Ks Zs/ t

- Merrell Bros History
- PFAS Regulations
- Disposal Options
- Innovative Drying Technology
- Beneficial Reuse vs Destruction
- Future of Biosolids

MERRELL BROS.®

Driven by Integrity, Proven by Results

- <HDUV ([SHULHQFH
- %ERVROLGV 0DQDJHPHQW
- 86 3DWHQWV
- 333 '%22 '%2
-)DPLO\ 2ZQHG
- /HG 7HDP 0HPEHUV

6SHFLDO Transforming Waste LQWR YDOXDEOH UHVRXU

PHUUHOOEU

MERRELL BROS.®

CORE VALUE

- ,QWHJULW\ 'ULYHQ
- 7U\ +DUGHUµ
- 6WHZDUGVKLS
- ,QWHQWLRQDO &XVWRPHU
- &RPPLWPHQW WR ([FHOOHQFH

0$.(,7 $33$5(17 7+$7 :(6(59(*2' ,1 $// :('2 5RPDQV

& Œ o W t W & ^ Z P µ o š] } v •] v] } • } o] •

US EPA Draft Risk Assessment & Roadmap

PFAS

î ì í õ PFAS Action Plan

î ì î ñ Draft Risk Assessment

î ì í õ t W & ^ š] } v W o v

,VVXHG D IRUPDO FDOO WR DFWLRQ LQ WKH 3)$6 $FWLRQ 3ODQ

î ì î ñ t Œ (š Z] • l • • • u v š

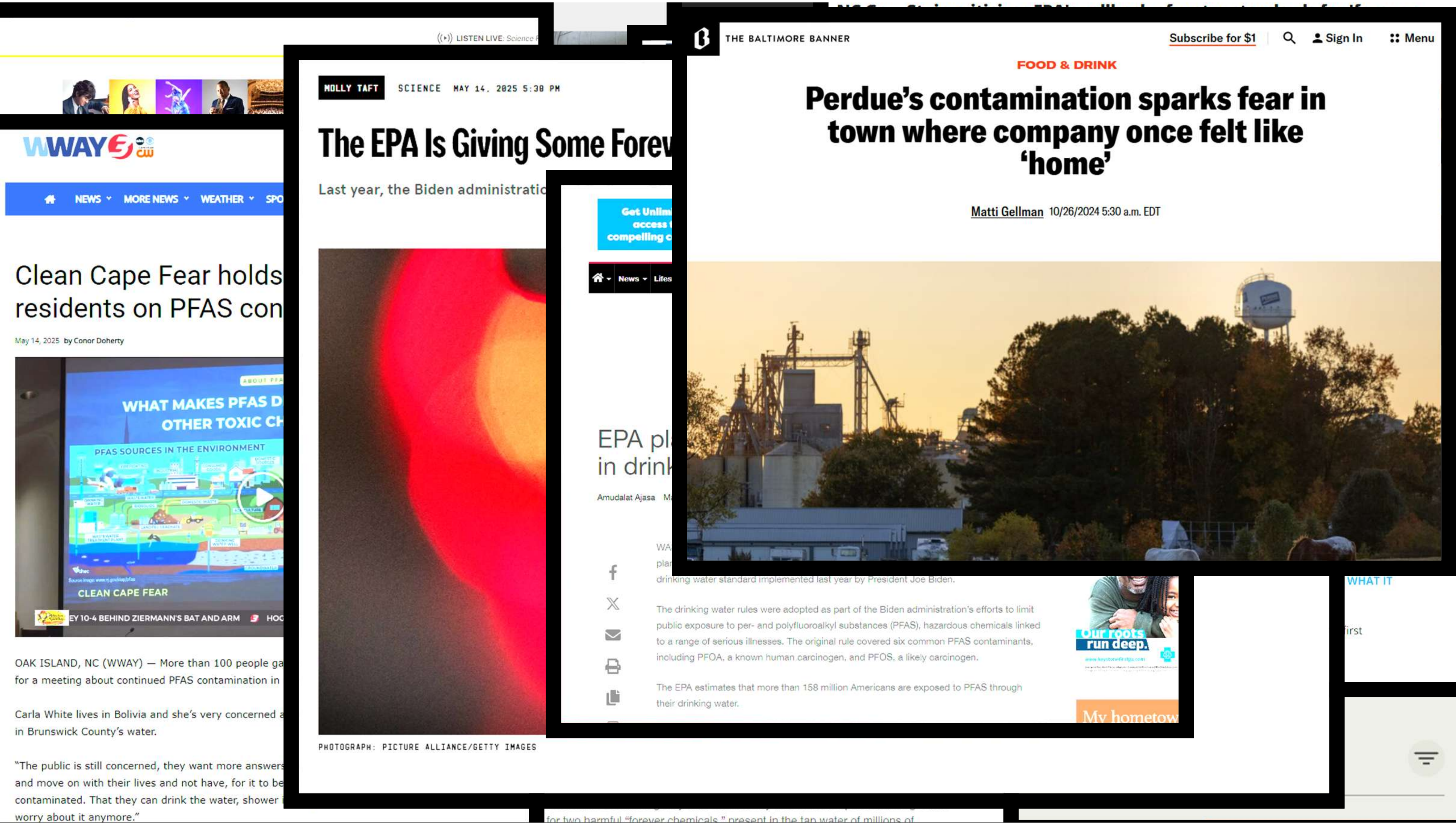
(YDOXDWHG 7KUHH %LRVROLGV 0DQDJHPHQW
/DQG $SSOLFDWLRQ RI %LRVROLGV
6XUIDFH 'LVSRVDO
,QFLQHUDWLRQ

^ v Œ] } t ^ & Œ u & u] o] • _

6FHQDULR EDVHG PRGHO RI ´IDUP IDPLOLHVµ RU QHDU ODQG ZKHUH ELRVROLGV DUH DSSOL WKH SUHVHQFH H[SRVXUH DQG WR[LFLW\ RI FRPSRXQGV 3)2$ DQG 3)26

Z • µ o š • W

,Q VRPH PRGHO VFHQDULRV ELRVROLGV FRQV SDUW SHU ELOOLRQ SSE RI 3)2$ RU 3)26 H[F KXPDQ KHDOWK WKUHVKROG ZKLFK LV RQH D FDQFHU FDVH SHU PLOOLRQ LQGLYLGXDOV



LISTEN LIVE:

WWAY

NEWS MORE NEWS WEATHER SPO

Clean Cape Fear holds
residents on PFAS con

May 14, 2025 by Conor Doherty

WHAT MAKES PFAS D
OTHER TOXIC CH
PFAS SOURCES IN THE ENVIRONMENT
CLEAN CAPE FEAR

OAK ISLAND, NC (WWAY) — More than 100 people ga
for a meeting about continued PFAS contamination in

Carla White lives in Bolivia and she's very concerned a
in Brunswick County's water.

"The public is still concerned, they want more answers
and move on with their lives and not have, for it to be
contaminated. That they can drink the water, shower i
worry about it anymore."

MOLLY TAFT SCIENCE MAY 14, 2025 5:38 PM

The EPA Is Giving Some Forev

Last year, the Biden administratio

PHOTOGRAPH: PICTURE ALLIANCE/GETTY IMAGES

Get Unlim
access
compelling c

News Lifes

EPA pl
in drink

Amudalat Ajasa Ma

WA
pla
drinking water standard implemented last year by President Joe Biden.

The drinking water rules were adopted as part of the Biden administration's efforts to limit public exposure to per- and polyfluoroalkyl substances (PFAS), hazardous chemicals linked to a range of serious illnesses. The original rule covered six common PFAS contaminants, including PFOA, a known human carcinogen, and PFOS, a likely carcinogen.

The EPA estimates that more than 158 million Americans are exposed to PFAS through their drinking water.

Our roots run deep.

My hometow

for two harmful "forever chemicals," present in the tap water of millions of

WHAT IT

first

THE BALTIMORE BANNER

Subscribe for $1 Sign In Menu

FOOD & DRINK

Perdue's contamination sparks fear in town where company once felt like 'home'

Matti Gellman 10/26/2024 5:30 a.m. EDT

Maryland	PFOA or PFOS	>100 ppb – Industrially impacted/no land application > 50 or <100 ppb – Reduce application rate to 1.5 dt/acre >20 or <50 ppb – Reduce application rate to 3 dt/acre ≤ 20 ppb – No action required
Michigan	PFOA or PFOS	>100 ppb – Industrially impacted/no land application 20 – 100 ppb – Reduce land application rate to 1.5 dt/acre <20 ppb – Normal application rate
New York	PFOA or PFOS	≥ 50 ppb – No land application >20 or <50 ppb – Additional monitoring, steps to limit application ≤ 20 ppb – No action required
Maine	PFOA, PFOS, & PFBS	Banned land application of biosolids in June 2022
Texas	PFAS	House Bill 1674
Oklahoma	PFAS	Senate Bill SB3
Connecticut	PFOA & PFOS	Banned biosolids containing PFAS as a soil amendment in October 2024
Vermont	PFAS	House Bill H.303

À}oµš]}v }(šZ o v t š Œ š ~
D v P u vš d Zv}o}P] •

&}µv š]}vW dZ o v t š ŒWš • ~ t •

7KH &:$ HVWDEOLVKHG WKH UHJXODWRU\ IUDPHZRUN IRU SURWHFWLQJ 8 6 ZDWHUV IURP SROOXWLRQ VHWWLQJ ZDVWHZDWHU GLVFKDUJH VWDQGDUGV DQG PDQGDWLQJ WUHDWPHQW

dÁ}W o •• D ZWŽ • Á š Œ]vP

%LRORJLFDO ELRVROLGV DUH SURFHVVHG WKURXJK FHQWULIXJHV RU EHOW SUHVVHV WR UHGXFH ZDWHU FRQWHQW

&}µŒW À v ŒÇ]vP ~

+LJK HIILFLHQF\ WKHUPDO GU\HUV UHGXFH ELRVROLGV VROLGV FUHDWLQJ SHOOHWV RU SRZGHUV

s}oµu Z µ š]}v v (]] o Z µ•

WZ • Kv W o •• >]‹µ] %‰%‰o] š]}v

&ODVV % ELRVROLGV DUH WUHDWHG WR UHGXFH SDWKRJHQV EXW VWLOO KDYH GHWHFWDEOH OHYHOV WKH\ UHTXLUH VLWH UHVWULFWLRQV DQG FURS KDUYHVWLQJ OLPLWDWLRQV

> WZ • dZŒ W o ••]}•}o]

&RPSRVWLQJ KHDW GU\LQJ SDVWHXUL]DWLRQ DQG DGYDQFHG GLJHVWLRQ

u ŒP]vP &Œ}vš] ŒW E]}•}o] • •šŒ

- 7KHUPDO +\GURO\VLV $QDHURE ELRJDV \LHOG DQG VROLGV EUHD
- 3\URO\VLV *DVLILFDWLRQ &RQYH V\QJDV RU RLOV
- 6XSHUFULWLFDO :DWHU 2[LGDWL GHVWUXFWLRQ RI RUJDQLF FRQW DQG LQHUW DVK

]•‰}• o K%
(}Œ o ••
]}•}o] •

> v ‰‰o] š]}v

}u‰}•š]vP ~ Z •] µ o
D v P u vš &]o]š] •

> v (]oo]•‰}

IN MANY AREAS ACROSS THE US, DISPOSAL OPTIONS ARE BECOMING MORE CHALLENGING & VERY EXPENSIVE

d Ç ‰ • } (Œ Ç Œ• &}Œ]}•}

¥Ì÷ ë ¥ë

- Low Temp & Low Dust
- Large Footprint
- Low Throughput
- Low Product Density
- Moderate energy efficiency

_Û÷Œë _qG ë ¥ë

- Proven technology
- Low Temp
- High Throughput
- Requires Back Blending
- Dust

'Ìý¹ ¹ ¥ ¥ ë ¥ë

- Efficient heat and mass transfer.
- Consistent product quality
- No Back Blending
- Emissions & Permitting
- Maintenance & Inert Gas

[Œ Ì¥ ë ¥ë

- Excellent energy efficiency.
- Low air emissions—closed system.
- Compact Footprint
- Dust

dÇ‰ • }(ŒÇ Œ• &}Œ]}•}

k_ ƒ ë ¥ë

- Low Temp Drying
- Low Dust
- Low Product Density
- Backmixing Required

cÛÌŒë ë ¥ë

- Low energy cost (renewable source).
- Low operational cost and carbon footprint.
- Simple design, easy to maintain.

AÛ k¥Òç .qG

- Efficient & Low Temp
- Low Dust
- Compact system design
- Low Throughput

¹Û ë ¥ë

- Simple Operations
- Energy Efficient
- Low Throughput

dÇ‰ • }(ŒÇ Œ• &}Œ]}•}(
v (]š• ~ Œ Á l•

Dryer Type	Energy Efficiency	Footprint	Complexity	Throughput	Emission Control	Cost (CapEx/OpEx)
Belt Dryer	Medium	Large	Medium	Medium	High	High/Medium
Drum Dryer	Low	Medium	Low	High	Medium	Medium/High
Fluidized Bed Dryer	High	Compact	High	High	Medium	High/High
Paddle Dryer	High	Medium	Medium	Medium	High	High/Medium
Tray Dryer	Medium	Compact	Medium	Low	Low	Medium/High
Solar Dryer	High	Very Large	Low	Meduim	Very High	Low/Low
Low Temp DeHum	High	Compact	Low	Low	Low	High/Low
Bio Dryer	High	Compact	Low	Low	High	Medium/High

Primary Types of Dryers For Biosolids

Be[illegible]s

Dryer Type	Energy Efficiency	Foot[illegible]	[illegible]exi[illegible]	[illegible]put	Emission Control	Cost (CapEx/OpEx)
Belt Dryer	Medium	La[illegible]	[illegible]edium	[illegible]n	High	High/Medium
Drum Dryer	Low	Medium	[illegible]	[illegible]h	Medium	Medium/High
Fluidized Bed Dryer	High	Compact	[illegible]	High	Medium	High/High
Paddle Dryer	High	Medium	[illegible]	Medium	Very High	High/Medium
Tray Dryer	Medium	Compact	[illegible]	High	Low	Medium/High
Solar Dryer	Low	Very Large	[illegible]	Low	Very High	Low/Low
Low Temp DeHum	Medium	Compact	[illegible]	Medium	High	High/High

D ZZ >> ZK^X

d ,EK>K'/ ^

D ZZ >> ZK^X

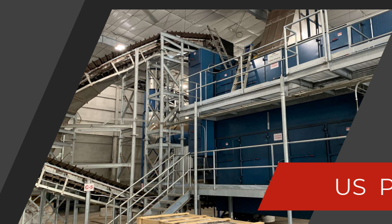
d ,EK>K'/ ^

Solar Thermal
Simple Process, Proven Results, Large Volumes

US PATENT

Double Drum
Energy Efficient, Small Footprint, Low OpEx

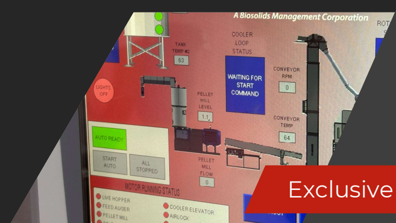
US PATENT



Pasteurization
158°F for 30 Min & 75% TS

Guaranteed Class A

US PATENT



Pelletization
Highly Desirable Pellet
Increased Bulk Density
Low Dust

Exclusive License

Marketing & Distribution
FloridaGreen

FloridaGreen Plus

Beneficial Reuse

7HFK *RDOV 6LPSOH ² (IILFLHQW ² %HQHILFLDO 5HXV

D ZZ >> ZK^X
^K> Z d, ZD >
W ^d hZ/• d/KE

Pasco County, FL

Combines greenhouse solar thermal technology & oven pasteurization to achieve a Class AA product.

$250,000+ Annual Savings for Pasco County, FL	50,000+ WET TONS / YEAR	7+ YEARS OF OPERATIONS

^K> Z d, ZD >

DRYING

6,03/(352&(66(6

- *UHHQKRXVH 'U\LQJ ,QFRPLQJ 76 GULHG
- 7UDFWRUV)DOF 7LOOHUV WR 7XUQ %LRVR
- (PLVVLRQ &RQWURO 6\VWHP ² N &)0 WKUR
- /DUJH +9/6)DQV $LU &LUFXODWLRQ LQ *UHHQKRXVHV

(QHUJ\ (IILFLHQW 6LPSOH 3URFHVV ² *XDUDQWHH

EFFICIENCY

îXóñ rïXñ0ròí

Sq Ft of Greenhouse Per Wet Ton of Biosolids (annually)

CLASS AA FERTILIZER

$J 6SHF 1XWULHQW ULFK
0DUNHWDEOH &ODVV $ %LRVR

PHUUHOOEU

^K> Z d, ZD >

DRYING

*5((1+286((;3$16,21 352-(&7

- +HDWHG &RQFUHWH)ORRUV
- 2QH $GGLWLRQDO $FUH RI *UHHQ
- *RDO 0D[LPL]H 3DVWHXUL]HU &D

EFFICIENCY

îXñD dhíñUììì td

,1)/225 +($7 %2,/(5 6<67(0

$'',7,21$/ %,262/,'6 &3&,7< 3(5 <($5

D ZZ >> ZK^X
Kh > ZhD Zz/E'

Kokomo, IN

Indirect Drying & Pasteurization, Simple Operation,
Efficient BTU/LB of H2O Evaporation, No Sticky Phase

1,600	>75%	~320°F
DRY TON PER YEAR	TOTAL SOLIDS CLASS A PELLETS	DRUM TEMP WITH 80 PSI STEAM

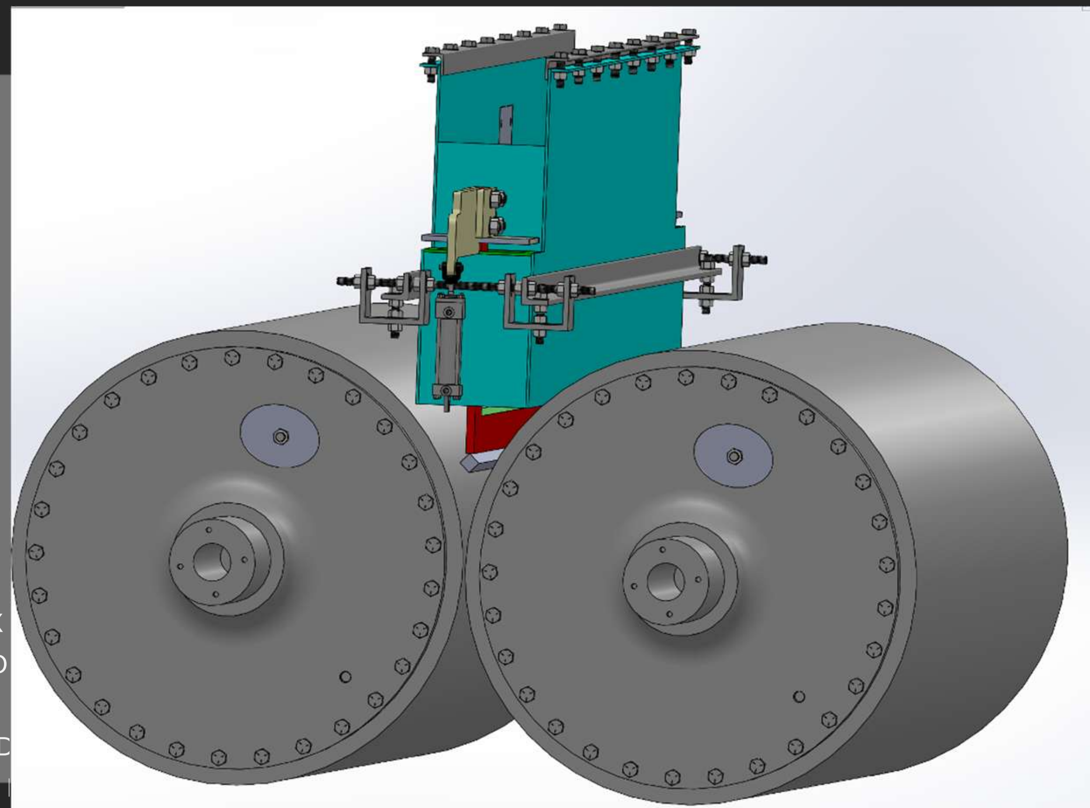

ALFA LAVAL PM 38000
CENTRIFUGE
ALFA LAVAL PM 38000
CENTRIFUGE
Clean
Water

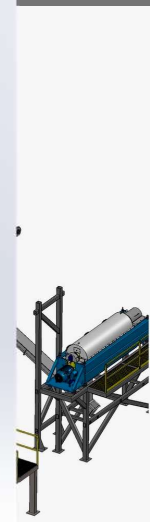
Kh > ZhD

DRYING & PASTEURIZATION

'RXEOH 'UXP WHFKQRORJ\ XWLOL]HV
VRXUFH ²VWHDP LV SLSHG WKURXJK
EULQJLQJ WKH VXUIDFH WHPSHUDWX
ƒ)DKUHQKHLW 'HZDWHUHG ELRVRO
FRQYH\HG RQ WKH GUXPV 7KH QLS
WKH WZR GUXPV QHDUO\ WRXFK SOD
XQLTXH HQYLURQPHQW XQGHU WHPS

SCALABILITY





òììrôìì dXíD dh

&RQVHUYDWLYH $QQXDO 7KURXJKSXW RI (DFK 'RXEOH 'UXP 'ULHU

%78 5HTXLUHG IRU (DFK 'RXEOH 'UXP 'ULHU

Kh > ZhD

DRYING & PASTEURIZATION

0DWHULDO DGKHUHV WR WKH VXUID
õ URWDWLRQ WR WKH VWDWLF VFUI
GULYHQ RII WKH GUXP DOORZLQJ IRU DV PXFK DV   WR
EH UHPRYHG IURP WKH ELRVROLGV 7KH PDWHULDO LV WKHQ
FDQ KDYH WKH DSSHDUDQFH RI ILVK IRRG RU FRIIHH
JURXQGV GHSHQGLQJ RQ WKH WUHDWPHQW SURFHVV SULRU WR
EHLQJ SXW WKURXJK WKH 'RXEOH 'UXP

SCALABILITY

EK ^d/ <Z WF,G^
'HZDWHUHG %LRVROLGV)HG ,QWR 1LS *DS ²'ULHG %LRVRO
)ODVK (YDSRUDWLRQ RFFXUV ZKHQ SUHVVXUH LQFUHDVHV

ïìì£ &

'RXEOH 'UXP 6XUIDFH a
7HPSHUDWXUH   36, 6WHDP

îì9 r Eóñ9 d^

)HHG 6ROLGV 'ULHG WR !   &DNH
6ROLGV %HIRUH 3DVWHXUL]DWLRQ

/K^K/> ^
PASTEURIZATION

- +HDWLQJ 'U\LQJ RI %LRVROLGV LQ
- 7LPH 7HPSHUDWXUH 0HW LQ %RWWRP
-)HHG a 76² 2XWSXW a 76
- 3DVWHXUL]DWLRQ 0LQ 76 0LQLP

SIMPLICITY

ïì D]v

0D[6SHHG RI %RWWRP =RQH

7LPH 7HPS 'RFXPHQWDWLRQ

& > K>/&KZD

7HVWLQJ 9HULILHG WKURXJK PRQWK

WLRQ HQVXUH &ODVV $$

D ZZ >> ZK^X

W oo š]Ì š]}v

Pasco Milling & Bagging Facility

Class AA Biosolids from the Solar Thermal Pasteurization plant will be pelletized to produce FloridaGreen

9,000	500,000+	+4.5 Ton/Hr
Dry Tons Per Year	32 lb Bags of FloriaGreen Annually	Three 24" Pellet Mills

D ZZ >> ZK^X
W oo š]ì š]}v

Milling & Bagging Technology

- Pellet Mills produce 1/8,”, 1/4”, or 3/8” diameter pellets
- Dust Reduction
- Consistent Sizing
- Increased Bulk Density & Marketability
- Drier Agnostic (80%+ TS Required)

~50	$500+	145°-155° F
Lbs Per Cubic Foot Bulk Density	Bagged Product Sells for Per Ton	LIGNIN ACTIVATION

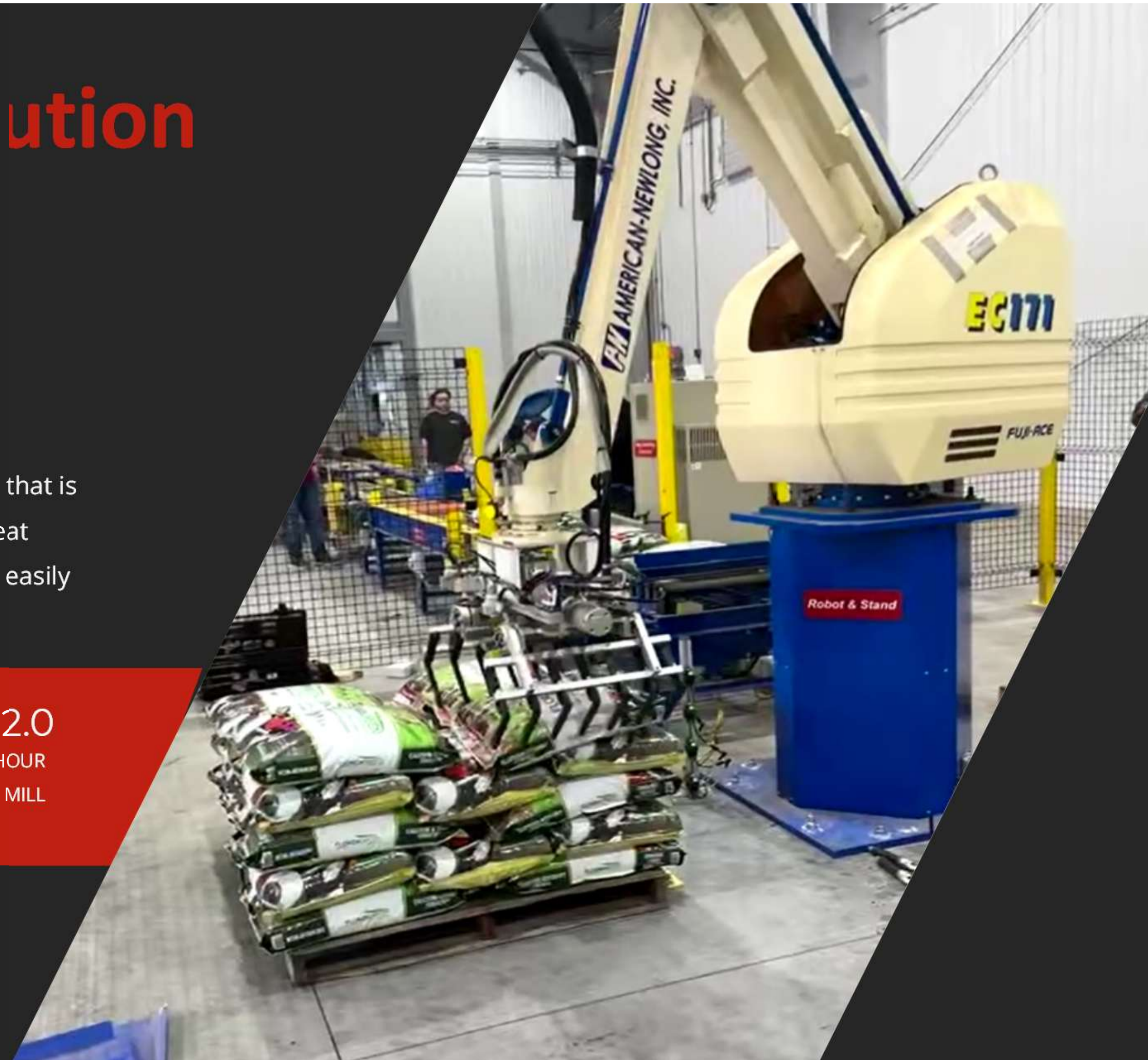
[redacted]

D Œl š]vP ~ution
&}Œ v(]]

Milling & Bagging

Many drying technologies produce a final product that is dusty and not uniform in size. Pelletization is a great solution. Once pelletized, the final product can be easily marketed and distributed for beneficial reuse.

32 lb	1500+	Up to 2.0
Residential & Commercial Bags	RUNTIME HOURS PER DIE & ROLLERS	TONS PER HOUR PER PELLET MILL



D Œl š]vP ~]•šŒ] µš]}v

&}Œ v (]] o Z µ•

-)XOO\ $XWRPDWHG %DJJLQJ /LQH
- $PHULFDQ 1HZORQJ %DJJLQJ 6\VWHP
-)XML 5RERW &HOO
- 3URGXFWLRQ EDJV SHU PLQXWH
- OE RU OE EDJV

D Œl š]vP ~]‚
&}Œ v (]] o

%DJJLQJ DQG VHOOLQJ SHOOHWL]
YDOXDEOH UHYHQXH VWUHDP E\ W
PDUNHWDEOH HFR IULHQGO\ IHUW
DSSURDFK VXSSRUWV VXVWDLQDE
ZKLOH PHHWLQJ FRQVXPHU GHPDQ
QXWULHQW ULFK VRLO DPHQGPHQ

Profitability

> Á v ˜ > v • ‰ v (]] o Z µ•

After applying FloridaGreen on her home lawn, the City of Kokomo Wastewater Plant Superintendent saw significant improvements. Here are the before and after results.

D Œl š]vP ~]•š(
&}Œ v (]] o Z

What about PFAS?

:H PRQLWRU WKH ELRVROLGV WKDW SURGXFH
)ORULGD*UHHQ WR HQVXUH LWV VDIHW\ DQG FRPSOLDQFH
$V VWDWH UHJXODWLRQV HYROYH PDUNHWLQJ DQG
GLVWULEXWLRQ ZLOO EH DGMXVWHG DFFRUGLQJO\

PFAS

D Œl š]vP ~]•šŒ

&}Œ v (]] o Z µ

W&K^ ~ W&K > À o•

BloomSoil.com

What about PFAS?

PFAS

W&K^ ~ W&K > À o•

SSE

Milorganite Safety

E Á •šŒµ š]}v
d Zv}o}P] •

' •](] š]}v ˜ WÇŒ}oÇ•]•

+D]HQ·V 5HVHDUFK LV FXUUHQWO\ XQGHUZD\ WR HYDOXDWH WKH GHVWUXFWLRQ RI 3)$6 LQ *DVLILFDWLRQ

^ tK

,QFUHGLEOH WHFKQRORJ\ LI LW FDQ VFDOH WR WKH GHPDQG RI WKH ELRVROLGV PDUNHW

>d ZE d/s &h >

'ULHG ELRVROLGV KDYH D FDORULILF YDOXH ! %78 OE GU\ EDVLV PRLVWXUH WR EH XVHG IRU .LOQV &R ILULQJ :DVWH (QHUJ\

D ZZ >> ZK^ E t d , KD/E' ^KKEJ

1HZ SDWHQW IRU WHFKQRORJ\ WR UHPRYH 3)26 EHIRUH PHFKDQLFDO GHZDWHULQJ

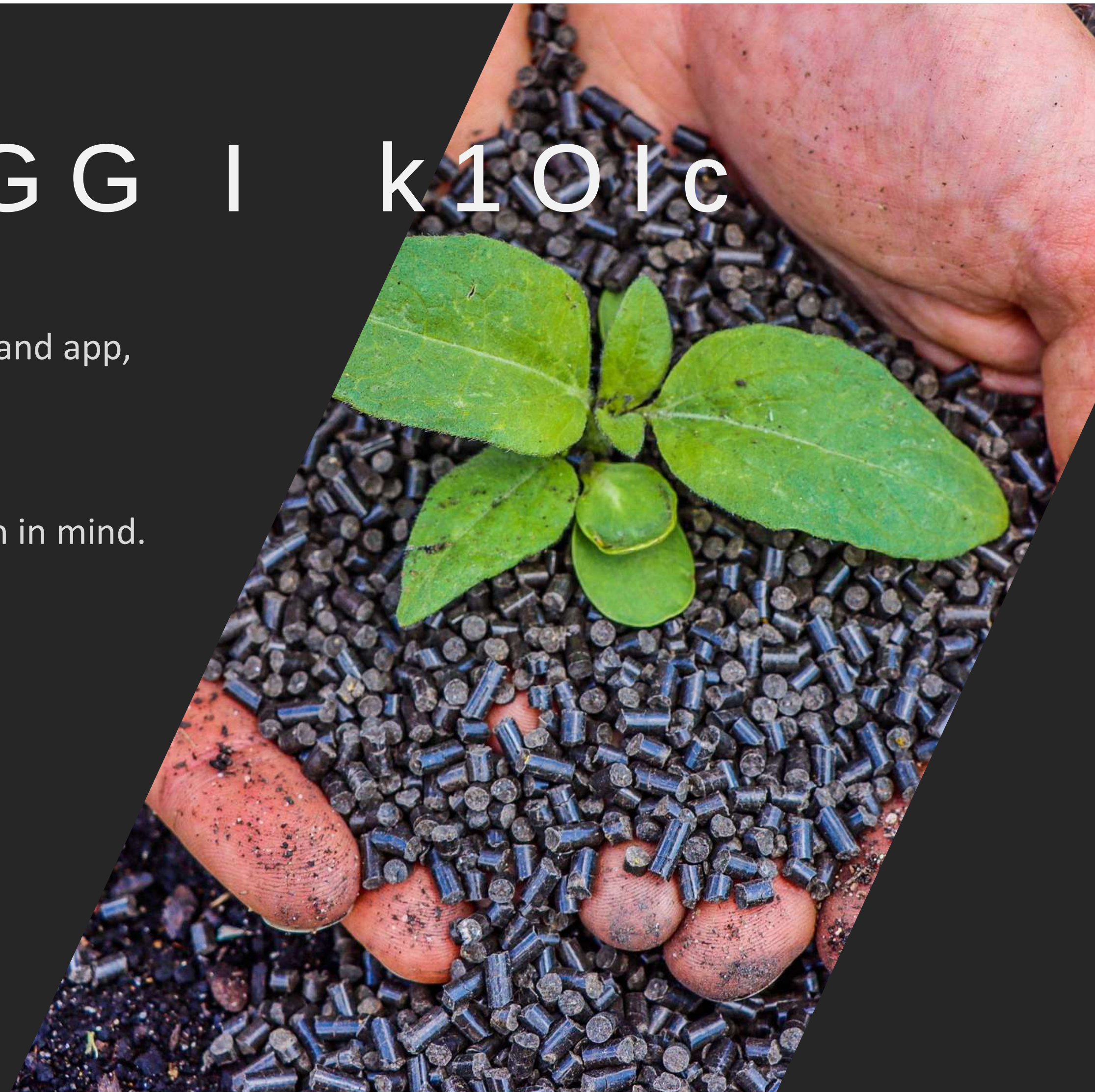
OqkÅOO?OGG I k1OIc

More regulations, less land app, full landfills.

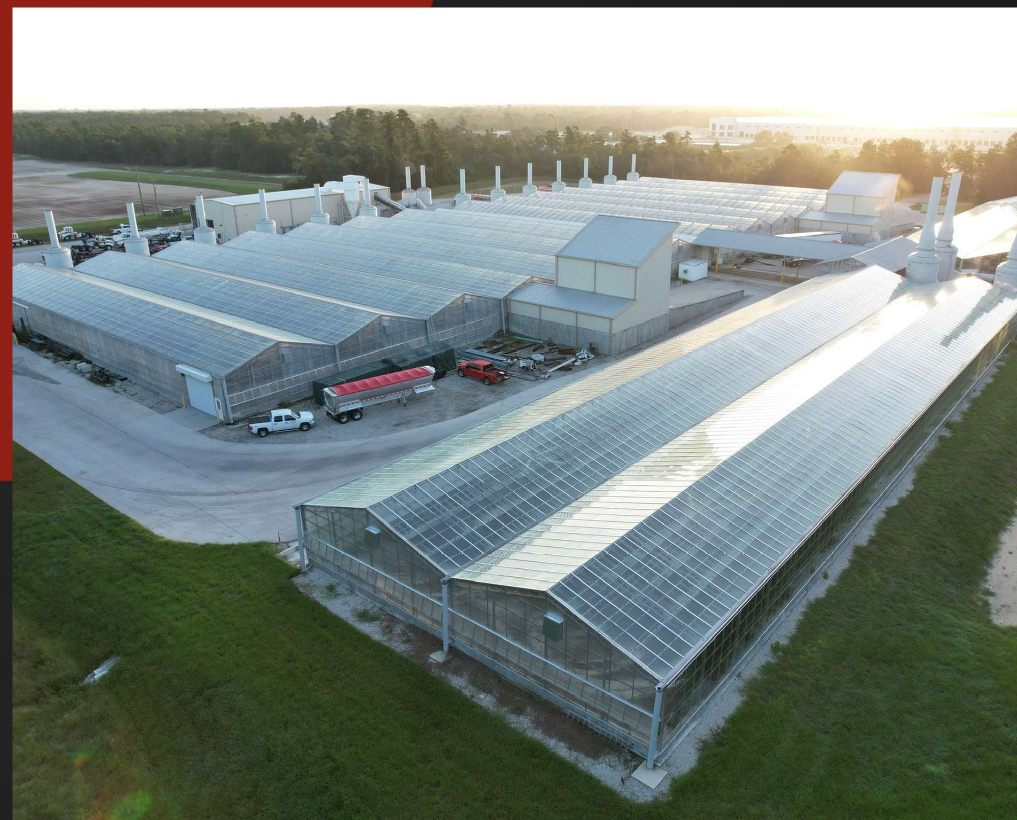
Plan with a long-term solution in mind.

! Volume & Moisture reduction is key.

" Consider beneficial reuse if possible, prepare as if it's not.



Yµ •š]}v•M



u ŒŒ oo Œ}•X }u

ô ì ì X ò ò ï X ô ô ï ì

dZ vl z}|

ýï÷¹Ô cÒ¹÷

u ŒŒ oo Œ}•X }u

ôììXòòïXôôïì