



BIO-RAN^{Co}
International Bio Technologies

Project Report

Application of **Ydro Process[®]** biotechnology at **Marijampole**
wastewater treatment plant, Lithuania

Summary

- WWTP Marijampole
- Objectives and requirements
- Dosing of YDRO Microorganisms®
- Reduction of the sludge for disposal
- Influent and effluent characteristics
- Results
- Customer review
- Client savings

Project Customer: UAB „Suduvos vandenys“

Project Initiation: 03.08.2022

BIO RAN Ltd UK

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WWTP Marijampole

Characteristics	Data
Population equivalent	100,000
Type of treatment plant	Classic
Design capacity (18,000 + 4,000 m ³ /day)	22,000 m ³ /day
Flowrate per day (average)	12,500 m ³



WWTP Marijampole



Objectives & requirements



Objectives

- Reduction of the excess sludge;
- Reduction of costs associated with sludge treatment and disposal: dewatering, sludge drying, trucking, chemicals, landfill gate fee, etc.;
- Reduction of odors at the WWTP.



Requirements

Recirculation of 75 - 150 m³/day of the digested sludge to the inlet of the plant and:

- 1) Initiate the bacterial activity early in the process and as a result organic acids will be produced;
- 2) The organic acids are degraded downstream the operation to Carbon Dioxide (CO₂) and water (H₂O) in aerobic conditions and methane (CH₄) and hydrogen (H₂) in anaerobic conditions - and also into free, available energy;
- 3) Reduce the odors (if any) at that part of the plant.

Dosing of YDRO Microorganisms®

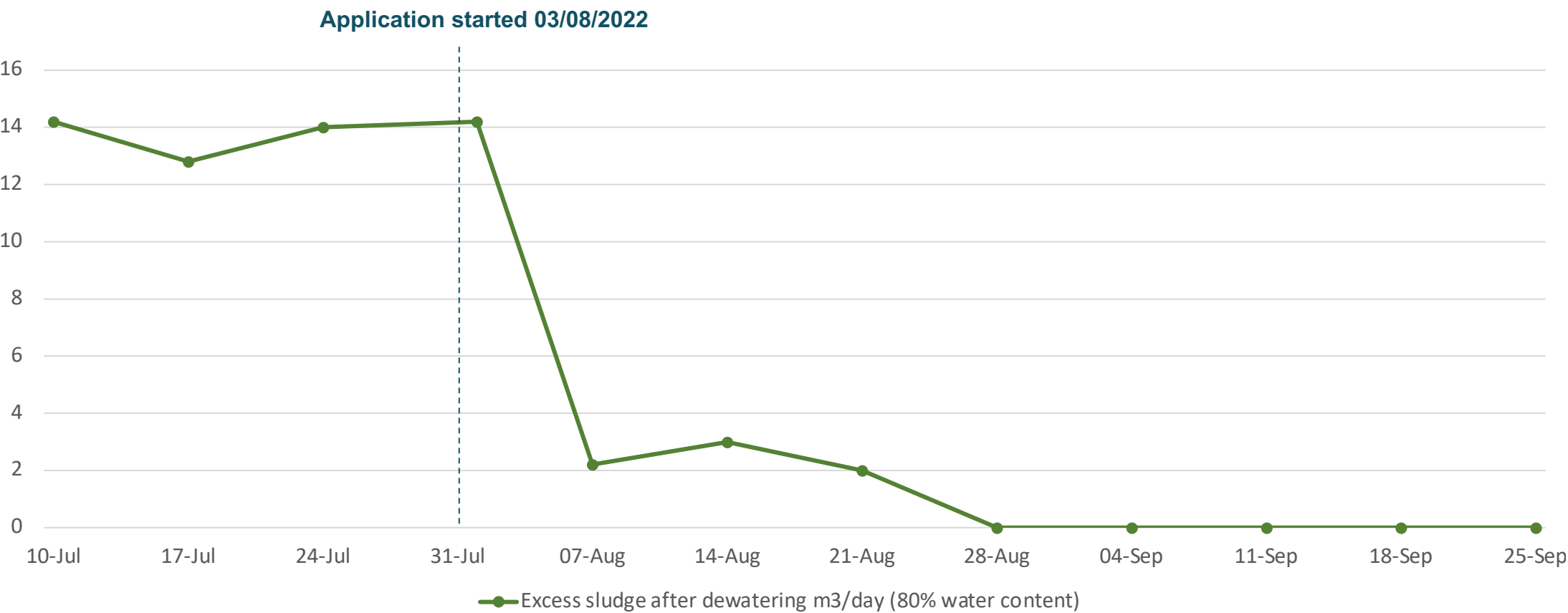
- The dosing point is the sand trap inlet;
- Dilution rate is 1:10 i.e. up to 1kg of product in 10 lt;
- The maturation duration is at least 12 hours, which can go up to 24 hours accordingly to personnel availability;
- Due to high COD fluctuations product usage ranges from 0.8 to 2.8 kg/day (first 30 days double q-ty).



Tikslus skaičiavimas, kai vidutinis debitas 12,500 m3/d ir ChDS 950 mg/l					
YDRO daily dosing q-ty when average flow 12,500 m3/d and COD 950 mg/l					
	debitas / flow	ChDS / COD	koeficientas / k	dienos / Days	kg
Formulė	12500	950	1.2	396	564
		dozė / q-ty kg	dienos	kg	kg
2022	rugpjūtis / Aug	2	31		62
2022	rugsėjis / Sep	1	30		30
2022	spalis / Oct	1.6	31		49.6
2022	lapkritis / Nov	2.8	30		84
2022	gruodis / Dec	2.8	31		86.8
2023	sausis / Jan	2.8	31		86.8
2023	vasaris / Feb	1.6	28		44.8
2023	kovas / Mar	0.8	31		24.8
2023	balandis / Apr	0.8	30		24
2023	gegužis / May	0.8	31		24.8
2023	birželis / June	0.8	30		24
2023	liepa / July	0.8	31		24.8
Viso / total			365		566.4

Reduction of the excess sludge

By 4th week of application of **Ydro Process®**, reduction of the excess sludge by over **90%**.



Reduction of the sludge for disposal

Antriniai nusodintuvai / Clarifiers			Dumblas / sludge												Savaitė / week	Data / date	
švaraus v. stulpas / water level above sludge blanket, m			iš pirminių nusodintuvų / primary sludge		aerotanke / aeration tank				iš antrinių nusodintuvų / clarifiers		iš kontak-tinių rezervuarų * / final clarifiers	pūdytas į sausinimą (į centrifugą) / digested sludge to dewatering					
					aktyviojo dumblo indeksas / SVI		aktyviojo dumblo koncentracija / activated sludge concentration		grįžtamasis (cirkuliacinis) / return sludge	pašalintas (perteklinis) / excess sludge		tikslas / target - 180 m3/week					
			m3	SS, %	1 sekcija / 1st line	2 sekcija / 2nd line	1 sekcija / 1st line	2 sekcija / 2nd line	SS, %	m3	m3				SS, %		
Nr.1	Nr. 2	Nr.3	m3	SM, %	DI	DI	g/l	g/l	SM, %	m3	m3		m3	m3/sav (m3/week)	SM, %		
1.5 - 2.5	1.5 - 2.5	1.5 - 2.5		3.5 - 4.5	150 - 220	150 - 220	3.5 - 5.0	3.5 - 5.0	1					900	3.0 - 4.0	vidutinės reikšmės / average before YDRO application	
																02/08/2022	
2.90	2.90	2.90	65							240	5	0	160		1	03/08/2022	
2.70	2.70	2.70	40							384	4	0			1	04/08/2022	
2.40	2.40	2.40	15							384	4	59			1	05/08/2022	
2.30	2.30	2.30	50							384	3	0			1	06/08/2022	
2.10	2.10	2.10	70							336	7	0			1	07/08/2022	
2.00	2.00	2.00	110	5.0	211	227	4.41	4.046	0.95	88	3	0	208	2.9	2	08/08/2022	
2.00	1.50	1.70	40							384	3	0			2	09/08/2022	
1.80	1.80	1.70	30							384	3	0			2	10/08/2022	
1.10	1.80	1.40	30		231	222	3.94	3.245	0.88	384	4	0			2	11/08/2022	
2.00	2.70	2.30	40							384	3	96			2	12/08/2022	
1.90	1.80	2.00	42.5							384	2	112		2	13/08/2022		
2.20	2.30	2.10	57.5							384	2	0		2	14/08/2022		
2.10	2.20	2.10	57.5							384	2	0		3	15/08/2022		
2.40	2.50	2.30	50		216	237	3.804	2.832		384	1.5	76	141	2.9	3	16/08/2022	
2.30	2.40	2.50	45							384	1.5	65			3	17/08/2022	
2.50	2.30	2.10	47.5		221	252	4.071	3.535		296	1	0			3	18/08/2022	
2.20	2.30	2.20	85							384	1	0			3	19/08/2022	
2.30	2.00	2.10	60							384	1	0			3	20/08/2022	
2.70	2.10	2.70	50							384	1	0		3	21/08/2022		
2.50	2.40	3.00	87.5		213	241	4.134	3.481		192	1	0	0	2.9	4	22/08/2022	
2.40	2.20	2.10	145							0	1	0			4	23/08/2022	
2.30	2.80	2.70	75							190	1	0			4	24/08/2022	
2.40	2.50	2.40	55		231	256	3.984	3.71		400	1	0			4	25/08/2022	
2.40	2.50	2.40	35	3.9						384	1	0			4	26/08/2022	
2.30	2.40	2.40	77.5							384	1	0		4	27/08/2022		
2.80	2.80	2.60	50							384	1	0		4	28/08/2022		
2.80	2.70	2.80	55		258	280	3.567	3.213		384	1	0	0	2.7	5	29/08/2022	
2.80	3.00	2.90	110							144	1	0			5	30/08/2022	
2.30	2.40	2.60	135							0	1	0			5	31/08/2022	
2.60	2.30	2.40	115		211	160	4.267	4.366		0	1	0			5	01/09/2022	
2.60	2.00	2.30	102	3						56	1.5	0			5	02/09/2022	
2.50	2.00	2.50	126							0	1	0		5	03/09/2022		
2.10	2.00	2.50	122							0	1.5	0		5	04/09/2022		
1.20	0.90	1.50	24		151	157	6.433	6.243		236	2	0	0	2.6	6	05/09/2022	
1.10	1.30	1.40	0							382	3	0			6	06/09/2022	
1.60	1.70	1.60	23							382	2	0			6	07/09/2022	
1.50	1.60	1.50	44	3.6	155	175	5.854	5.375		356	2	0			6	08/09/2022	
1.50	1.80	2.00	7							419	1	0			6	09/09/2022	
1.6	1.4	2.1	17							430	2	0		6	10/09/2022		
1.5	1.5	2	26							430	2	0		6	11/09/2022		
1.8	2.2	2.1	12		175	195	5.428	4.779		430	2	0	0	3.2	7	12/09/2022	
1.6	2	1.8	86							148	2	0			7	13/09/2022	
2	2.1	2	75							280	3	0			7	14/09/2022	
2	2	2	64	4.2	187	211	4.978	4.217		430	3	0			7	15/09/2022	
2.6	2.9	2.9	96							194	2	0			7	16/09/2022	
2.3	2.5	2.6	139							0	1	0		7	17/09/2022		
2.3	2.5	2.4	141							0	1	0		7	18/09/2022		



Influent and effluent characteristics

Influent

Data (mg/l)	SS	COD	BDS ₇ /BOD ₇	TN	TP	NO ₃ -N	NH ₄ -N
Before application of Ydro Process®	345	952	592	61	12.9		43
During application (03.08.2022-ongoing)	386	976	460	68	14		45

Effluent

Data (mg/l)	SS	COD	BDS ₇ /BOD ₇	TN	TP	NO ₃ -N	NH ₄ -N
Before application of Ydro Process®	6,2	72	10,1	11,9	0.67	11,0	0.06
During application (03.08.2022-ongoing)	3,5	70	9	12.3	0.36	12	0.05

Results



Excess sludge reduction

excess sludge reduced by over 90%;



Reduction of costs

costs associated with sludge treatment and disposal reduced by over 90%;



Reduction of odors

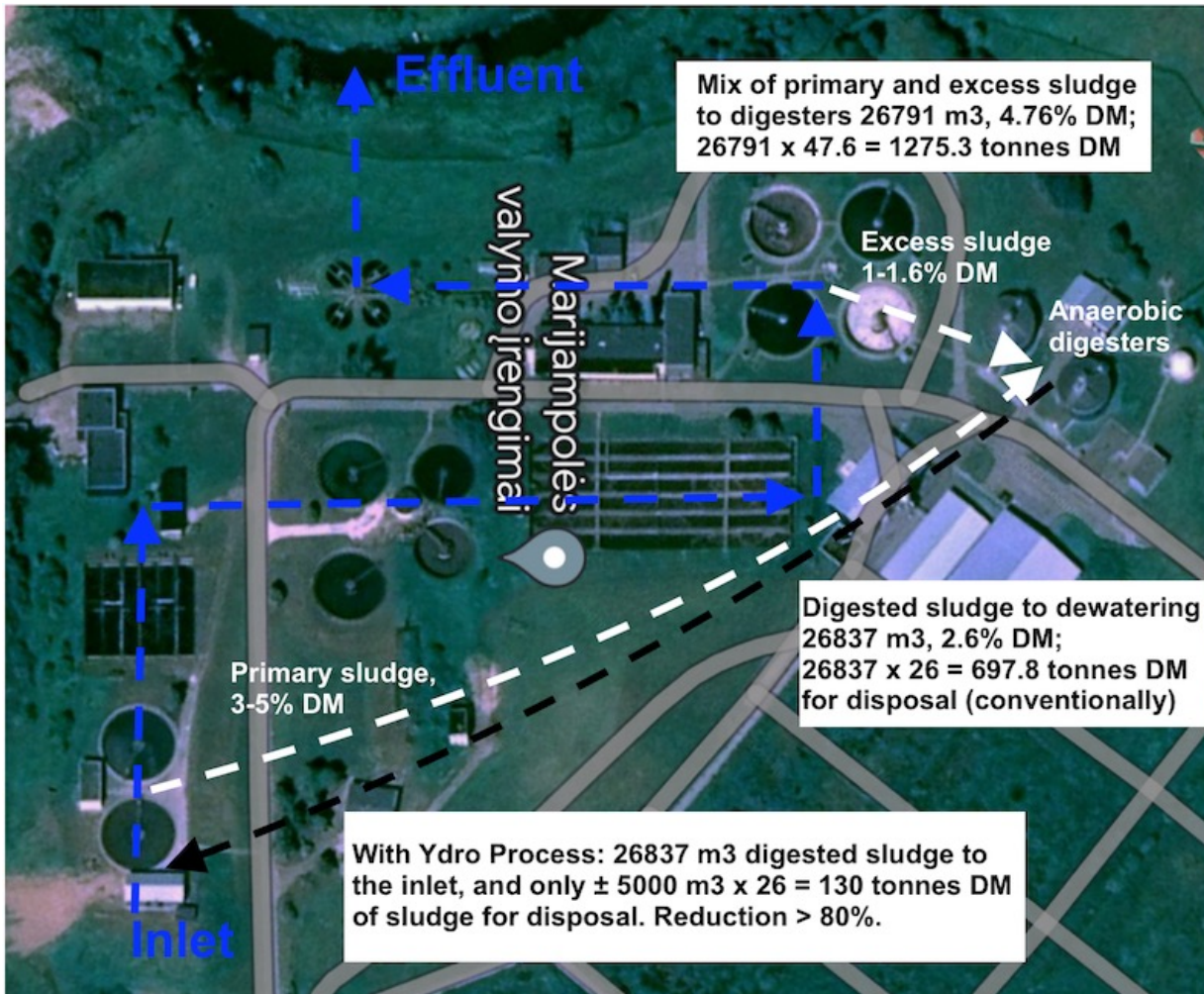
odors eliminated at the WWTP;



Effluent parameters

within limits.

Customer review



ON THE REQUEST OF DATA

On 2 March 2023, Sūduvos vandenys received an e-mail from Eigesa UAB requesting data on the percentage of excess sludge that has been reduced in the last six months at the Marijampolė sewage treatment plant by using the Ydro Process microorganisms to reduce the sludge quantity for disposal.

The „Ydro Process“ technology was implemented at the Marijampolė wastewater treatment plant in August 2022, and to date we have sludge data for a 7-month period, so we are reporting data accumulated over the entire period of the Ydro microorganisms' use at the plant.

With the „Ydro Process“ technology, during the period of August 2022 - February 2023, 25130 m³ of primary and excess sludge mixture was digested (in the anaerobic digesters), with a DM content of 3.85%. The total volume of sludge sent for dewatering was 4939 m³ with a DM content of 2.79%. The final product (dewatered sludge) contained 134 tonnes of dried sewage sludge (DM).

Without the „Ydro Process“ technology, 26791 m³ of primary and excess sludge mixture was digested (in the anaerobic digesters) during August 2021 - February 2022, with a DM content of 4.76%. The volume of sludge sent for dewatering was 26837 m³ with a DM content of 2.60 %. The final product (dewatered sludge) contained 698 tonnes of dried sewage sludge (DM).

The percentage of the sludge reduced for disposal in the last seven months at the Marijampolė WWTP was 80.77%.

Director

Vytautas Jasinskis

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Client savings

Ydro Process® implementation can be customized at any wastewater treatment plant with different facilities. It is a process that is adapted to local conditions and process stages to perform at the optimum level.

The anaerobic digestion processes can be utilized to treat the primary and secondary sludge and to recover energy. The only difference with the conventional method is that digested sludge has to be directed back to the inlet of the WWTP. At all stages, Ydro Process® will degrade the organic fraction at an optimum rate, and the conditions will be controlled.

It is also suggested, to operators, receive external sludge produced in wastewater treatment plants in the vicinity and create an income in the form of a gate-fee charge. This external sludge will be decomposed and eliminated with additional microbial product quantities at the WWTP.

In the picture on the right, we can see savings for the Client at WWTP Marijampole for the eight months, starting from August 2022 (polymer for sludge thickening, electricity for dewatering, biogas for sludge drying, etc.). The total savings are even higher > 40%, as sludge trucking and landfill gate-fee not included.

Year	Month	Polymer for sludge thickening			Electricity for sludge treatment			Biogas for sludge drying			sludge dewatering	total pol+el+gas
		kg/month	Euro/kg	Euro/month	kWh	Euro/kWh	Euro/month	m3/month	Euro/m3	Euro/month	/drying days	Euro
before YDRO application												
2022	6	850.00	4.10	3,485.00	75,460.00	0.0872	6,580.11	31,145.00	1.1560	36,003.62	31/31	46,068.73
2022	7	775.00	4.10	3,177.50	60,313.00	0.3322	20,035.98	17,342.00	1.2200	21,157.24	31/16	44,370.72
average:		812.50	4.10	3,331.25	67,886.50	0.21	13,308.05	24,243.50	1.19	28,580.43		90,439.45
during YDRO application												
2022	8	110.00	4.10	451.00	41,026.00	0.5121	21,009.41	9,088.00	1.9190	17,439.87	6/10	38,900.29
2022	9	-	4.10	-	25,300.00	0.4025	10,183.25	-	2.5200	-	0/0	10,183.25
2022	10	214.00	4.10	877.40	27,703.00	0.2317	6,418.79	2.00	2.2300	4.46	12/0	7,300.65
2022	11	93.60	4.10	383.76	26,021.00	0.2708	7,046.49	-	2.0010	-	4/0	7,430.25
2022	12	275.00	4.10	1,127.50	41,979.00	0.2881	12,094.15	11,513.00	1.3380	15,404.39	12/9	28,626.04
2023	1	161.50	4.10	662.15	37,033.00	0.1234	4,569.87	9,102.00	1.3930	12,679.09	6/6	17,911.11
2023	2	221.00	4.10	906.10	36,549.00	0.1356	4,956.04	11,039.00	0.8140	8,985.75	9/8	14,847.89
2023	3	156.00	4.10	639.60	29,907.00	0.1077	3,220.98	2,864.00	0.7210	2,064.94	7/2	5,925.53
average:		153.89	4.10	630.94	33,189.75	0.26	8,687.37	5,451.00	1.62	7,072.31	7/4	131,125.00
%, (+/-)		-81.1%	0.0%	-81.1%	-51.1%	23.5%	-34.7%	-77.5%	36.1%	-75.3%		

YDRO Microorganisms			total costs + YDRO	total prev year	total difference	in
kg/month	Euro/kg	Euro/month	Euro	Euro	savings (-)	%
-		-				
-		-				
-		-				
60.00	622.00	37,320.00	76,220.29	101,895.32	(25,675.03)	-25%
30.00	622.00	18,660.00	28,843.25	113,869.16	(85,025.91)	-75%
49.60	622.00	30,851.20	38,151.85	90,215.75	(52,063.90)	-58%
84.00	622.00	52,248.00	59,678.25	91,439.86	(31,761.61)	-35%
80.80	622.00	50,257.60	78,883.64	66,897.03	11,986.61	18%
49.60	622.00	30,851.20	48,762.31	56,181.34	(7,419.03)	-13%
40.80	622.00	25,377.60	40,225.49	39,069.41	1,156.08	3%
24.80	622.00	15,425.60	21,351.13	34,067.59	(12,716.46)	-37%
419.60	622.00	260,991.20	392,116.20	593,635.45	(201,519.25)	-34%
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