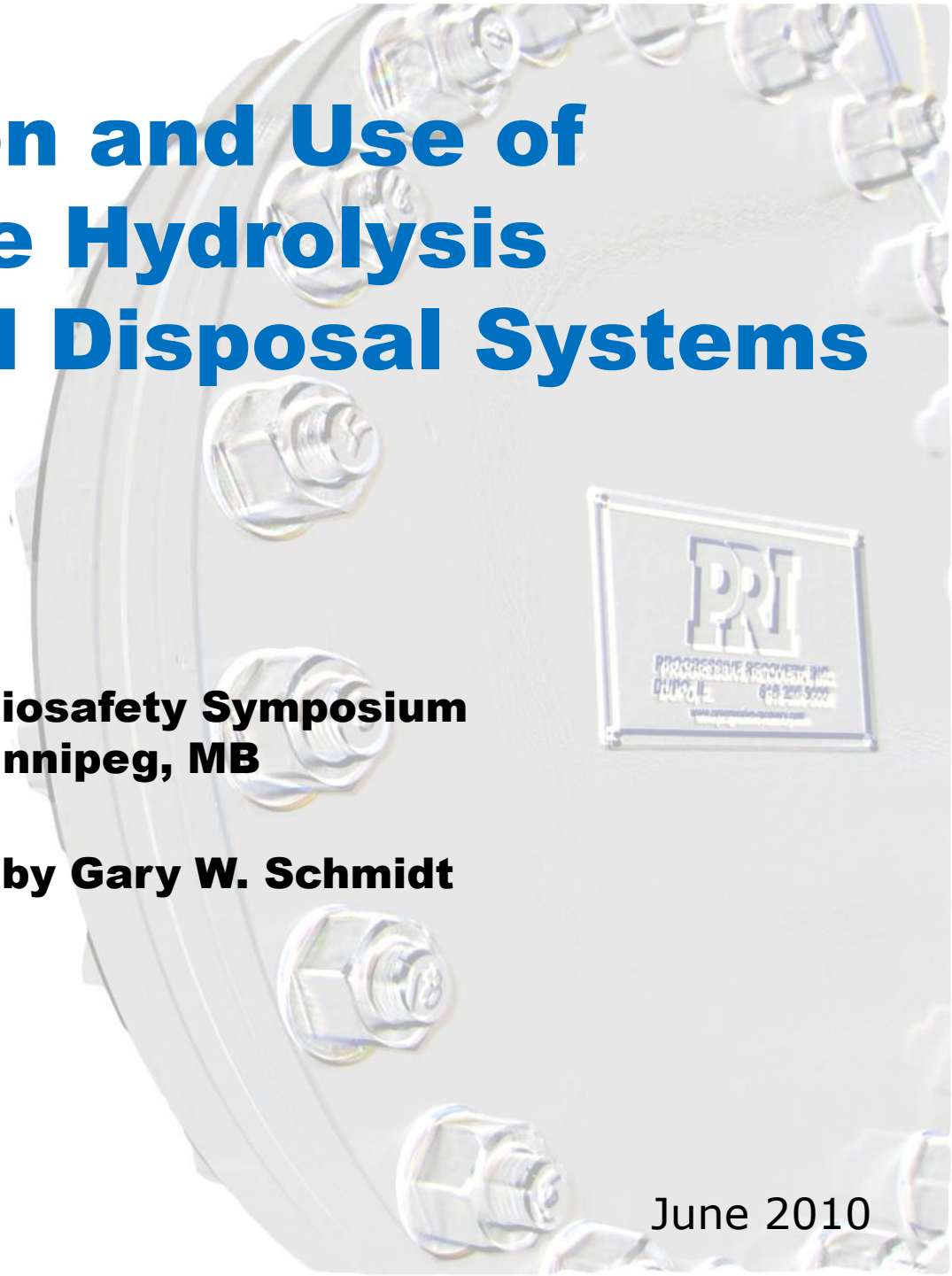
Selection and Use of Alkaline Hydrolysis Treatment and Disposal Systems



Canadian Biosafety Symposium
Winnipeg, MB

Presented by Gary W. Schmidt

PRI BIO

June 2010

Disposal Options and Considerations

Landfill - Incineration- AH

Path vs. Non Path Wastes

Prion Inactivation

Air Quality Issues - Public Perception

“Cradle to Grave” Responsibility

Cost

PRI BIO

General Method Comparisons

	Landfill	On Site Incineration	Off Site Incineration	AH
Capital Cost	Low	High	Low	High
Op Cost	Low	Med	High	Low
Manpower/Handling	Med	Med	Med	Low
Air Quality	Low	High	High	Low
Public Perception	Negative	Negative	Negative	Neutral
Liability	High	Med	High	Low
Prion Destruction	No	?	?	Yes

PRI BIO

Early Patent

" My invention relates to the treatment of bones and animal waste……and the horns, hoofs, skins, cartilages, and meat of animals……If bones be treated with from five to ten per cent of their weight of caustic potash or its equivalent, the …..matter of the bone is dissolved…..especially if heated to or above the boiling point….."

Amos Herbert Hobson Filed USPO April 5, 1888

PRI BIO

Current Process

Uses strong alkali (pH 14) to hydrolyze proteins, expedited by heat in a pressurized vessel

- Can use NaOH or KOH
- Water required for complete hydrolysis
- A very fast process for large amounts of tissue

Digests and sterilizes in one operation

- Generates a solution of amino acids, peptides, sugars, soaps and electrolytes that is suitable for release to a sanitary sewer, for use as fertilizer or feed for anaerobic digesters

PRI BIO

Current Process

Chemistry—NaOH or KOH

Tissue can be fresh, frozen, fixed

Denatures ALL protein material

Heat Sterilizes ALL material

Inactivates/Denatures Prions

Enclosed, Automated Process

PRI BIO

Current Process

Proven, Acceptable, Method

- Approved by NY State Dept of Health for Treatment of Infectious Agents

Process can be Documented and Validated

- Batch Report

PRI BIO

June 2010

Batch Validation

PRI CDU Batch Data Report

Batch: 34 Reactor: C 34 of 34

Batch:		34
Reactor:		C
Batch Start:	3/6/2008	2:18:24 PM
Batch End:	3/6/2008	4:55:24 PM
Pass/Fail Status:		Pass

Elapsed Time:

Integrity Time (minutes):	20
Fill Time (minutes):	5
Warm Up Time (minutes):	70
Sterilizing Time (minutes):	60
Drain Time (minutes):	28

Cycle Data:

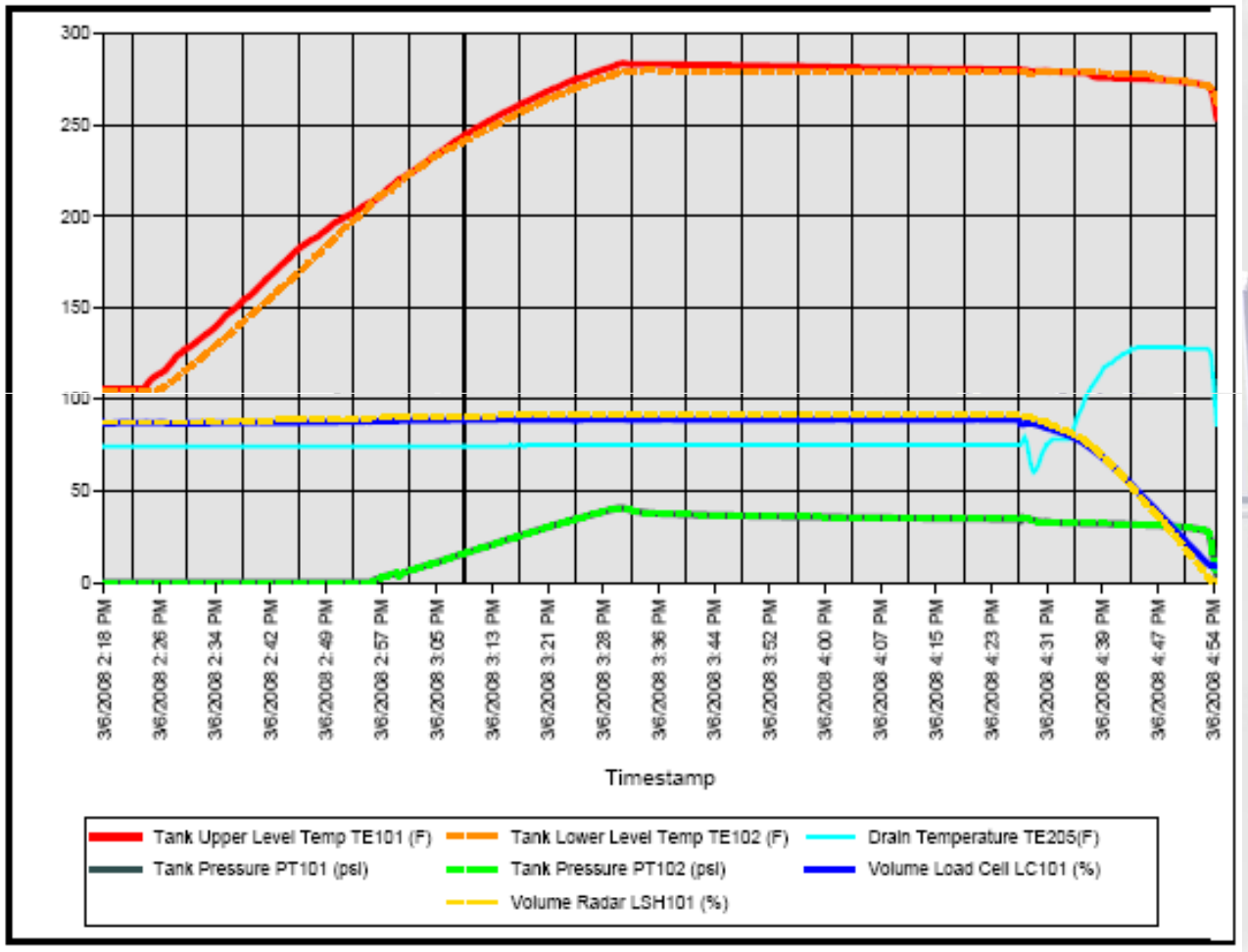
Batch Load Weight (lbs):	1582.9

OP Setpoints:

Level (gallons):	1500
Temperature (F):	275
Time (minutes):	60

Sterilization Phase Data:

Start Time:	3/6/2008	3:28:29 PM
End Time:	3/6/2008	4:27:33 PM
Start Pressure (psi):		38
End Pressure (psi):		34.5
Start Temperature (F):		275
End Temperature (F):		279.1
Max Temp. Dev (F):		8.7
Min Temp. Dev (F):		0
Warm Up Start Temp (F):		105.3



PRI BIO

June 2010

Design Considerations

Risk Assessment

- Bio Safety Level
- Inside or Outside of containment

Disposal Requirements

- Carcass Size and Qty
- Routine vs. maximum loading
- Largest affect on Capital Cost

Material Handling

- Whole animal vs. dissected
- Vertical space requirement

Design Considerations

Location and Space Requirements

- Inside or Outside Containment
- Through the floor or wall
- Skid or “pit” design

Utilities

- Heating - Steam, Electric
- Cooling - Closed Loop, Direct Injection
- Process Water
- Compressed Air

Design Considerations

Energy Recovery/Minimization/Water use

- Various methods to suit client
- LEED

Discharge Management

- Liquid
- Bone remnants
- Concentrated
- Options to suit site requirements

Operating Costs

1500lb Cycle (682kg)		
Description	**Cost**	
	NaOH	KOH
Utilities	13%	9%
Chemistry	84%	89%
Waste Disposal	3%	2%
Cost per Cycle	$86	$127
Cost per kg	$0.13	$0.19

Method Cost Comparison

Disposal Method	Cost/kg
On Site Incineration	$1.10-$1.65
Off Site Incineration	$.90-$2.95
Landfill	Highly Variable $.40-$.75/kg min. for transportation
Caustic Digester (AH)	$0.10-0.20

PRI BIO

System Examples

5000 lb. Through the Floor
84” Opening

PRI BIO

June 2010

System Examples

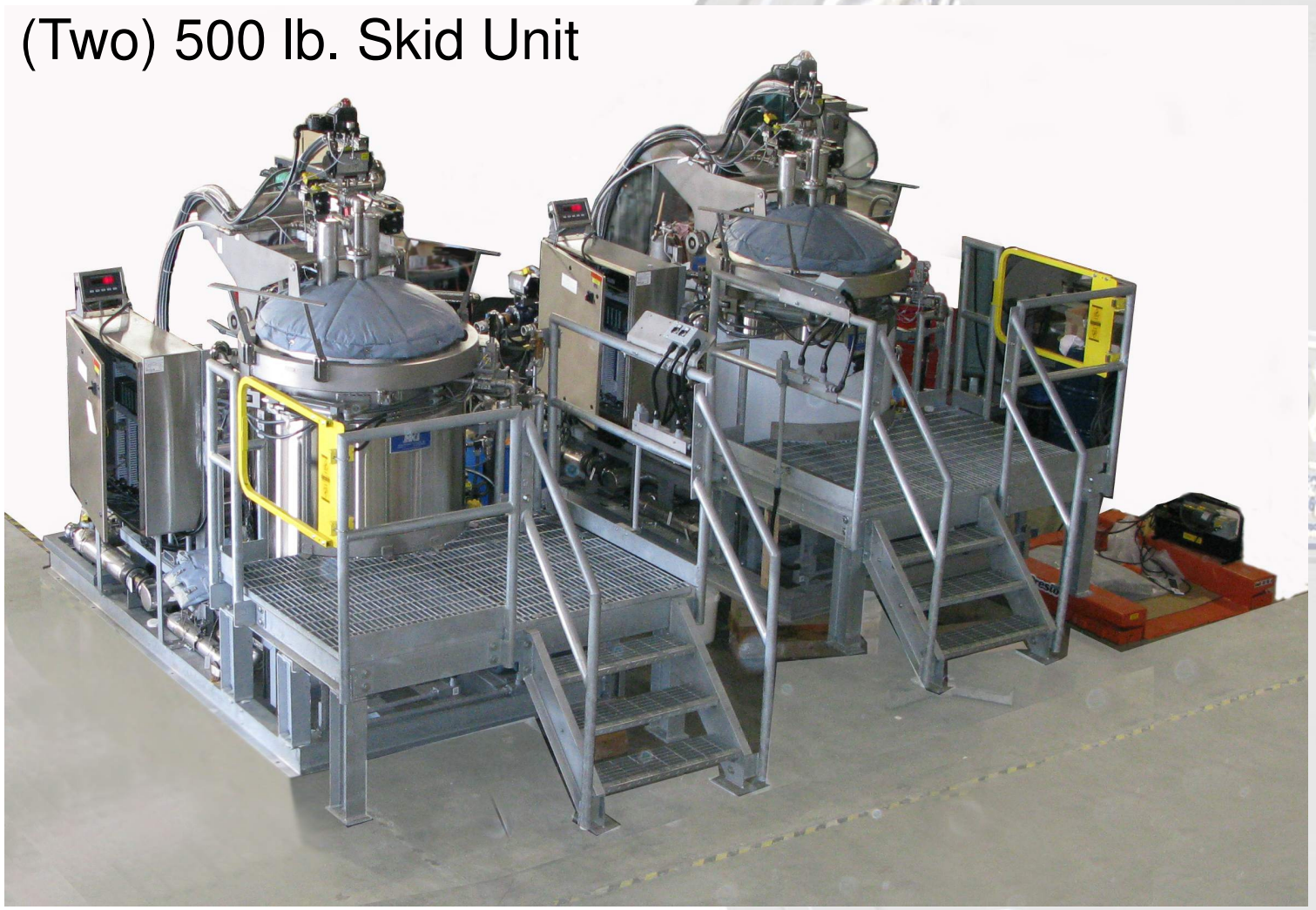
80 lb. Skid Unit

PRI BIO

June 2010

System Examples

(Two) 500 lb. Skid Unit



PRI BIO

June 2010

Summary

Proven, Acceptable, Documentable Method

Low Operating Costs

Handles Regulated Material - Inactivates Prions

High Level of Automation-Low Manpower

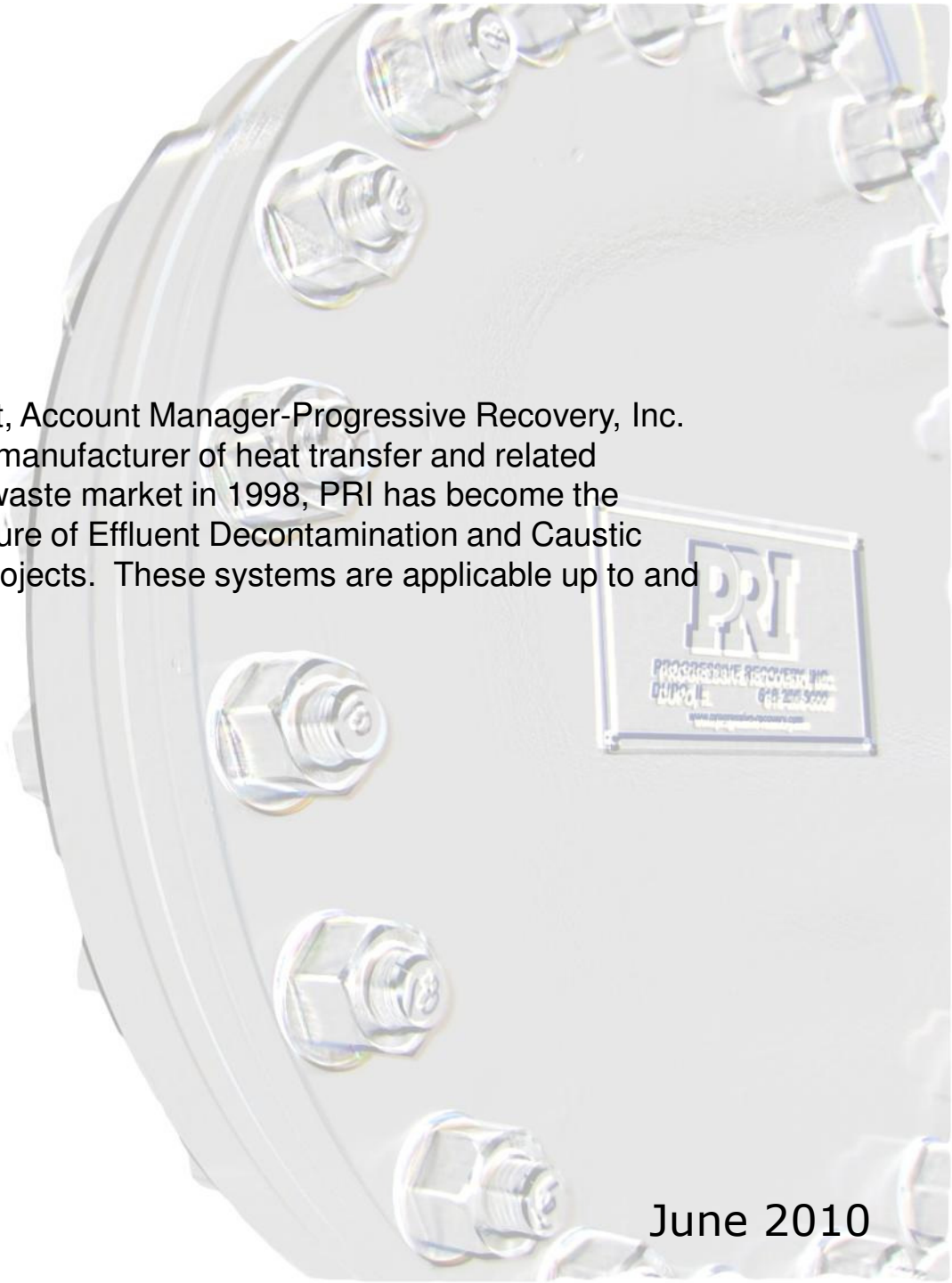
Environmentally Friendly

Denatures ALL Protein Materials

Sterilization of ALL Materials

Flexibility in Design and Lab Operation

PRI BIO



Presented by Mr. Gary W. Schmidt, Account Manager-Progressive Recovery, Inc.
PRI was established in 1983 as a manufacturer of heat transfer and related systems. Expanding into the Biowaste market in 1998, PRI has become the leader in the design and manufacture of Effluent Decontamination and Caustic Digester Systems with over 100 projects. These systems are applicable up to and including BSL-4 environments.

PRI BIO

June 2010