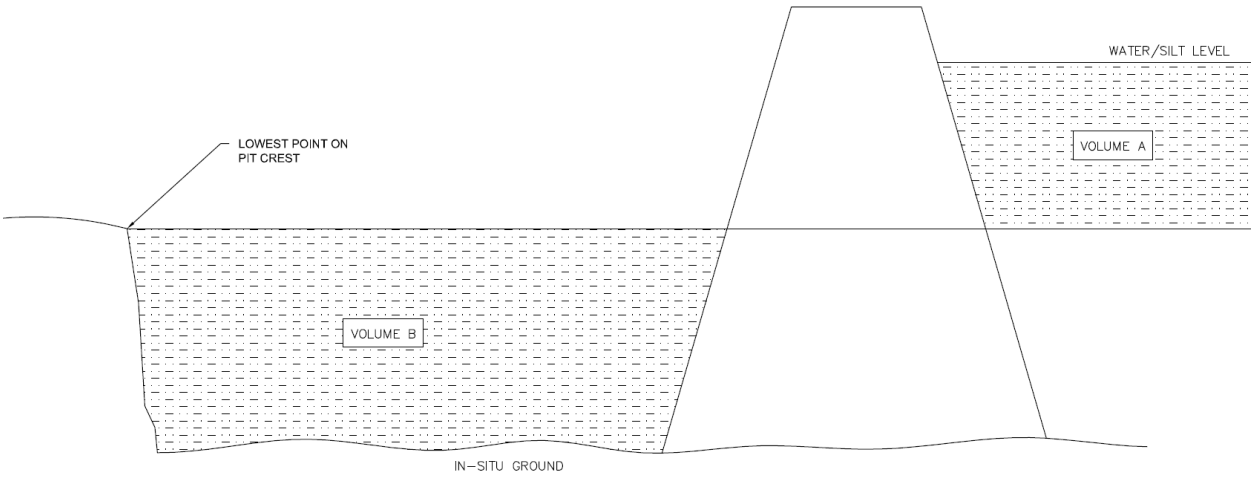
Impoundments that meet the third criteria must be constructed so that the water and tailings volume will be completely contained within the open pit adjacent to the structure, in the event of an impoundment failure.

For impoundment volume calculation purposes (Volume A, Diagram 3) the lowest point on the crest of the open pit will be referenced. Containment volume (Volume 8, Diagram 3) calculations will be the available volume below the lowest point on the crest of the open pit.

As long as the impoundment in question has an unobstructed wall that faces in the pit, adequate volume will be maintained within the pit to contain the impounded material should failure of the impoundment ever occur (Volume B ≥ Volume A, Diagram 3).

Whenever persons are required to work on or below these impoundments, daily safety inspections will be made of the structure.

**Diagram 3:**



**Please see below comments from the Land Quality Section, Dam Safety Program dated June 27, 2013.**

## Draft Impoundment Design Guidelines

Guidelines for a typical mine tailings/reclamation impoundment are as follows:

- Typical impoundment areas vary from 2 to 7 acres in size.
- Constructed outer embankment walls will have side slopes of 2:1 with a top width of 15 feet.

  **COMMENT #1: The sum of the horizontal components of the upstream and downstream slope should be 5 (five) or greater. Base ref: NRCS Engineering Standard 378.**

- One foot of freeboard between the water or slurry surface and top of embankment will be maintained at all times.

Embankments will be monitored and surveyed during construction to ensure that approved slope angles and dimensions are met.

Embankment footprints will be inspected prior to construction. Where seeps are evident, a blanket or toe drain will be installed to transport water away from the toe area. On the surface, positive drainage will be maintained to drain runoff away from toe areas.

The criteria listed below are to serve as design guidelines that will ensure that impoundments are constructed such that they are below the G.S 143-215.25A size criteria. In the future if it is found that these criteria do not provide definitive guidance, they may have to be altered as agreed to by the NCDENR Division of Energy, Mineral and Land Resources and Iluka Resources, Inc. (Iluka).

G.S 143-215.25A(6) applies to impounding structures less than 25 feet in height or that have an impoundment capacity of less than 50 acre-feet, unless the Department determines that failure of the dam could result in loss of human life or significant damage to property below the dam.

A minimum of at least 2 feet of freeboard will be maintained for surface impoundments unless open channel spillways are provided. In lieu of open channel spillways, the freeboard for surface impoundments may be reduced to 1 foot if weirs and trash racks designed to handle a 50-year storm event are part of the surface impoundment design. The design for each surface impoundment required at the facility will be developed based on the site-specific conditions and material availability.

Waste material tailings of clay, quartz sands and gravel will serve as backfill for the mine cells, mimicking pre-mining topographic features. After being pumped back to the mined-out cells, the tailings are allowed to settle and dewater. The topsoil containment berms will then be graded across the mined areas as top dressing for the final reclamation contouring. Due to the high clay content of the ore, the final grades of some reclamation areas might be approximately 20% to

30% higher than the pre-mining contours.

**General**

**COMMENT #2: Please add a definitions section to include as a minimum: 1) "in-situ ground" (as defined below), 2) "pre-mined natural ground elevation" (obvious but please define), 3) "downstream" (define as direction of lower adjacent impounded water/silt levels).**

For the purpose of this text, "in-situ ground" is understood to be unmined ground or undisturbed ground below an excavation. The integrity of in-situ ground shall not be disturbed by excavation, backfilling or scarification (except for keyway cuts).

Documents titled "Form to determine if a dam is governed by the Dam Safety Law of 1967" and the "Dam Hazard Classification Form" will be submitted to the NC Dam Safety Program in order to receive approval that a dam safety permit is not required.

**COMMENT #3: Please also include drawing exhibits to clarify.**

**Impoundment Construction Sequence**

Whenever practical, impoundments will be constructed such that impoundments at lower elevations are constructed first. This will not always be practical, and impoundments may be constructed in any sequence. Regardless of constructions sequence, all impoundments will be constructed according to the above-listed design criteria.

**Overview**

There will be three design criteria to determine if an impoundment is considered exempt. Each impoundment will be designed and constructed in accordance with one or more of the criteria as applicable. Diagram 1 is used to help demonstrate when the different design criteria apply to particular structures.

*Criterion 1*

The first criterion is to be used when any portion of an impoundment is built on umnined ground. In Diagram 1, this criterion would apply to:

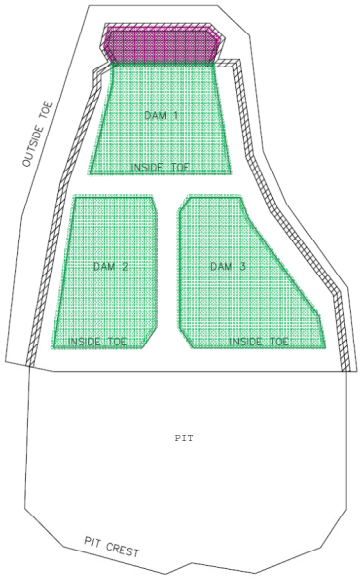
- the north portion of Dam 1 (constructed entirely on unmined ground);
- the western portion of Dams 1 and 2 (constructed partially on unmined ground above the pit crest and partially within the pit); and
- the eastern portion of Dams 1 and 3 (constructed partially on unmined ground above the pit crest and partially within the pit).

Impoundments that meet the first criteria must be constructed so that they are less than 25 feet in height and contain less than 50 acre-feet of capacity above in-situ (unmined) ground.

**COMMENT #4: This conclusion is valid provided the dam is not of high hazard**

**classification as defined by 15A NCAC 2K .0105 or .0211. High hazard dams are jurisdictional regardless of dam height or impoundment capacity. The dam and reservoir must meet both conditions (25 feet in height and contain less than 50 acre-feet of capacity at top of dam elevation) to be jurisdictional if it is not of high hazard classification. This of course will depend on the mining area location. As for an immediate case, if mining personnel are operating in the pit on the downstream side of a containment dam built within the pit, then the containment dam is high hazard until mining personnel are no longer required to work in the pit. For this reason, construction of the containment dam will require approval under the NC Dam Safety Law of 1967.**

**Diagram 1:**




For height and volume calculation purposes, the lowest in-situ ground point will be determined as follows:

Where the inside toe of the berm falls on unmined in-situ ground, the lowest inside toe intercept with in-site ground will be used. See magenta-shaded area of Diagram 1.

Where the inside toe of the berm falls within the mined-out pit (where the pit crest falls within the constructed berm), the lowest point on the pit crest will be used. See green-shaded area of Diagram 1.

For impoundments that have part of the inside toe fall on unmined ground and part of the inside toe fall within the pit (Dam 1, for example), the lowest elevation from 1 and 2 above will be used.

Volume calculations will be from this lowest reference point to the maximum pool level within the impoundment.

*Criterion 2*

The second criterion is to be used when any portion of an impoundment is shared by another, previously constructed impoundment. This criterion applies when the proposed impoundment is to be constructed at a higher elevation than the previously constructed adjacent impoundments.

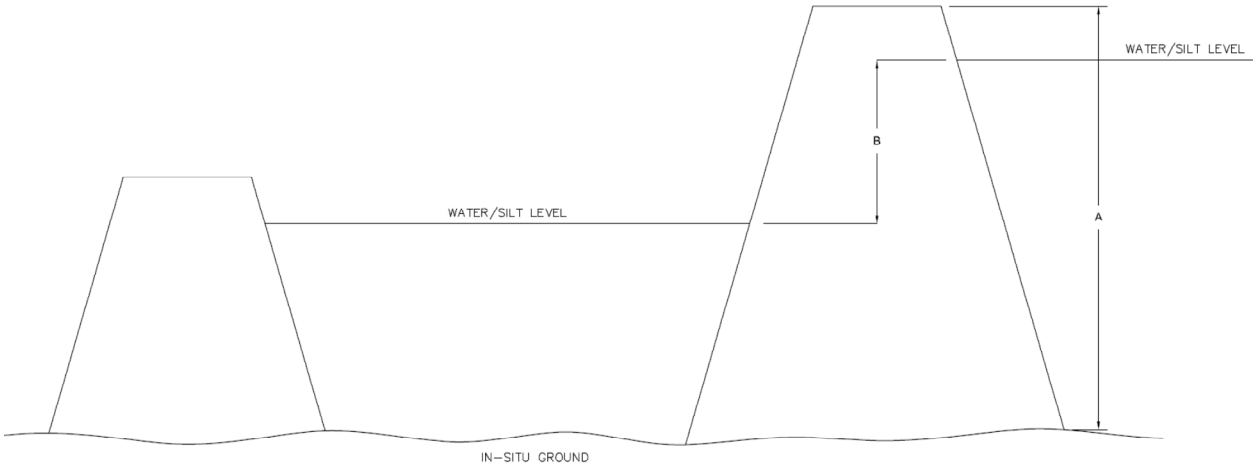
In Diagram 1, this criterion could apply to wall of Dam 1 that abuts Dam 2 and Dam3 (assuming that Dams 2 and 3 were constructed prior to Dam 1).

Impoundments that meet the second criteria and have dimension “A” less than or equal to 40 feet must be constructed so that dimension “B” is less than 25 feet (see Diagram 2). Impoundment volume must be less than 50 acre-feet using the depth “B” in the calculation.

Impoundments that meet the second criteria and have dimension “A” greater than or equal to 40 feet must be constructed so that dimension “B” is less than 15 feet (see Diagram 2). Impoundment volume must be less than 50 acre-feet using the depth “B” in the calculation.

Under no circumstances will these structures be constructed to a height of 25 feet or more above the pre-mined natural ground elevation.

**Diagram 2:**




**COMMENT #5: The height of the dam in accordance with 15A NCAC 2K 0.223 would be the “A” dimension as measured on the downstream (left in this diagram) side of the containment dam. Computation of impoundment capacity is to be computed from the in-situ ground surface to top of dam.**

Dimension A is the total wall height above in-situ ground. It is measured from the crest to the lowest inside toe intercept with in-situ ground.

Dimension B is the relative difference in impoundment elevations. It is measured from the pool elevation in the impoundment to the lowest pool elevation in any adjoining impoundment

*Criterion 3*

The third criterion is to be used when any portion of an impoundment is built within the pit and the embankment faces the open pit. This criterion does not apply if the impoundment height is less than 25 feet and total containment capacity is less than 50 acre-feet relative to the lowest inside toe intercept with in-situ ground.

In Diagram 1, these criteria could apply to the walls of Dams 2 and 3 that abut the pit (assuming that Dam 1 was previously constructed).

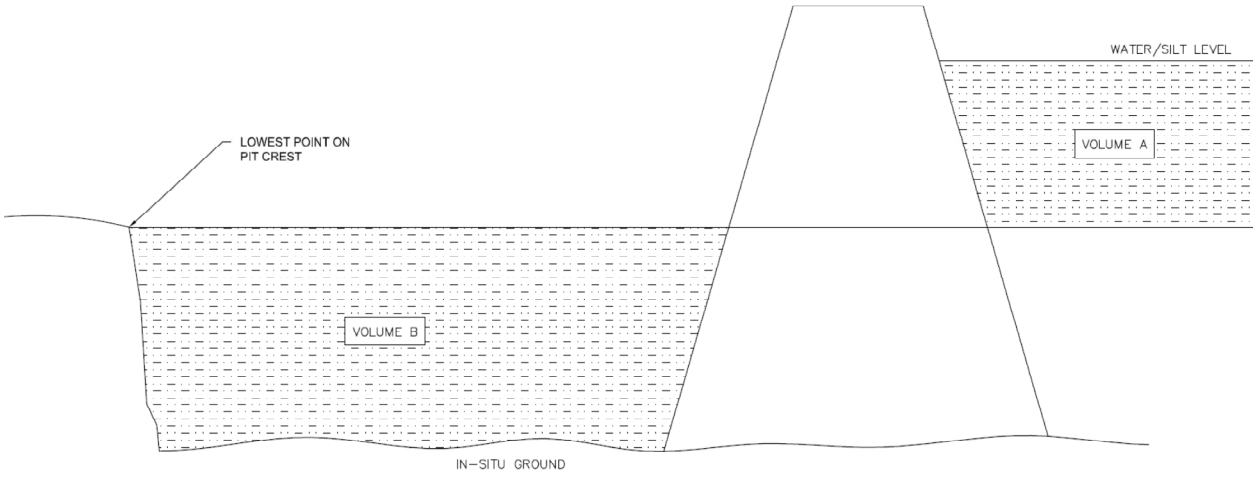
Impoundments that meet the third criteria must be constructed so that the water and tailings volume will be completely contained within the open pit adjacent to the structure, in the event of an impoundment failure.

For impoundment volume calculation purposes (Volume A, Diagram 3) the lowest point on the crest of the open pit will be referenced. Containment volume (Volume 8, Diagram 3) calculations will be the available volume below the lowest point on the crest of the open pit.

As long as the impoundment in question has an unobstructed wall that faces in the pit, adequate volume will be maintained within the pit to contain the impounded material should failure of the impoundment ever occur (Volume B ≥ Volume A, Diagram 3).

Whenever persons are required to work on or below these impoundments, daily safety inspections will be made of the structure.

**Diagram 3:**



**COMMENT #6: if mining personnel are operating in the pit on the downstream side of a containment dam built within the pit, then the containment dam is high hazard until mining personnel are no longer required to work in the pit. For this reason, construction of the containment dam will require approval under the NC Dam Safety Law of 1967.**

# Draft Impoundment Design Guidelines

Guidelines for a typical mine tailings/reclamation impoundment are as follows:

- Typical impoundment areas vary from 2 to 7 acres in size.
- Constructed outer embankment walls will have side slopes of 2.5:1 with a top width of 15 feet.
- One foot of freeboard between the water or slurry surface and top of embankment will be maintained at all times.
- Slopes will be tracked and compacted to prevent rilling or other erosion.

Embankments will be monitored and surveyed during construction to ensure that approved slope angles and dimensions are met.

Embankment footprints will be inspected prior to construction. Where seeps are evident, a blanket or toe drain will be installed to transport water away from the toe area. On the surface, positive drainage will be maintained to drain runoff away from toe areas.

The criteria listed below are to serve as design guidelines that will ensure that impoundments are constructed such that they are below the G.S 143-215.25A size criteria. In the future if it is found that these criteria do not provide definitive guidance, they may have to be altered as agreed to by the NCDENR Division of Energy, Mineral and Land Resources and Iluka Resources, Inc. (Iluka).

G.S 143-215.25A(6) applies to impounding structures less than 25 feet in height or that have an impoundment capacity of less than 50 acre-feet, unless the Department determines that failure of the dam could result in loss of human life or significant damage to property below the dam.

A minimum of at least 2 feet of freeboard will be maintained for surface impoundments unless open channel spillways are provided. In lieu of open channel spillways, the freeboard for surface impoundments may be reduced to 1 foot if weirs and trash racks designed to handle a 50-year storm event are part of the surface impoundment design. The design for each surface impoundment required at the facility will be developed based on the site-specific conditions and material availability.

Waste material tailings of clay, quartz sands, and gravel will serve as backfill for the mine cells, mimicking pre-mining topographic features. After being pumped back to the mined-out cells, the tailings are allowed to settle and dewater. The tailings initially include approximately 40% to 45% solids, of which approximately 35% is clay. Complete consolidation of the tailings is time-dependent, but the tailings begin consolidation immediately. The tailings remain flowable for relatively short periods of time, and Iluka has found that the material is not flowable at the time the impoundments are broken during final grading. For purposes of Iluka's MSHA permits, MSHA does not consider the tailings impoundments readily flowable.

The topsoil containment berms are graded across the mined areas as top dressing for the final reclamation contouring. Due to the high clay content of the ore, the final grades of some reclamation areas might be approximately 20% to 30% higher than the pre-mining contours.

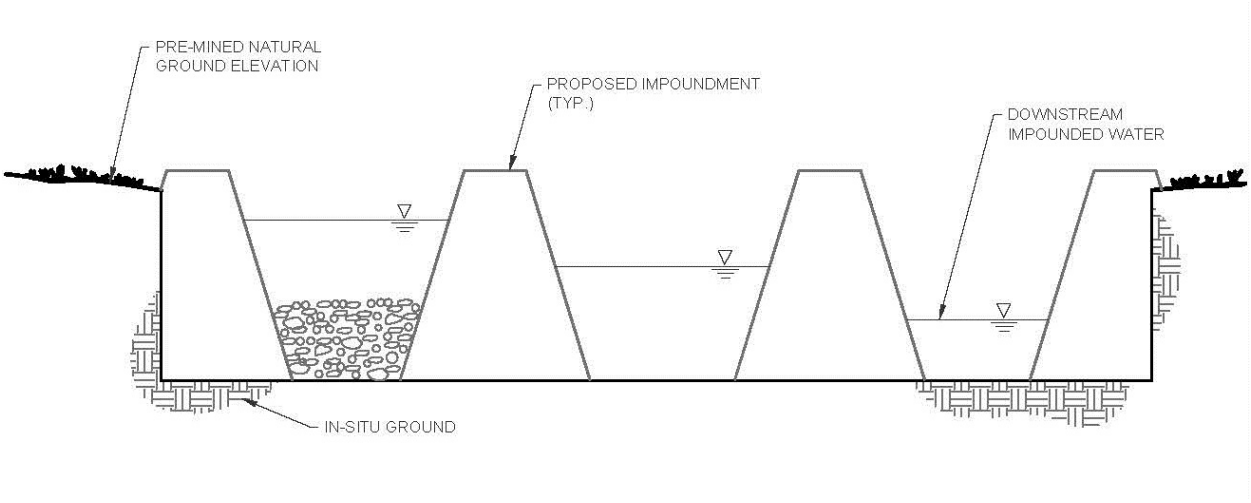
## General

For the purpose of this text, the following terms and definitions are used:

- in-situ ground - unmined ground or undisturbed ground below an excavation. The integrity of in-situ ground shall not be disturbed by excavation, backfilling or scarification (except for keyway cuts).
- pre-mined natural ground elevation - the existing contour elevations prior to land disturbance activities.
- downstream - the direction of lower adjacent impounded water/silt levels

Documents titled “Form to determine if a dam is governed by the Dam Safety Law of 1967” and the “Dam Hazard Classification Form” will be submitted to the NC Dam Safety Program in order to receive approval that a dam safety permit is not required. See Figure 1 for the definitions exhibit.

**Figure 1: Definitions Exhibit**




## Impoundment Construction Sequence

Whenever practical, impoundments will be constructed such that impoundments at lower elevations are constructed first. This will not always be practical, and impoundments may be constructed in any sequence. Regardless of constructions sequence, all impoundments will be constructed according to the above-listed design criteria.

## Overview

Iluka intends to operate as exempt from G.S. 143-215.25A, but Iluka will submit design plans to NCDENR if dams exceed the jurisdictional threshold. There will be two criteria to determine if an impoundment is considered exempt. Each impoundment will be designed and constructed in accordance with these criteria as applicable.

*Criterion 1*

The first criterion is to be used when employees are working in a pit downstream of an active tailings area. In criterion 1, the following standards apply:

- Impoundments must be constructed so that they are less than 25 feet in height or contain less than 50 acre-feet of capacity above in-situ ground.
- To serve as a setback, an open pit must be constructed between the employees in the downstream pit and the active tailings pit.
- The open pit shall be sized such that it can contain the volume of the upstream tailings pit (volume B $\geq$ volume A in Figure 2).
- The setbacks between impoundments must be a minimum of 100' or 10 times the height of the dam, whichever is greater (dimension A in Figures 2 and 3).
- The height of the dam will be calculated from the crest of the dam to the lowest in-situ ground point on the downstream side of the dam (dimension B in Figure 3).
- Volume calculations will be from the lowest in-situ ground point to the maximum pool level within the impoundment.

Criterion 1 is shown in plan view and cross-section view in figures 2 and 3, respectively.

**Figure 2: Plan View**

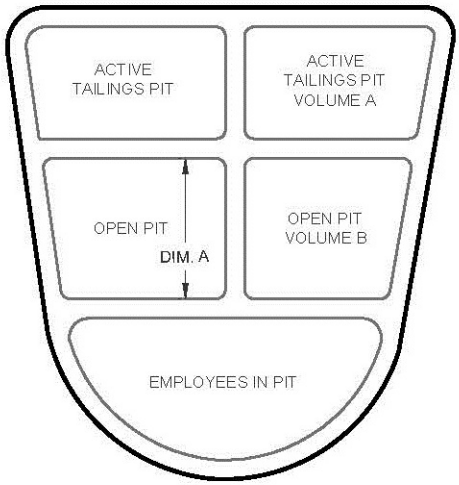
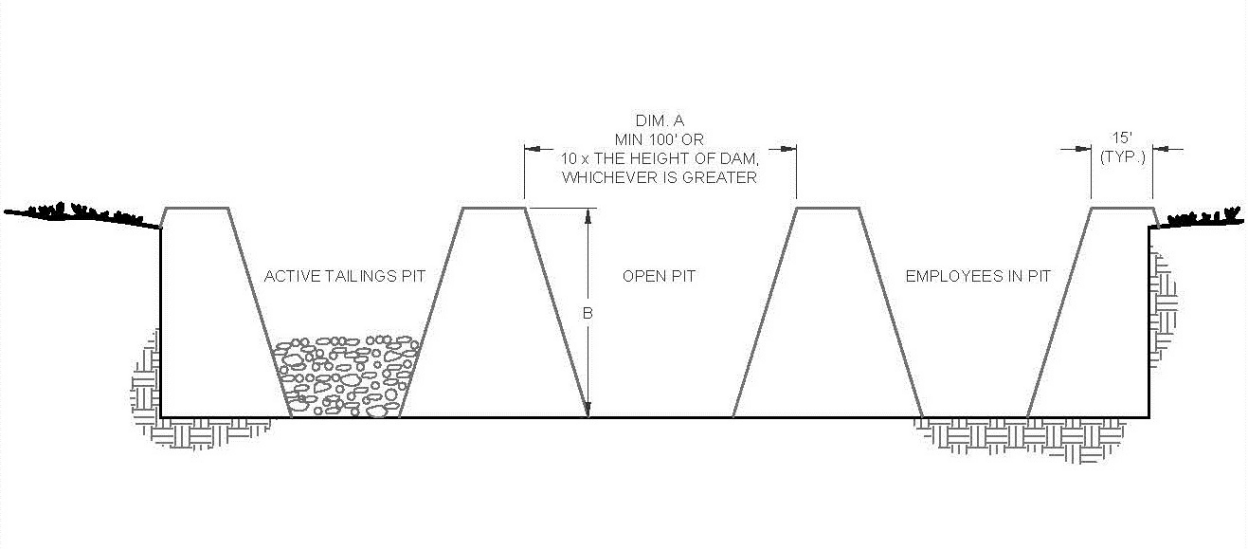


**Figure 3: Cross-Section View**




*Criterion 2*

The second criterion is to be used when there are no employees working downstream of an active tailings area. In criterion 2, the following standards apply:

- Impoundments must be constructed so that they are less than 25 feet in height or contain less than 50 acre-feet of capacity above in-situ ground.
- The height of the dam will be calculated from the crest of the dam to the pre-mined natural ground elevation (dimension C in Figure 4).
- Volume calculations will be from the crest of the dam to the pre-mined natural ground elevation (volume C in Figure 4).

**Figure 4: Cross-Section View**

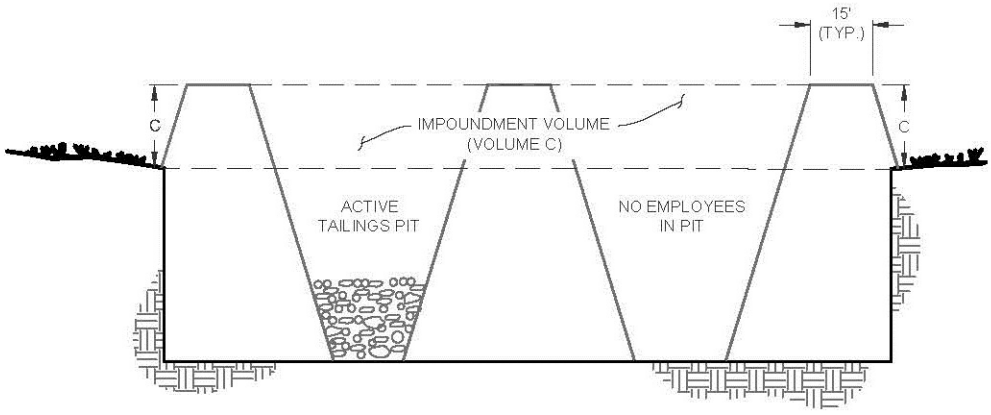


Exhibit A-4

## Jon Frazier

**From:** McEvoy, Steve <steve.mcevoy@ncdenr.gov>
**Sent:** Monday, September 16, 2013 5:28 PM
**To:** Jon Frazier
**Cc:** Davis, Tracy; Vinson, Toby; Boyer, Janet; Denton, Bill; Idol, Tami
**Subject:** RE: Iluka Aurelian Springs Revised Impoundment Design Guidelines
**Attachments:** DEMLR Criterion Defn.pdf; Aurelian Springs_Revised Impoundment Design Guidelines_2013-09-09.pdf

Jon:

I wanted to send this along to you ahead of our meeting on Wednesday, September 18 to facilitate discussion. Please see attached our response to the criterion discussion for jurisdictional exemption in your proposal based on how DEMLR would interpret 15A NCAC 2K. I also attach your proposal for reference convenience.

In addition, I recall discussion in our July 30 meeting relative to Figure 4 and in particular dimension C. DEMLR considers the height dimension to be measured from in-situ ground elevation at the downstream toe to crest elevation of the embankment and has consistently measured height in this manner for the mining industry. In addition, volume in like manner has consistently been measured from in-situ ground elevation. The internal dike height and reservoir volume shown in Figure 4 would be measured in this manner. If you eliminate the internal dike leaving only one open pit, the reality is that if the Figure 4 cross section were cut on an axis along the fall of the terrain, the two C dimensions shown could vary considerably given equal crest elevations. There may be cases relative to Figure 4 involving non-high hazard conditions whereby given a single open pit for slurry storage without divider dikes and a 360 degree containment (perimeter) dike, DEMLR would consider the largest C dimension (a downstream dimension) along the circumference of the perimeter dike as dam height but would measure reservoir volume from the in-situ ground floor elevation of the single pit.

Please feel free to share this with anyone you feel would be interested. I look forward to our meeting. Thank you.

**Steven M. McEvoy, PE**
State Dam Safety Engineer
NC Land Quality Section
1612 Mail Service Center
Raleigh, NC 27699-1612
Office: (919) 707-9220
steve.mcevoy@ncdenr.gov



---

**From:** Jon Frazier [mailto:JFrazier@kleinfelder.com]
**Sent:** Monday, September 09, 2013 2:56 PM
**To:** McEvoy, Steve
**Cc:** Davis, Tracy
**Subject:** Iluka Aurelian Springs Revised Impoundment Design Guidelines

Hi, Steve.

I've attached the revised impoundment guidelines based on our discussion during our meeting on August 30th. Please take a look and let us know if you have any questions or need any additional information.

Tracy, these guidelines will be included in the overall operations plan, which I sent to Ashley on July 23rd. This version of these guidelines is different than what is included in the operations plan that I provided because we met with Steve after I sent Ashley the plan.

Thanks.

**Jon Frazier, PE, LEED AP**
3500 Gateway Centre Blvd, Suite 200
Morrisville, NC 27560
o|919.755.5011 ext. 135
f |919.755.1414
c |919.610.1051

Exhibit A-5

**Criterion offered by DEMLR (9-16-13):**

It is suggested that Figures 2 and 3 be renamed 2A and 3A. Two new figures would then be created. Figure 2B would have three cells eliminating the two open pit cells in Figure 2A and noting "no employees or others in pit". Dimension A would remain as in Figure 2A. Figure 3B would delete the open pit and containment dike shown to the right in Figure 3A with the addition of a note stating "no employees or others" in the far right pit. Dimensions A and B remain as in Figure 3A.

***Criterion 1***

The first criterion is to be used when employees are working in a pit downstream of an active tailings area or when there are other people and/or facilities in a pit downstream of an active tailings area. In criterion 1, the following standards apply:

1. Impoundments must be constructed so that they are less than 25 feet in height or contain less than 50 acre-feet of capacity above in-situ ground.

2. To serve as a setback, an open pit must be constructed between the employees in the downstream pit and the active tailings pit.

3. The open pit shall be sized such that it can contain the volume of the upstream tailings pit (volume B > volume A in Figure 2A).

4. The setbacks between impoundments must be a minimum of 100' or 10 times the height of the dam, whichever is greater (dimension A in Figures 2A and 3A).

5. The height of the dam will be calculated from the crest of the dam to the lowest in-situ ground point on the downstream side of the dam (dimension B in Figure 3A).

6. Volume calculations will be from the lowest in-situ ground point to the maximum pool level within the impoundment as defined by crest elevation of the containment dike.

***Criterion 2***

The second criterion is to be used when there are no employees working downstream of an active tailings area or when there are no other people and/or facilities in a pit downstream of an active tailings area. In criterion 2, the following standards apply:

1. Impoundments must be constructed so that they are less than 25 feet in height or contain less than 50 acre-feet of capacity above in-situ ground.

2. The setbacks between impoundments must be a minimum of 100' or 10 times the height of the dam, whichever is greater (dimension A in Figures 2B and 3B).

3. The height of the dam will be calculated from the crest of the dam to the lowest in-situ ground point on the downstream side of the dam (dimension B in Figure 3B).

4. Volume calculations will be from the lowest in-situ ground point to the maximum pool level within the impoundment as defined by crest elevation of the containment dike.

**END**