

Nano Aeration and Green Technology for Iron and Pollutant Removal in Groundwater Treatment

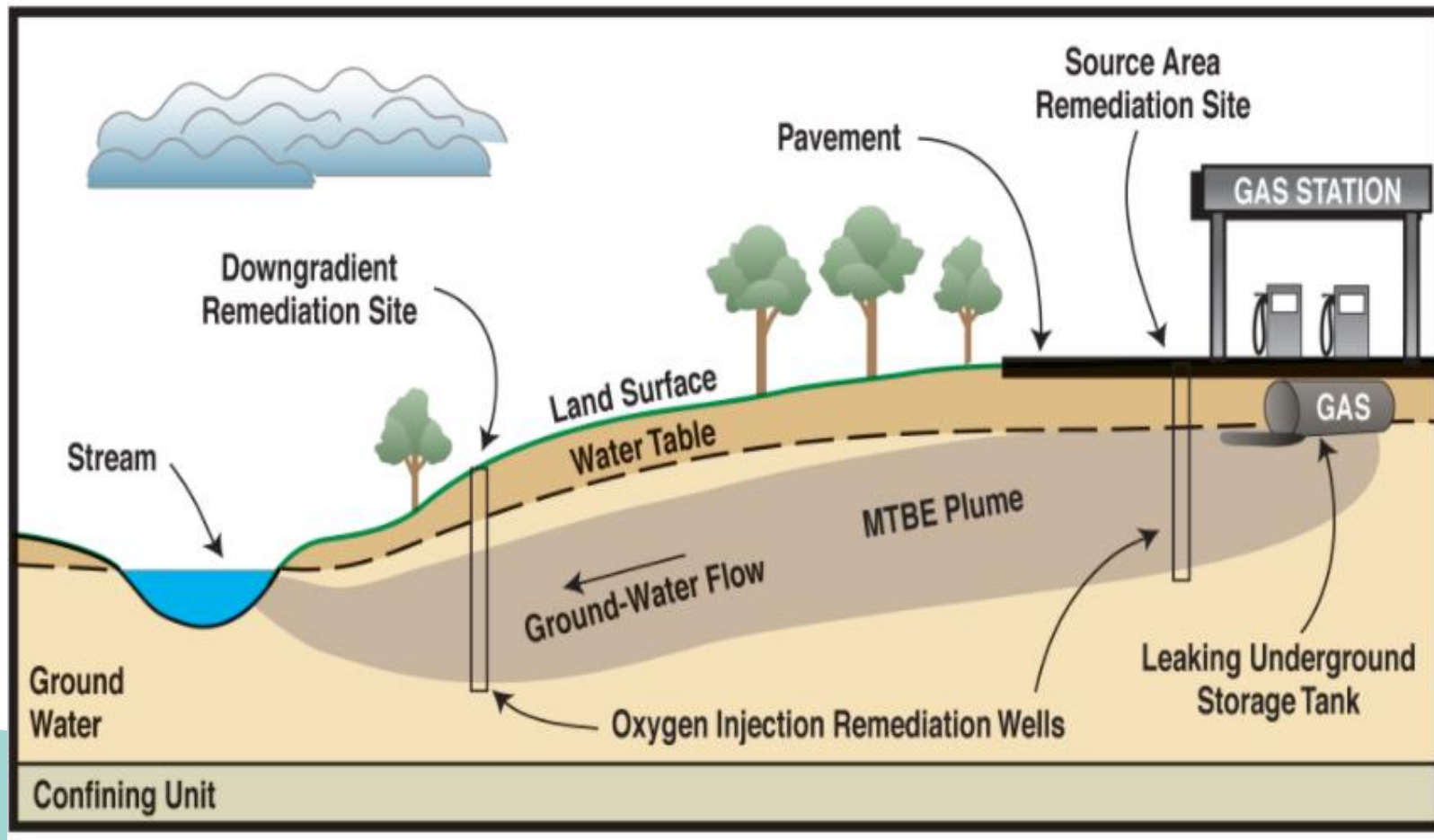


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Introduction

1. Nano Aeration Technology
2. Green Technology – Activated Carbon from Rice Husk
3. Natural disinfection

Lack of Oxygen and Contamination in Groundwater Aquifer



Introduction to Drinking Water for MLGW by Dr. Lin (2007)

<http://www.mhhe.com/Enviro-Sci/CaseStudyLibrary/>

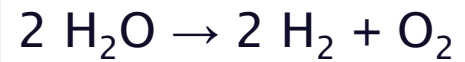
[Memphis and Shelby Counties, Tennessee: Drinking Water from Wells, Not from the River](#)



Oxygen through Aeration

(Fe++) to insoluble ferric oxides (FeOx).

Fe++ (ferrous) + oxygen → FeOx (ferric oxides)



Pending Patent



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
63/259,443	07/19/2021	Nicholas Eckelberry	

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CONFIRMATION NO. 7469

FORMALITIES LETTER



0C000000127395928

Date Mailed: 08/02/2021

NOTICE TO FILE MISSING PARTS OF PROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(c)

Filing Date Granted

An application number and filing date have been accorded to this provisional application. The items indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is insufficient.
- Surcharge as set forth in 37 CFR 1.16(g) must be submitted.
The surcharge is due for late submission of filing fee or cover sheet.

Current Water Treatment at MLGW

1. Aeration tower
2. Trickling down the tower
3. Coal for iron, odor, other pollutant removal
4. Sand bed - filtration
5. Disinfection
6. Chemical addition

Nano Aeration


1. The glasses on either side of normal water contains nano-bubble produced with EA mini aerator and fresh water.
2. The primary function is the reduction or elimination of organic pollutants in water, whether that pollutant is hydrocarbon, nitrogen, or an organic chemical based.



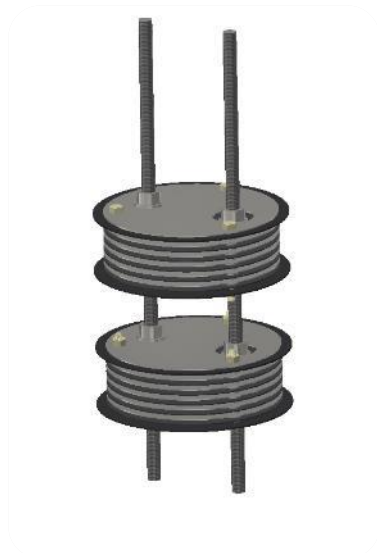


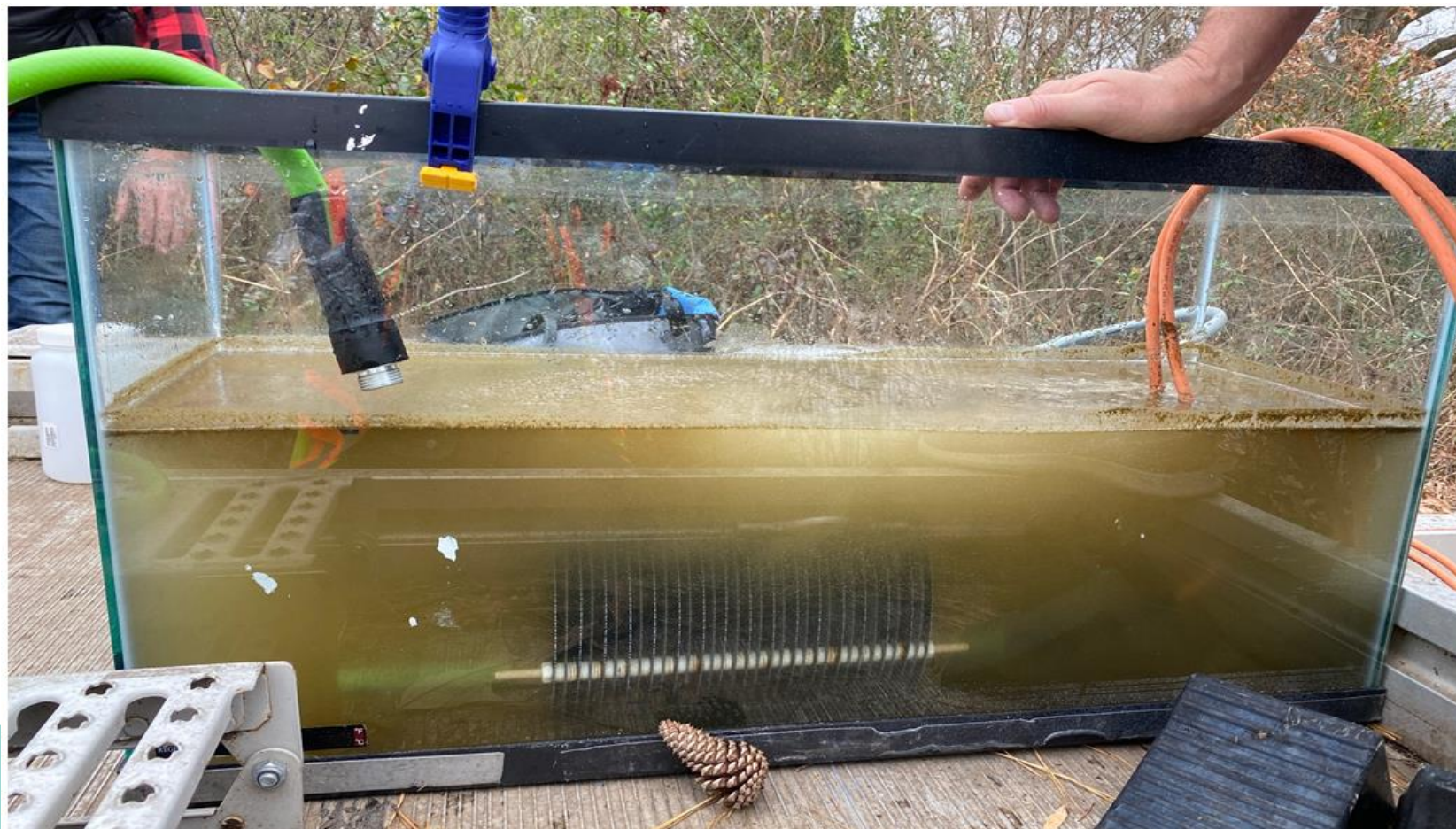
1. Produce Dissolved Oxygen in water body
2. Increase water penetration of water through Nano technology
3. Produce reactive oxygen species, such as (O_3), (H_2O_2), (OH^-), and Hydroxyl radicals ($^\circ\text{OH}$)
4. Increase air stripping to remove organic, odor, and inorganic components
5. Increase water cleaning processes

Advantage of Nano Aeration Technology

1. Rapid increase of Dissolved Oxygen
 2. Remove Hydrogen Sulfide (H_2S)
 3. Lower of Biochemical Oxygen Demand
 4. Reduce Ammonia and organic Nitrogen reduction (TKN)
 5. Generate Reactive Oxygen Species (R.O.S) Which include O_2 , H_2O_2 , O_3 , O , and $-\text{OH}$
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Aeration Technology





Low Power and Operation

1. Operation needs low power (2-4KW/H or 500-700 watts/reactor)
2. Power can be provided by solar energy
3. 6-minute operation to oxide Fe (++) to Fe (+++)
4. Only 6- 8 inch pipe required with a continuous reactor and no aeration tower.



Aeration in Six Minutes



Patent -Rice Husk Activated Sludge - US 10562792 by Dr. Lin



US010562792B2

(12) **United States Patent**
Lin et al.

(10) **Patent No.:** **US 10,562,792 B2**
(45) **Date of Patent:** **Feb. 18, 2020**

(54) **METHOD OF REMOVING HEAVY METALS FROM AN AQUEOUS SOLUTION USING PARTIALLY CHARRED RICE HUSKS**

B01J 20/3085 (2013.01); *B01J 2220/4875* (2013.01); *C02F 2101/20* (2013.01); *C02F 2101/22* (2013.01); *C02F 2101/306* (2013.01); *C02F 2101/32* (2013.01); *C02F 2101/322* (2013.01); *C02F 2103/10* (2013.01); *C02F 2103/36* (2013.01); *C02F 2103/365* (2013.01); *C02F 2303/16* (2013.01)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/415,166**

(22) Filed: **May 17, 2019**

(65) **Prior Publication Data**

US 2019/0270041 A1 Sep. 5, 2019

(58) **Field of Classification Search**
None
See application file for complete search history.


(56) **References Cited**
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3,392,838 A 7/1968 Mark
4,280,912 A 7/1981 Berry et al.
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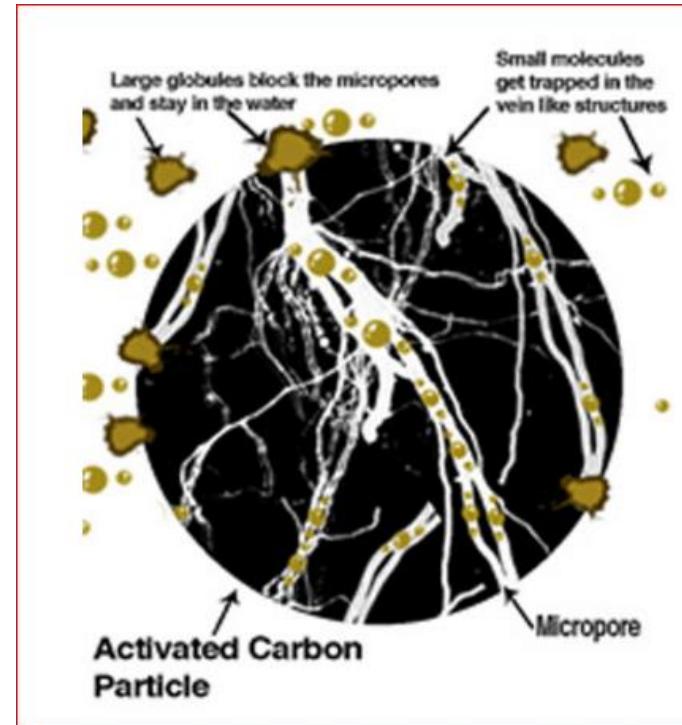
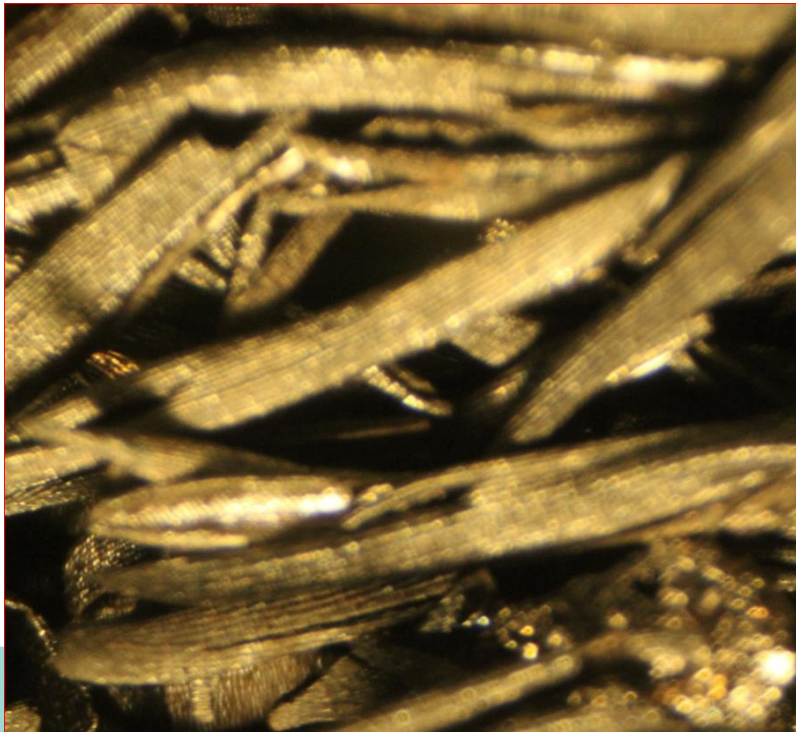
OTHER PUBLICATIONS

Ahiduzzaman et al, Preparation of porous biochar and activated carbon from rice husk by leaching ash and chemical activation, Aug.

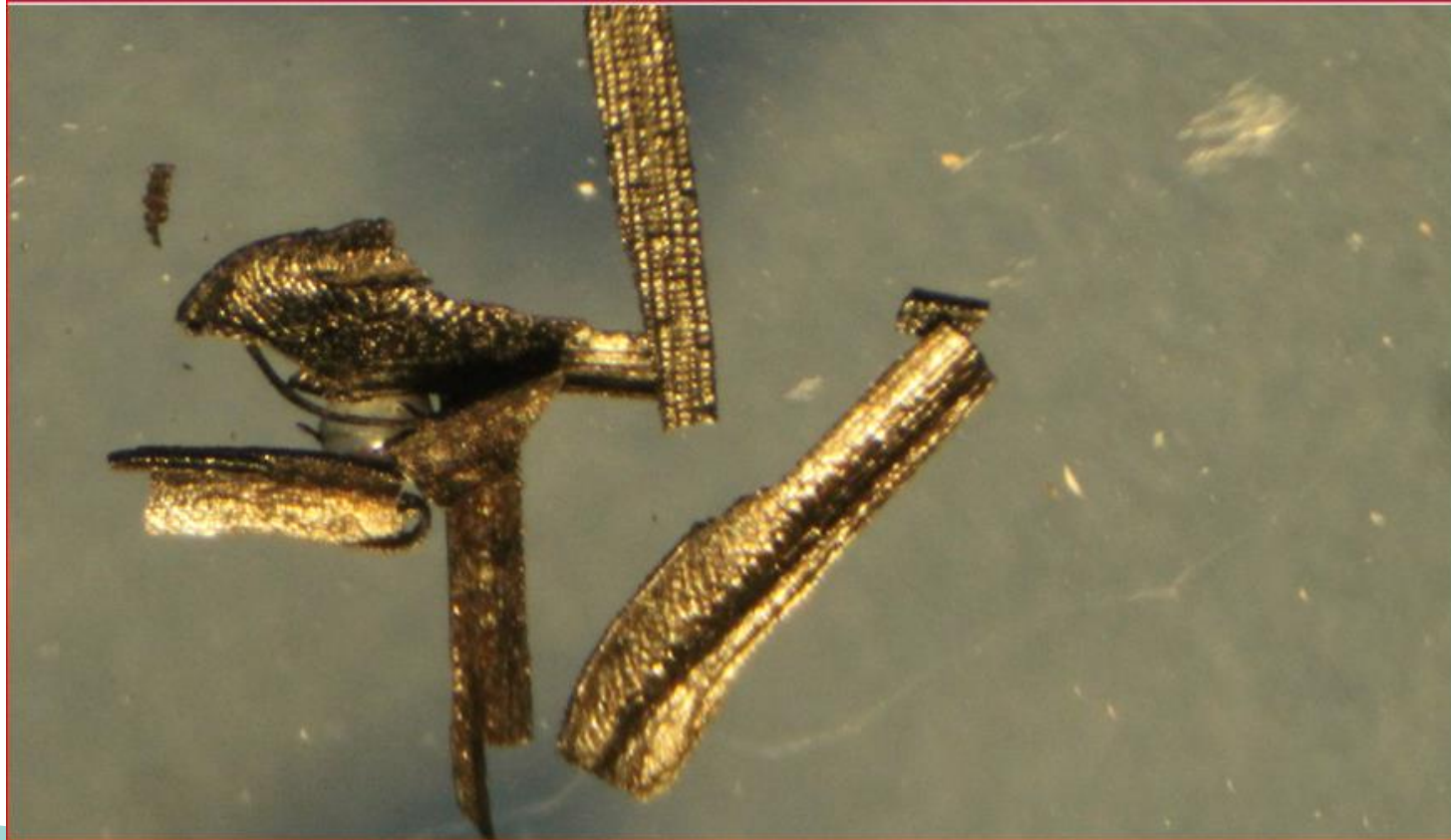
901 X for Drinking Water Treatment

1. NSF 61 Drinking Water Certificate Material
 2. Removal total solids, suspended solids, organics, heavy metals, and bacteria.
 3. Glanris' biocarbon™ filtration media can remove *both metals and organics*.
 4. It operates in a wide pH range and uses no harsh chemicals or microplastics.
 5. Its structure gives it rapid kinetics.
 6. It can achieve in a single pass through mixed media to achieve.
 7. The price of ion-exchange/sand bed with the added benefit of organics removal.
 8. \$ 3.0 per one cubic foot
 9. Recyclable and re-washable material
- 

901X and Activated Carbon



Microporous Material



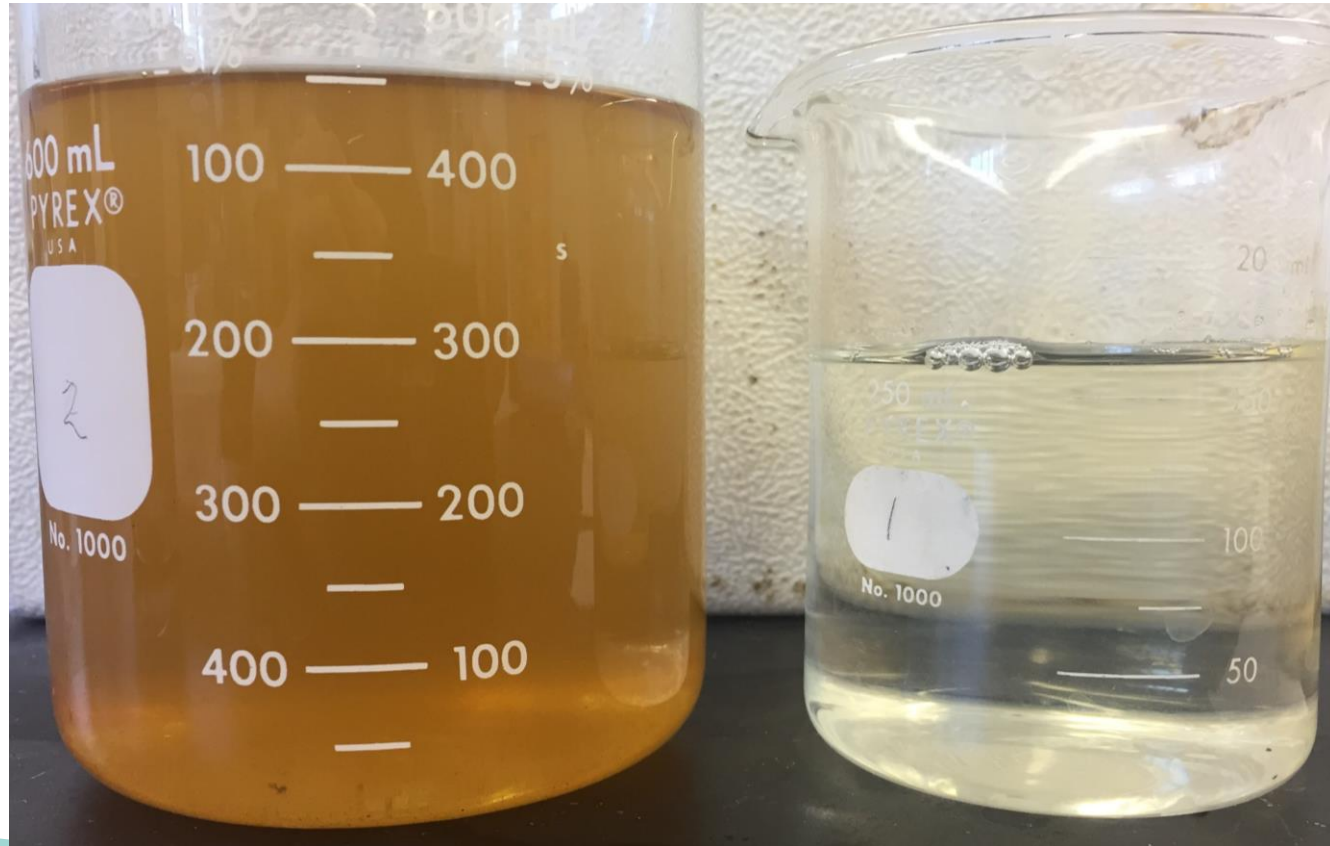
901 X Raw Material



Glanris Production



Pollutant Removal



Several Steps of Aeration and Adsorption

