Shincci-USA Sludge Dryer

Game Changer for Biosolids Management

NEWEA Spring Meeting
June 4, 2019
Shelagh Connelly, RMI President
Charley Hanson, RMI Senior Project Manager

RMI
BUILDING HEALTHY SOILS

SHINCCI-USA

Resource Management, Inc.

- RMI is a regional organic residuals recycling company based in Holderness, NH
- RMI employs 30 people including agronomists, compliance specialists, field technicians, truck drivers, operations, sales and project managers

Annually, RMI recycles over 350,000 cubic yards of organic residuals including biosolids, wood ash, short paper fiber, and hydrosolids as part of our Heart & Soil agricultural product line

It has been 25 years of Residuals Recycling Success but not without challenges along the way….

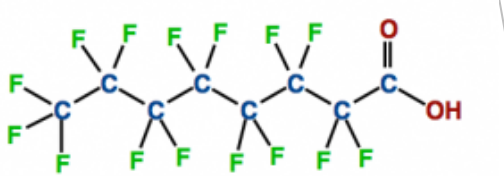
- Public perception of waste vs. resource
- Public Policy – emotion vs. science
- Regulatory requirements – increasing & costly
- Coordinating supply with demand
- Operating challenges of delivering in Northeast with snow and rain
  - Lots of trucking – wear and tear on equipment and road infrastructure
  - Hauling wet materials is expensive
  - Abutters at odds with farming practices
  - New Permits are not easy to secure

Game Changer

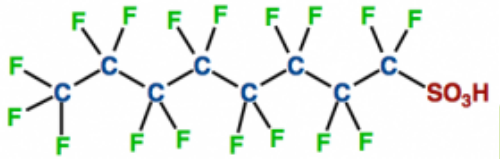
- May 2016 EPA set a guidance level of 70 PPT for PFOA and PFOS (combined) in drinking water.
- RMI did not take notice of this as it was not on our radar screen. For the past three decades we have weathered the rise and fall of various issues affecting residuals management like concerns over heavy metals, PCBs, dioxin, personal care products, odor, local bans, public hearings, and managing the different regulations in each state….to name a few.
- But nothing has been more intimidating than this new paradigm we find ourselves in…which began for RMI in January 2017 when NH-DES asked us to budget additional time in our routine annual program review meeting to meet with folks from the groundwater program….
- Sure we said. And asked “what will we be talking about?”

PFAS – ubiquitous and effective

- Per- and Polyfluoroalkyl Substances (PFAS)are a group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water
- Can be found in products such as:
  - Water-repellent clothing
  - Furniture and rugs
  - Adhesives
  - Paint and Varnish
  - Food Packaging
  - Heat-resistant non-stick cooking surface
  - Fire Fighting Foam
  - Pesticides



PFOA - perfluorooctanoic acid



PFOS - perfluorooctanesulfonic acid

So what does that have to do with RMI and biosolids???

Future of Farms & Biosolids Uncertain

- RMI works with large farm operations that have been using biosolids for almost 30 years.
- When the Stoneridge Farm story broke in Arundel, Maine in April 2019 several farmers began questioning continued biosolids use.
- Milk testing and the public perception over PFAS may force them to stop participating in the program.

Landfills saying no…

- Over past 10 years RMI has worked with 2 Massachusetts landfills who have used paper fiber and biosolids to manufacture topsoil for capping their closed portions and growing a grass layer.
  - In July 2018 RMI was turned away from both of these landfills due to "the PFAS issue"
- In August 2018 RMI was slated to provide paper fiber and biosolids for a superfund site in Vermont to finalize closure on a steep grade.
  - All was moving forward until a regulator in the VT-DEC heard about the paper fiber and biosolids and decided they would not be approved due to "the PFAS issue."

All of these materials had been tested for PFAS and have very low levels.

Who is the <u>Responsible Party</u> in all of this?

NASHUA SCHOOLS

Board member censured for social media post • A2

NHWeekend

Live on Mars: Bowie tribute artist Alex Thomas

"There is nothing so powerful as truth" DANIEL WEBSTER

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NH sues 3M, DuPont, 6 others over PFAS contamination

'Forever chemicals': Contamination has been found in groundwater across the state, including Bedford, Merrimack, Manchester and Portsmouth.

By DAVE SOLOMON
New Hampshire Union Leader

CONCORD — The state of New Hampshire is taking some of the biggest chemical companies in the world to court, seeking hundreds of millions of dollars to clean up groundwater and other forms of contamination from a group of highly toxic chemicals used in everything from firefighting foam to Teflon pans.

Gov. Chris Sununu and Attorney General Gordon MacDonald on Wednesday announced lawsuits against the companies, all of which are involved in the manufacture and distribution of chemicals known as PFAS (polyfluroalkyl substances)

Two lawsuits have been filed in Hillsborough County Superior Court North against 3M, DuPont, the Chemours Company, Chemguard, Tyco Fire Products, Buckeye Fire Equipment, Kidde-Fenwal and National Foam, Inc.

Three of the companies are named in both lawsuits — 3M, DuPont and Chemours, a spinoff from DuPont. The suits allege that despite their unique knowledge of the dangers of these chemicals, the companies continued to make and sell them without warning the public of

► See PFAS Suit, Page A3

Attorney General Gordon MacDonald explains the state's lawsuit seeking damages for contamination caused by PFAS chemicals. Gov. Chris Sununu stands behind MacDonald.

DAVID SOLOMON/ UNION LEADER

Where do we go from here?

- There is cause for concern when long term successful recycling programs are suddenly in jeopardy.
- There is not science in place to support that biosolids and other soil amendments are a problem to public health or the environment due to the presence of PFAS.
- There is lots of science to support that these materials are beneficial for soils and crop growth due to the presence of nutrients and organic matter.

- If the limits for PFAS are so conservative and unattainable, society will need to come up with some way to manage our biosolids and paper fiber.
- If landfills will not take it, then we may need to build incinerators and destroy the PFAS through combustion. Then build lined monofills for the incinerator ash.

A New Approach to Solids Management

- In April 2018, Sunstate Environmental Services, Inc. (SES) approached RMI about belt drying technology.
- In August RMI traveled to China to see first hand multiple installations.
- RMI was convinced this technology was a solution to the new direction solids management needed to head.
  Stop hauling water!
- RMI has ordered two Shincci Dehumidifcation/Dryer units and should take delivery in late September 2019.
- RMI is partnering with the Hooksett, NH and Brattleboro, VT WWTFs to be the first North American installations.

RMI
BUILDING HEALTHY SOILS

SES Sunstate Environmental Services, Inc.

SHINCCI

ENERGY-EFFICIENT
LOW TEMPERATURE SLUDGE DRYING

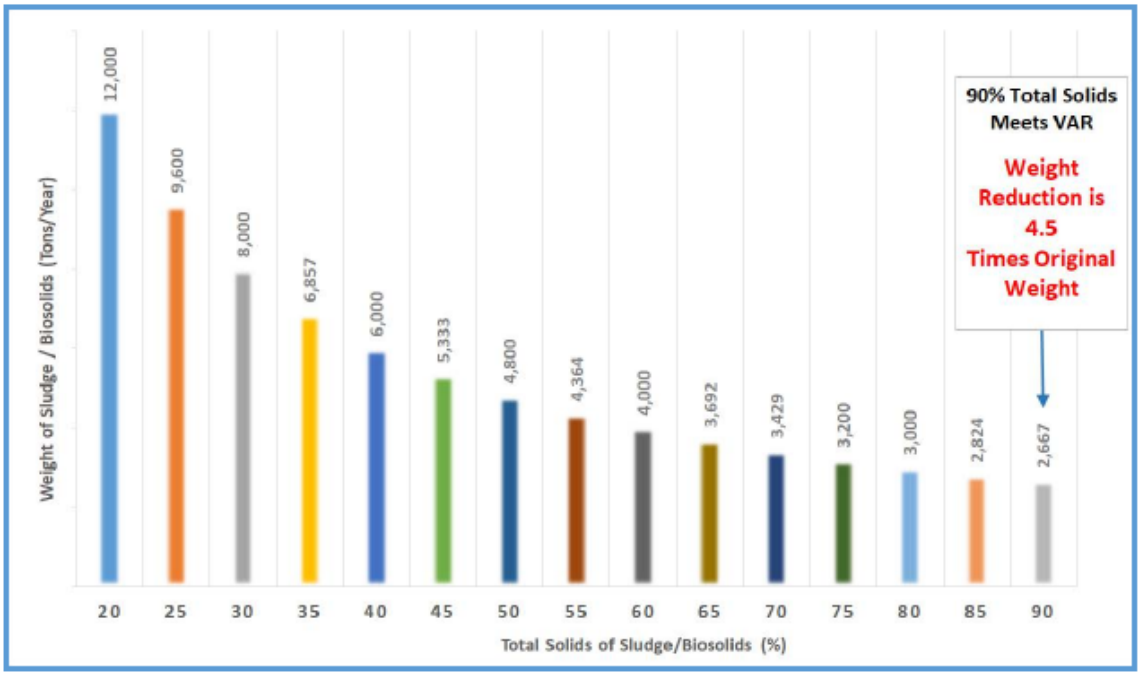
Sunstate and RMI tour of Shincci manufacturing facility in Guangzhou China

Shincci Dryer from China

- Once RMI committed to this technology we shared the story with our partners in both wastewater facilities and at paper mills
- The number of truckloads leaving a generator drops from 100 to 20, thereby reducing impact to roads and bridges, air pollution, and carbon footprint
- And the final product meets Class A requirements for pathogens and vector attraction reduction.
- WWTFs will make a lovely dried Class A biosolids fertilizer and paper mills will make a wonderful dry bedding product, or fuel.
- Benefits abound with cost savings for residuals hauling and greatly improved product value

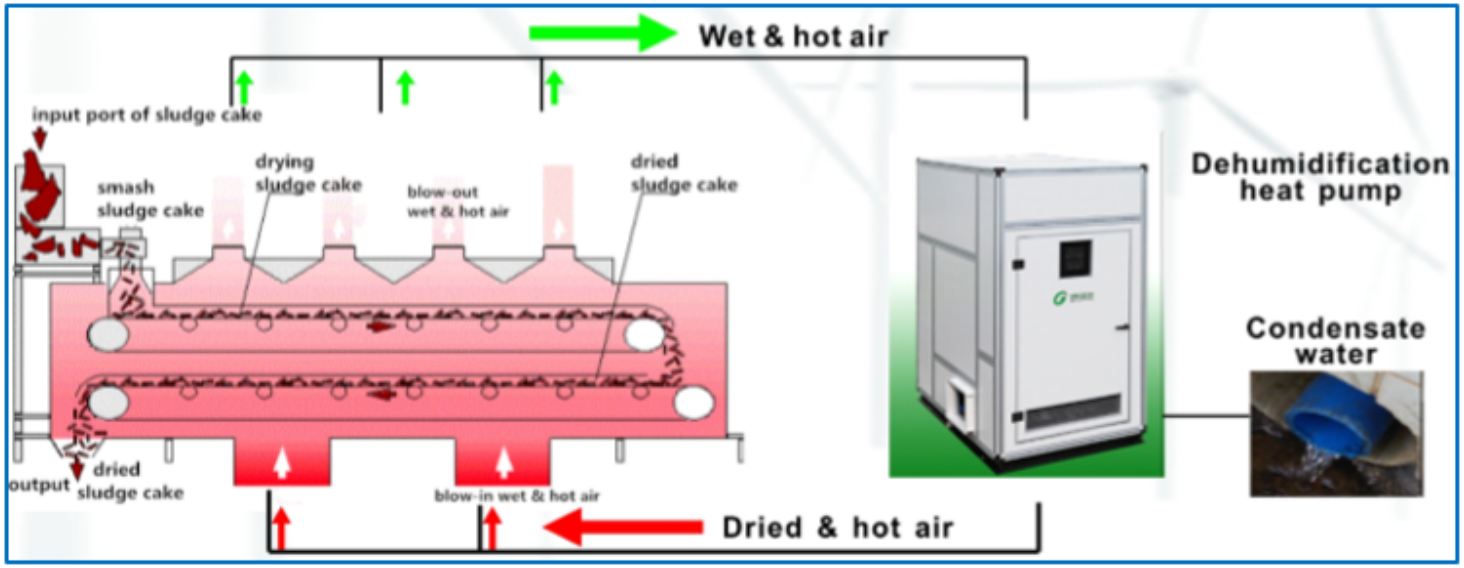
Shincci dryer reduces tons

- 4 – 5 fold reduction



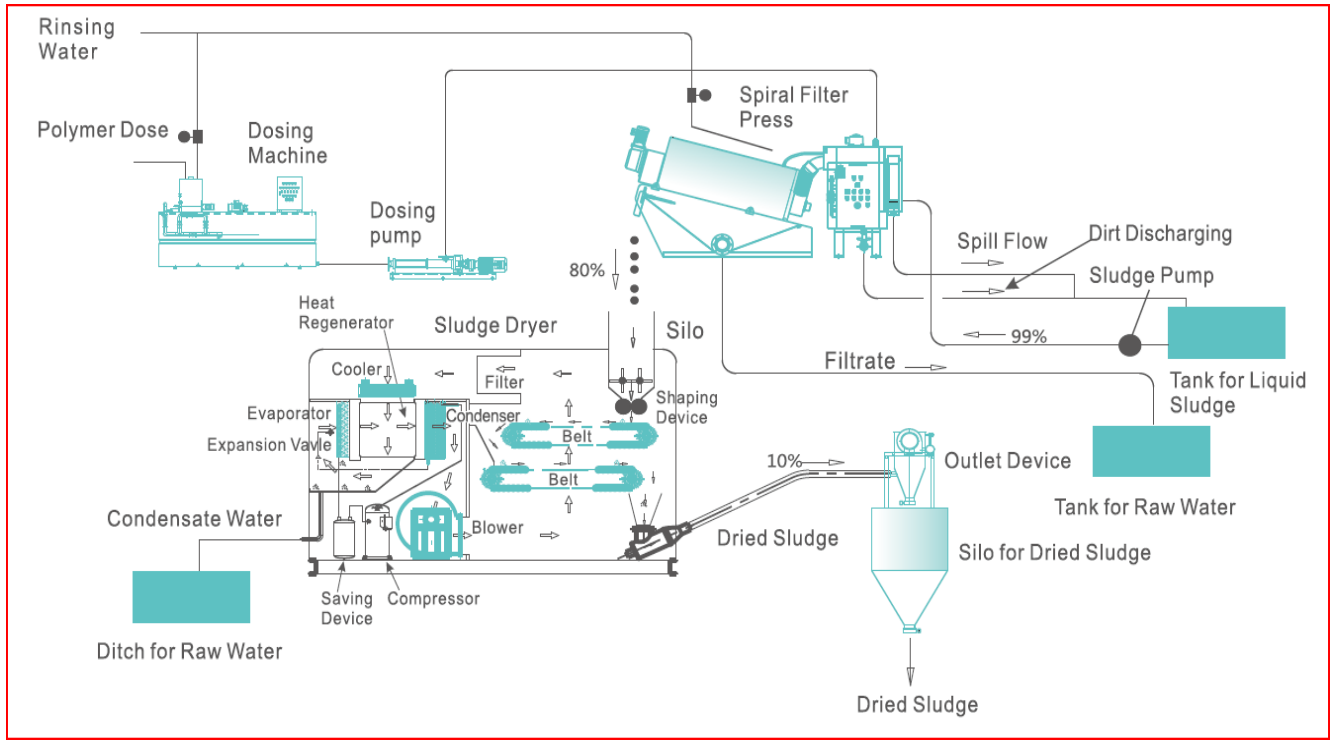

SHINCCI 晟启

Shincci - USA
Low Temperature Dehumidification Module



Shincci Schematic

Dewatering Spiral Filter Press and Dryer



Monitoring Temperature and Time:

SCADA Compatible to Demonstrate Compliance with 503

Installed Shincci Dryer

How Shincci – USA Technology Meets U.S. EPA Rule 503 Requirements

- **Class A Biosolids**
  - One of two processes can be utilized to show that the Shincci – USA technologies meet Processes to Further Reduce Pathogens (PFRPs) (producing Class A biosolids) that are listed under the U.S. EPA 40 CFR Part 503 regulation:
- **Heat Drying:**
  - Which is defined as: "Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10% or lower. Either the temperature of the sewage sludge particles exceeds 80°C (176°F) or the wet bulb temperature of the gas in contact with the sewage sludge as it leaves the dryer exceeds 80°C (176°F)."
- **Pasteurization**
  - Pasteurization involves heating sewage sludge to above a predetermined temperature for a minimum time period. For pasteurization, the Part 503 PFRP description is: "The temperature of the sewage sludge is maintained at 70°C (158°F) or higher for 30 minutes or longer."
  - The Shincci – USA low temperature dehumidification system meets both heat drying and pasteurization principles, but it is preferred to use the Pasteurization option to arrive at Class A biosolids.
- **Vector Attraction Reduction – VAR**
  - Option 8 in U.S. EPA 503 rule is used to meet vector attraction reduction requirements for the Shincci – USA treatment processes, and specifically 503.33(b)(8). The option in the rule states that "percent solids of sewage sludge that contains un-stabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids prior to mixing with other materials." Thus the heat drying and pasteurization treatment with Shincci meets the vector attraction reduction requirements.
- **Emissions and Odor Control**
  - The Shincci – USA treatment processes meet the California Air Quality Emissions and Odor Control requirements since the treatment occurs through closed system processes at low temperature. No change in chemical characteristics of the sludge occurs during the treatment process; changes occur in the physical characteristics of the sludge: shaping and drying at low temperature. There is no recovery of nitrogen, phosphorus or metals in this treatment.

List of Installed Shincci Dryers

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
1	Dongguan Chengyuen Tannery	SBDD4000	Leather	30.0%	6	75%	2012-8-1
2	Dongguan Liaoh						
3	FoShan Xinlon						
4	Taiwan Ping H Technology						
5	Taiwan Shang						
6	Foshan Gaomin						
7	Taiwan Yiqin						
8	Taiwan Shangx						
9	Taiwan Yiqin						
10	Shanghai Tian						
11	Shanghai INES materials Co.						
12	Taiwan Pingho Technology						
13	Henkel (Dongg						
14	Taiwan Pingho Technology						
15	Suzhou Hongda						
16	Suzhou EMC Gr						
17	Guangdong Tit						
18	Taiwan Yiqin						
19	Yunnan Qingzh						
20	Chongqing Dai						
21	Jiangsu Blue (						
22	Performance F						
23	Sembcorp WTTP						
24	Hunan province						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
25	Meizhou city Sludge Treatment Center	SBDD9600FL	Municipal	20.0%	12	80%	2016-5-1
26	Shenzhen LuoFang WWT						
27	Shanghai Lubrizol						
28	Shanghai MinXin Envi						
29	Nanjing Runbu WWTP						
30	Foshan Xinlong WWTP						
31	Sighisora, Romania Mu						
32	Sky						
33	Hunan province, Xian WWTP						
34	Zhejiang Lily Group						
35	DYSTAR (Nanjing)						
36	Xiamen ReCulture Ren Energy Co.						
37	Ningbo Zhengguang Re						
38	Hebei Province, Langf						
39	Hubei Xianlong Chemi Engineering						
40	Chongzhou Jin Peng E Tech						
41	Shenzhen Shekou WTTP						
42	Zhejiang Wansheng						
43	Shandong Qilu Pharma						
44	Siemens (Wuxi) Switc						
45	Jiangsu Skyray-Instr						
46	Henan Prosper						
47	Sierra PCB						
48	Zhejiang Jiande WWTP						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
49	Shandong Yantai Refuse Disposal	SBDD2400FL	Municipal	18.0%	3	70%	2016-11-1
50	Everbright Water Affairs						
51	Qingdao Shuiqingmuhua						
52	International Flavors & Fragrances (Zhejiang)						
53	Bekaert China						
54	Dali Fengyi Industry Park WW						
55	Guangzhou Sino-Singapore-tow WWTP						
56	Guanghan Sanxingdui WWTP						
57	Zhengzhou WWTP						
58	Hitachi Elevator China						
59	Guangzhou Midori automotive leather						
60	Yuma, Arizona WWTP						
61	Shaoyang Sludge Treatment Cen -BOT						
62	Taiwan HannsTouch Solution						
63	Jiangsu Skyray Instrument						
64	Jiaozuo Joincare						
65	Citic Envirotech, Changyi Ci WWTP						
66	Hunan Province, Yuanling WTTP						
67	Cosmax (China)						
68	Henkel (Shanghai Factory)						
69	Shanghai Sanjiu Mechanical						
70	Pingdong Zhupiter						
71	Hangzhou Electrochemical Gro						
72	Zhengzhou City Second WWTP						
73	Fulong Fiberglass						
74	Yantai Runda Group						
75	OTAX Electronics (ShenZhen)						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
76	Zhejiang Dibang Chemical	SBWHD20000	Chemical	55.0%	40	80%	2017-8-1
77	Chongqing Earthope						
78	Huiyang Yuangao Elec						
79	Sino-American Silico						
80	Jiangyin Xingiao Sew						
81	Bicheng Glassfiber						
82	Huiyang Yuangao Elec fan)						
83	Huiyang Yuyuan Indus						
84	Shanghai Rongcheng P						
85	Toyo Pack (Changshu)						
86	Shanghai Amkor OSAT T						
87	Changan Auto						
88	VOSS (Hubei) Beverage						
89	Zhejiang Huangma Surf Manufacturer						
90	Zhangyuan Tungsten						
91	Shenzhen, Futian WWTP						
92	Haojue Motorcycle						
93	Zhenjiang Jiangnan Ch						
94	Shandong Lukang Pharm						
95	Changde Huirui WWTP						
96	Jiangsu Minth						
97	Luxi Group						
98	Longxin Fine Chemical						
99	JAC Automobile (Phas						
100	Dongyang Hengdian WWT						

No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
101	Beijing BOE	SBDD2400FL	Electronics	20.0%	2	80%	2017-10-1
102	Lvliang Second WWTP	SBDD21600FSL	Municipal	15.0%	28	70%	2017-10-1
103	Suzhou L-Max Electronic	SCODD800FL	Industrial Sludge	21.0%	1	> 75%	2017-10-1
104	Gansu province, Subei WWTP	SBDD2400FL	domestic sludge	20.0%	3	80%	2007-11-1
105	Career PCB (Kunshan)	SBDD2400FL	Plating	30.0%	3	70%	2007-11-1
106	Yiyang New Material Industrial Park	SBDD7200FL	Industrial Sludge	20.0%	7	> 70%	2007-11-1
107	Hubei Province, Julu First WWTP	SBDD7200FL	Municipal	20.0%	12	50%	2007-11-1
108	Beijing BOE	SBDD16200FSL SBDD21600FSL	Casting	30.0%	80	70%	2007-11-1
109	Hunan Province, Xiangyin WWTP(Phase 2)	SBDD9600FL	Municipal	20.0%	15	70%	2007-11-1
110	Texas Instruments (China)	SCODD800FL	Plating	25.0%	1	60%	2017-12-1
111	Shenzhen city						
112	Sinopec (Xi'ar						
113	Shandong Xinli						
114	Zhejiang Cheng						
115	Tianjin Toyo I						
116	Kuangchuan Pas						
117	Beijing Foton						
118	JAC Automobile						
119	JAC Automobile						
120	Xichang water - Jiongjiu Pro						
121	Xichang water - Qionghai Pro						
122	Xichang water - Xiaomiao Pro						
123	Jiangsu Youth						
124	SPRING PROFIT						
125	Zhoushan Omat						

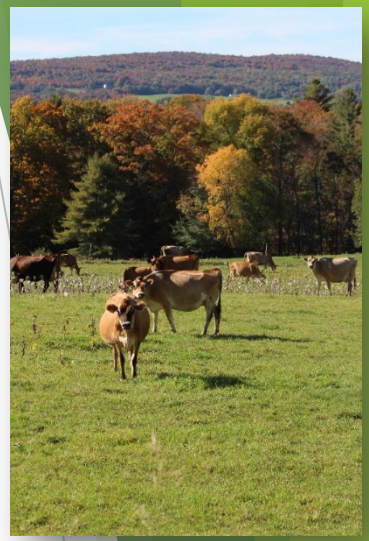
No.	User Entity	Model Specification	Sludge Type	Initial Percent Total Solids	Wet Sludge Scale (MTons/Day)	Final % Total Solids	Operation Start Time
126	Harbin Institute of Technology	SBDD1200FL	laboratory Sludge	20.0%	1.5	88%	2018-3-1
127	Hongjiang Shuangxi WWTP	SBDD2400FL	Municipal	20.0%	2.1	50%	2018-3-1
128	Tangshan Kobelco	SCODD800FL	Surface finishing	30.0%	1.2	75%	2018-3-1
129	JAC (2 STATION)	SCODD800FL	Automotive making	30.0%	1.4	70%	2018-3-1
130	JAC (7 STATION)	SCODD800FL	Automotive making	30.0%	1.4	70%	2018-3-1
131	Jiangsu Jiannong ABA Agrochemical	SBDD2400FL	Industrial	22.0%	3	70%	2018-3-1
132	Nichicon (Suqian factory)	SCODD800FL	Industrial	20.0%	1	> 70%	2018-4-1
133	Nantong Changyou Pharmaceutical	SCODD800FL	Industrial	32.0%	1	> 70%	2018-4-1
134	Joincare Pharmaceutical Group Industry -BOT(Phase 3)	SBDD38400SL	Fungus Residue	35.0%	60	70%	2018-4-1
135	Yaan First Sewage Treatment Plant	SBDD14400SL	Municipal	20.0%	20	65%	2018-4-1
136	Qingdao Shuiqingmuhua Environment	SBDD2400FL X 2	Plating	20.0%	6	70%	2018-4-1
137	JAC Auto	SCODD800FL	Surface finishing	30.0%	1.4	70%	2018-4-1
138	Zhejiang Gaohe Wool	SBDD19200FL	unicipal&industria	37.0%	35	73%	2018-4-1
139	Guangdong Titan Pharmaceutical	SBDD4800FL	Medical	20.0%	6.9	> 80%	2018-5-1
140	Funing Industry Sewage Treatment	SBDD4800FL	Chemical	37.0%	5	78%	2018-5-1
141	Tianjin Kinport Plating	SBDD7200FL	Plating	35.0%	14	70%	2018-5-1

Only current unit in the United States is in Yuma, AZ

Benefits to Treatment Plants

- Decreases amount of solids to manage by a factor of 4 – 5 times
- Creates an attractive Class A fertilizer product, stable and no odor
- Lowers costs for solids management
- Provides for more stable outlets
- Less trucking across roads and bridges
- Can use either electricity or waste heat
- Is an effective risk management tool simply because it reduces the amount of solids to manage whether recycling continues or not

Throughout the northeast both biosolids and paper fiber have been in very successful recycling programs for the past 30+ years

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