Water Management & Reuse

Sugar Beet Processing

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INTRODUCTION

- TASCO has operated WW land application systems at the 3 facilities in Idaho for over 30 years. Treatment systems have continuously improved with an emphasis on water conservation and plant reuse activities. TASCO continues to work collaboratively with IDEQ to identify future systems improvements.


White Satin
sugar
2205XB1549
GRANULATED
NET WT. 5lb (2.27 kg)
NATURALLY SWEET FROM WESTERN FARMS
Nature's own sweetener!
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NATURALLY SWEET FROM WESTERN FARMS
Nature's own sweetener!
White Satin
sugar
2205XB1547
GRANULATED
NET WT. 5lb (2.27 kg)
NATURALLY SWEET FROM WESTERN FARMS
White Satin
Nutrition Facts
Serving Size 1 Teaspoon (4g)
Servings Per Container 567
Amount Per Serving
Calories 15
% Daily Value
Total Fat 0g 0%
Sodium 0mg 0%
Total Carbohydrate 4g 1%
Sugars 4g
Protein 0g
White Satin
White Satin
White Satin

Overview

- Sugar Beet Processing
- Water Management Systems & Reuse
- Reuse - Crop Irrigation
- Improvements

The Amalgamated Sugar Co. LLC

TASCO- Company Overview

- Local grower-owned cooperative.
- 785 Shareholders and 180,000 acres.
- Annual Production - Process 6,000,000 tons of beets & produce 900,000 tons of sugar or 11% of domestic consumption.
- TASCO is the 2nd largest beet sugar processing company in the US.

Processing Facilities

The Amalgamated Sugar Co. LLC

- Three (3) processing facilities located in the cities of Paul, Twin Falls and Nampa.

<u>Daily Beet Processing</u>

- Mini Cassia/Paul (est.1918) – 17,000 tons/d
- Twin Falls (est.1916) – 7,000 tons/d
- Nampa (est.1942) – 12,000 tons/d


IDAHO
MONTANA
Nyssa
Nampa
Twin Falls
Mini-Cassia
UTAH

Facility Water Generation

The Amalgamated Sugar Co. LLC

- Excess water is generated throughout the year.
- Highest quantities generated during the beet processing campaign (fall-winter months).
- Smaller quantities generated during juice/molasses processing (spring-summer).

Overview Water Systems

Sugar Beet Processing

- Inside Facilities – Complex piping systems for recirculating and reusing water.
- Outside Treatment Systems
  - Storage ponds, clarification and aeration.
  - Crop irrigation pivots, hand lines and other equipment.

Simplified Water Flow Diagram

Sugar Beet Processing Facility

Water In

Sugar Beets →

Freshwater →
(Groundwater or Surface Water)

Water Out

Products →

Evaporation →

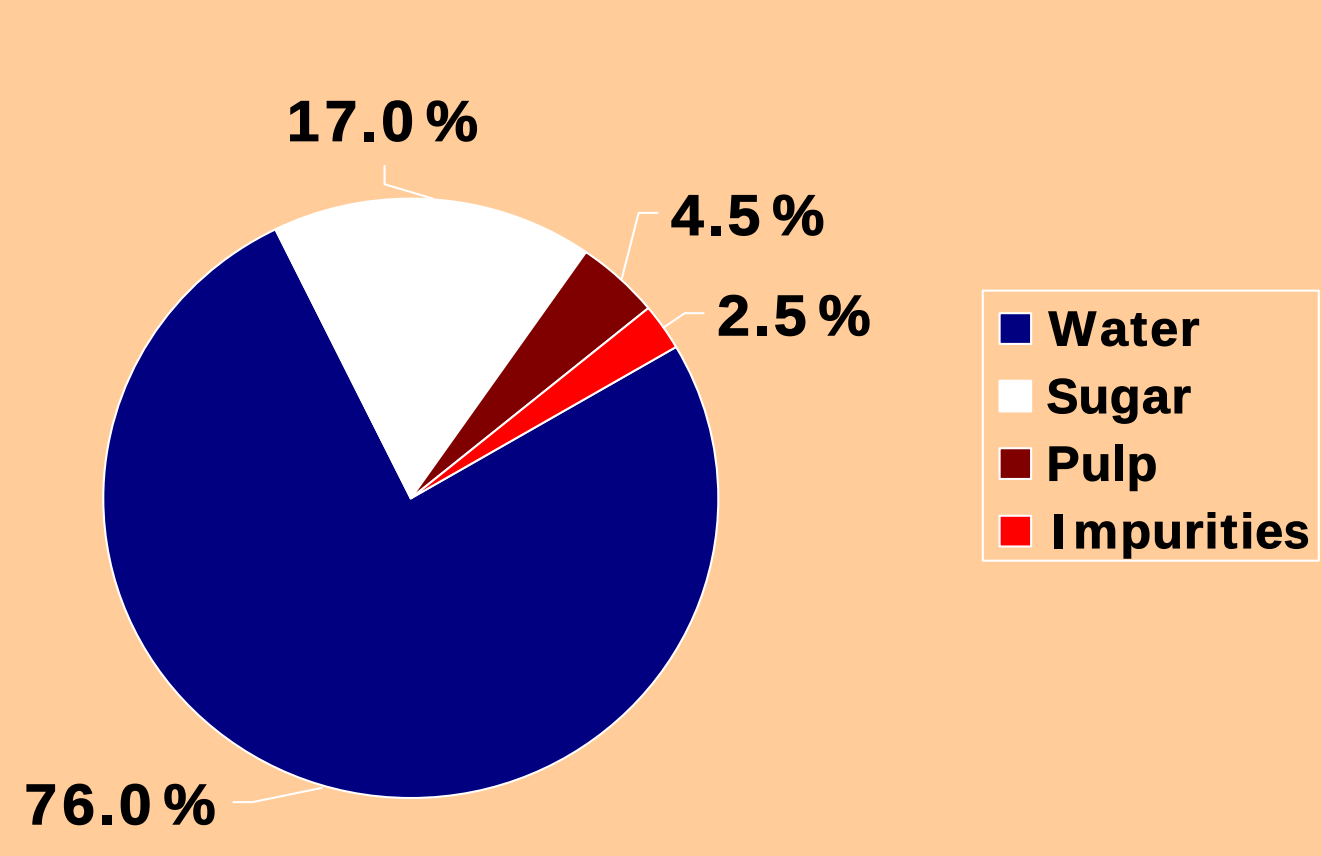
Storage Ponds & Excess Water →

Recycle

Water In

- Facilities are net importers of water since sugar beets contain 76% moisture.
- Secondary Source – Groundwater/surface water.
- Facility water reuse and conservation are critical to the overall balance.

Sugar Beet
Constituent Summary



Water In – Sugar Beets

Facility	Daily (MG)	Annual (MG)
Mini Cassia	4.1	779
Twin Falls	1.7	323
Nampa	2.9	377

Facility Water
Recycled Systems

- Varies by facility.
- Process Reuse – Sugar extraction from beets.
- Flume System – Beet handling/cleaning, tailings recovery, mud removal (all facilities) and Nampa lime removal.
- Cooling Water Systems – Cooling towers or evaporative cooling.
- Ash System – Boiler fly and bottom ash.

Facility Water
Recycled Systems

- Recycled water systems minimize:

  1) Freshwater usage.

  2) The amount of excess wastewater generated.

Excess Water Out

- Excess water separated into 2 categories.

  1) Condensate.

  2) Process wastewater.

Excess Water Out
Condensate

- High quality water evaporated from sugar beets.
- Low hardness, low COD, contains a small amount of nitrogen.
- Excellent source of water for process needs and crops.
- High volumes.

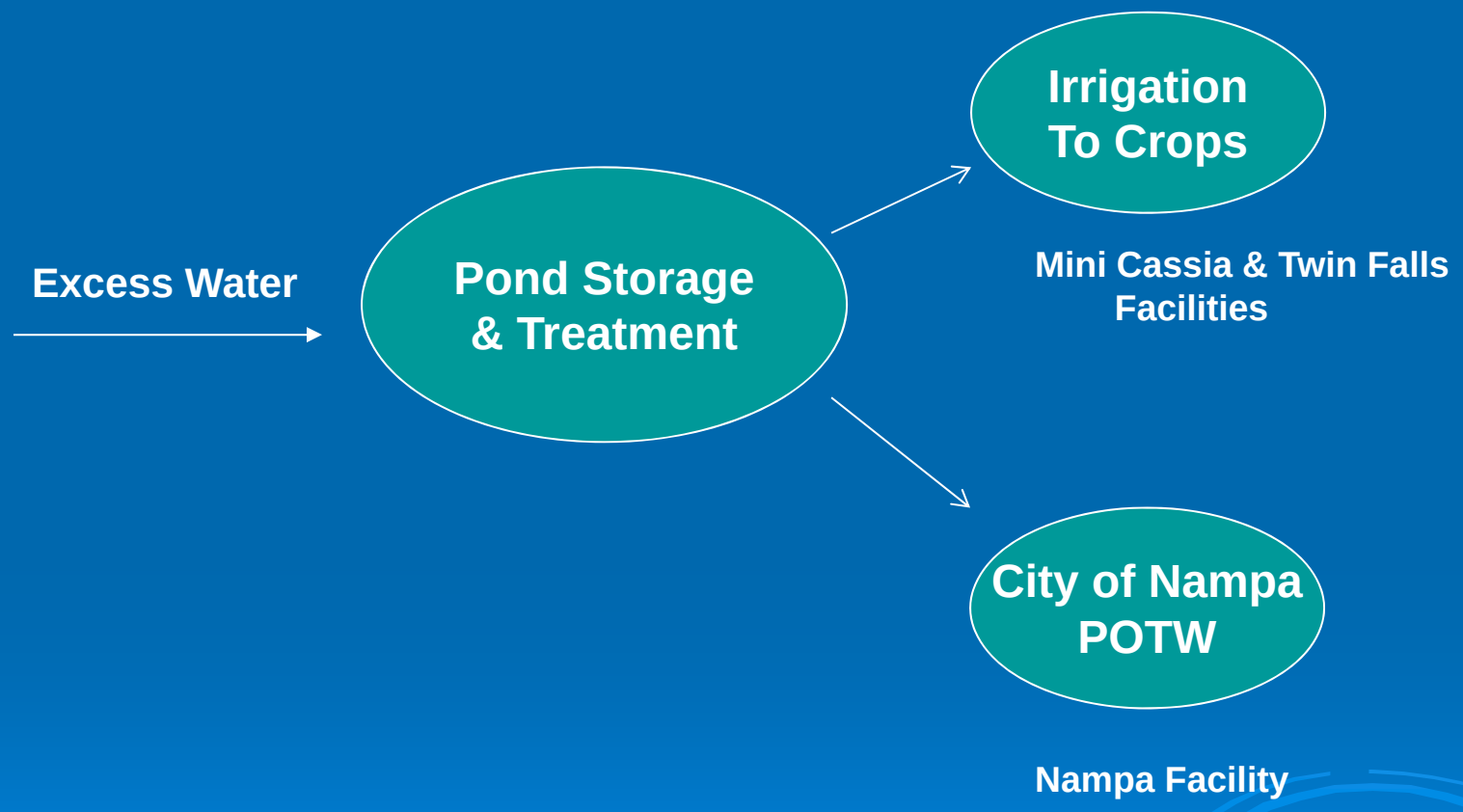
Excess Water Out
Process Wastewater

- Excess water from recycled systems (beet flume, scrubbers and ash), floor washings, tank overflows, etc.
- Lower quality (high hardness, high COD, contains a small amount of nitrogen).
- Treatment – aeration systems.
- Land Application – low volumes.

Facility Excess Water Management & Treatment Systems

General Diagram

Excess Water Treatment



Facility Storage & Treatment Ponds

- Separation of high quality condensate and lower quality process water.
- High Quality Condensate – Store and land apply primarily during growing season (MC & TF facilities).
- Process Water – Aerate, land apply (MC & TF) or discharge to POTW (NA).

Storage & Treatment Ponds

Facility	Water Type	No. of Ponds	Total MG's	Total Aeration hp
Mini-Cassia	Process	6	60	1945
	Condensate	4	222	----
Twin Falls	Process	10	33	325
	Condensate	2	130	----
Nampa	Process	12	60	1175
	Condensate	----	----	----

Water Reuse - Land Application

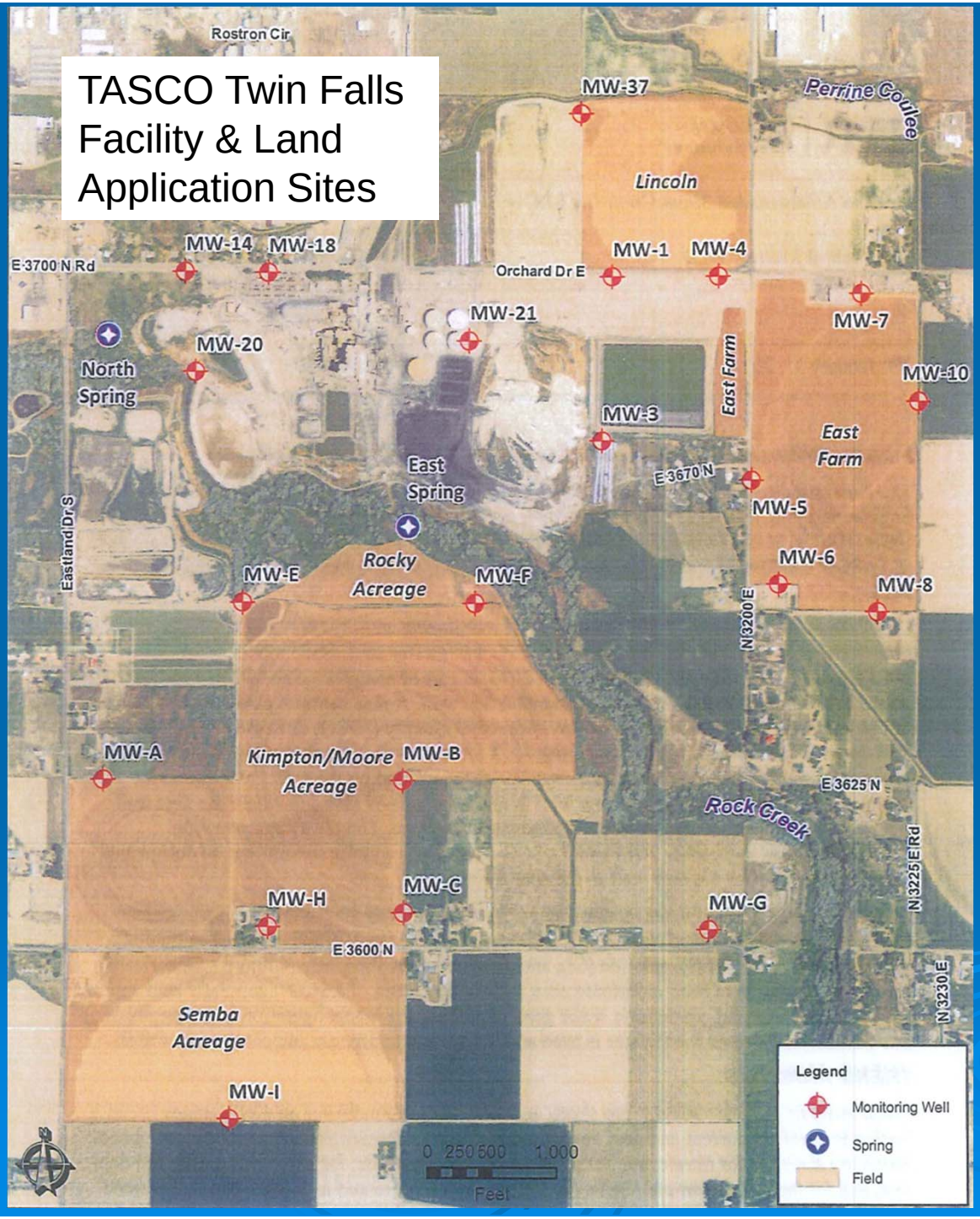
TASCO Factory Sites - Acres

Facility	Facility [a] Grounds	Onsite Farms	Total
Mini-Cassia	457	514 [b]	971
Twin Falls	320	329	649
Nampa	272	118	390

[a] Includes main factory area, beet piling grounds and storage ponds
[b] 315 offsite acres also available

TASCO Mini Cassia Facility & Land Application Sites

TASCO Twin Falls Facility & Land Application Sites



Nampa Facility & Land Application Sites

Onsite Farms

- Crops - Primarily alfalfa.
- Fertilizer additions closely monitored and maintained well below crop requirements.

TASCO Facility Water Reuse Permits

Overview

TASCO Industrial Permits

- First permits issued to all facilities in 1989.
- Permits recently renewed.
- Over the past 25 years, permit requirements have become significantly more complex.
- TASCO facilities progressively improved WW management operations to ensure compliance with more stringent permitting requirements.

Permit Requirements

TASCO Idaho Facilities

- Farm Loading Limits
- Monitoring & Recordkeeping (WW Loadings, Crops, Soils & Groundwater)
- Annual Performance Reports
- Compliance Activities (Plan of Operations, QA Plans, Odor Management, Buffer Zones, Solids Management Plans, Groundwater Studies)

Farm Loading Limits

- Hydraulic (growing season & non growing limits).
- Organics (25 to 50 lbs COD /acre-day).
- Nitrogen – 150% of typical crop uptake (200 to 800 lbs/acre-yr).
- Non Volatile Dissolved Solids (NVDS) – 1200 to 3000 lbs/acre-yr.

Monitoring

TASCO WW Reuse Permits

Parameter/Constituents	Frequency	Samples
Wastewater/Irrigation Water – Flow, organics, nitrogen, NVDS, P	Daily & Monthly	WW applied to fields, ponds
Crops – Yields, %H_2O, nitrogen, % ash	After each harvest	Each field
Soils – Nitrogen, % organics, electrical conductivity, phosphorous	Once per year (March)	Each field
Groundwater - Water elevation, nitrate, TDS, iron, manganese	Twice per year (April, Oct.)	Upgradient, side gradient & down gradient wells

Reuse – Land Application Actual Loadings

Total Hydraulic Loading Summary

Land Application – Mini Cassia Facility

2012-2013

Water Type	MG's	%
Process - WW	20	2
Condensate - WW	149	13
Irrigation	1013	85
Total	1182	100

WW Crop Irrigation
Typical Concentrations (mg/l)

Type	COD	Nitrogen	TDS	Phos.
Excess Condensate	200	50	200	0.5
Process	3000	90	4000	4

Overall Onsite Farm Loadings

2012-2013 Weighted Averages
Twin Falls Facility (335 acres)

Parameter	Permit Limit	Actuals	% of Limits
WW Loading (NGS in.)	5.6	4.7	84
WW Loading (GS in.)	47.6	10	21
Nitrogen (lb/ac/y)	476	183	38
COD (lb/ac/d)	40	7.1	18
NVDS (lb/ac/y)	3065	2022	66

Crop = Alfalfa

Overall Onsite Farm Loadings

2012-2013 Weighted Averages
Mini Cassia Facility (514 acres)

Parameter	Permit Limit	Actuals	% of Limits
WW Loading (NGS in.)	7.9	3.2	41
WW Loading (GS in.)	50.4	10.4	21
Nitrogen (lb/ac/y)	504	183	36
COD (lb/ac/d)	40	2.9	7
NVDS (lb/ac/y)	2,000	601	30

Crop = Primarily Alfalfa

Groundwater Monitoring

- Up-gradient, side gradient and down gradient wells monitored semi annually for 11 constituents and water elevation.
- No. of wells sampled – Mini Cassia 23, Twin Falls 21 and Nampa 12.
- Detailed statistical evaluations of well monitoring data and interpretive discussions provided to IDEQ as part annual performance reports and other studies.
- Evaluations are complex and require well construction, GW flow direction and GW velocity assessments.

TASCO Mini Cassia Facility & Land Application Sites

Groundwater Monitoring Results

- In general, due to the implementation of best management practices most wells have decreasing concentration trends or are steady state.
- Elevated TDS and nitrate concentrations have been measured in some shallow wells.
- As part of the current Reuse Permits, groundwater studies continue at each facility.

Improvements

Water Management & Treatment

- Numerous improvements have been completed at all 3 facilities since the original permits were issued in 1989.
- Over the past 10 years, over $25 million has been spent improving the water management and treatment systems.

Major Improvements

Mini Cassia & Twin Falls Facilities

- Installation of lined condensate storage ponds which reduce non growing season loadings and allows for increased water reuse.
- Purchase of additional land for WW reuse.
- Dry lime handing (MC & TF) and dry dirt handling (MC).
- Purchase of additional aerators.

Major Improvements

Nampa Facility

- Since 1996, almost all WW has been discharged to the City of Nampa WW treatment plant. As a result, essentially no WW has been applied to the onsite farms.
- Purchase of additional aerators for flume water.
- Steam Pulp Dryer Installation – Reduced pond loadings.
- Potential Future Improvement – Cooling tower and lined condensate pond project.

Summary

- Since the first permits were issued to TASCO facilities in 1989, waste water management and treatment have continually improved.
- TASCO has worked collaboratively with IDEQ to prioritize the improvements.
- TASCO will continue this collaborative relationship to identify future improvements.

Questions?