

The Haitian Sea Salt Industry

SUPPLY CHAIN ASSESSMENT

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FOREWARD

The Haitian Sea Salt Industry Supply Chain Assessment highlights two critical issues that many countries face as they strive to eliminate iodine deficiency as a public health problem and achieve optimal iodine intake through salt iodization. From the perspective of an organization such as IGN, which endeavors to strengthen collaboration among the diverse partners involved with salt iodization, these efforts are encouraging. They represent an opportunity to make meaningful progress in addressing the iodine deficiency that has been such a long-standing problem in Haiti.



Jonathan Gorstein, Executive Director

The CSC Salt Project, operated by the Congregation de Sainte Croix (CSC)—Haiti and established with support from the University of Notre Dame, worked closely with key stakeholders, including the Haitian government, salt producers and the food industry, to develop the framework for a successful business model that allows small producers to capture markets by selling to a processor that can improve the quality of salt and its iodization for human consumption. This business model has broader implications than for Haiti alone as many countries continue to struggle with small producers and how they can best contribute to national salt iodization goals. Over the past several years, different ‘consolidation models’ have been tested and adapted to distinct national contexts, and the lessons learned from these can help define how countries achieve consistent salt iodization without endangering the livelihood of small producers.

The second lesson from the CSC Salt Project demonstrates the importance of the use of iodized salt in processed foods. In fact, a guiding principle of the business model used in Haiti has been to sell iodized salt to several key processed food industries so that it is used in the making of bread and bouillon, and the manufacturing of other commodities. This approach has led to a significant increase in the supply of iodized salt and has contributed to reducing iodine deficiency. The use of iodized salt in processed foods has a rapid impact on protecting children from iodine deficiency. IGN has recently developed guidance for countries to explore the actual or potential contribution of iodine when iodized salt is used in processed foods. For many countries, processed foods may contribute as much as 50%-75% of iodine intake and can thus provide a strong foundation for achieving universal salt iodization.

One strategic role for IGN is to strengthen network of partners in the global effort to eliminate iodine deficiency and to help share experiences with common challenges. IGN intends; to work closely with the CSC Salt Project to examine how their efforts working with small-scale producers offers valuable lessons to other countries that are addressing similar issues.

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GLOSSARY OF TERMS

AFN	National Ports Authority
AMURT	ANANDA MARGA UNIVERSAL RELIEF TEAM
APSCAR	ASSOCIATION OF SALT PRODUCERS OF THE COMMUNE OF ANSE ROUGE (<i>Association des Producteurs de Sel de la Commune d'Anse Rouge</i>)
CAFESA	Salt Value Chain Local Consultation Table (<i>Collectif d'Affiliation du Sel d'Anse-Rouge</i>)
CSC	Congregation De Sainte Croix
DID	<i>Développement International Desjardins</i>
ESPRI SEL	Haitian Social Enterprise for Salt Production
FOB	Free on Board
HIFIVE	Haiti Integrated Financing for Value Chain and Enterprises
HTG	Haitian Gourde
IDD	Iodine Deficiency Disorders
IGN	Iodine Global Network
KN	Kindernothilfe Foundation
LF	Lymphatic Filariasis
MCI	Ministry of Trade and Industry
MI	Micronutrient Initiative
MSPP	Ministry of Public Health and Population
MT	Metric Ton
NACL	Sodium Chloride
NGO	Non-Governmental Organization
PANSEH	National Support Program for Structuring Haitian Entrepreneurship (<i>Programme d'appui national à la structuration de l'entrepreneuriat en Haïti</i>)
PAP	Port-au-Prince
SHG	Self Help Groups
SOCOPROSA S.A.	Society of Production and Commercialization of Anse Rouge, a Limited Company (<i>Société de Production et de Commercialization du Sel à Anse Rouge, Société Anonyme</i>)
UIC	Urinary Iodine Concentration
UNDHP	University of Notre Dame Haiti Program
USAID	United States Agency for International Development
USEC	United States East Coast
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollar
USI	Universal Salt Iodization
WFD	World Food Program
WHO	World Health Organization

EXECUTIVE SUMMARY

There have been significant shifts and developments in the Haitian sea salt industry since publication of the TechnoServe study, “The Haitian Sea Salt Industry, An Analysis and Strategic Growth Plan,” in September 2011 (hereinafter, the “2011 TechnoServe study”). What remains unchanged, however, are the opportunities highlighted in that report: to improve the livelihoods of the estimated 50,000 Haitians directly involved in the production, transportation, processing, and commercialization of salt, and to improve the health for the six to seven million Haitians at risk of Iodine Deficiency Disorders (IDD). IDD is the world’s most prevalent cause of cognitive impairment. Despite Haiti approving legislation in 2017 that mandated the iodization of salt, less than 25% of Haitian households have access to iodized salt. Consequently, IDD remains a serious public health problem in Haiti.

The purpose of this paper is to analyze the developments in each area of the sea salt value chain since 2012 to identify the gaps remaining versus a desired end-state, and to propose prioritized initiatives to close those gaps. This paper coincides with the achievement of a long-standing goal, that being the first delivery of salt into the Haitian supply chain from the modernized salt basins in Anse Rouge.

In addition to the two opportunities already identified (improved livelihoods, improved health), this paper introduces two critical objectives to ensure the long-term sustainability of those efforts. In particular, benchmarking to ensure regional competitiveness (enabling Haiti to be self-sufficient in salt) and prioritizing the passive distribution of iodine through the food service and food-processing market segments (enabling faster prevention of IDD than would be possible through prioritization of universal salt iodization (USI).

The structure of this report is similar to that of the 2011 TechnoServe study. It cites background information on the salt industry, maps the Haitian value chain, identifies the regulatory factors influencing the value chain, and identifies steps to make the Haitian salt industry regionally competitive.

However, the structure of the report differs from the 2011 TechnoServe study in several key areas:

- IT EXPANDS THE VALUE-CHAIN COMPONENTS FROM TWO (PRODUCTION AND COMMERCIALIZATION) TO FIVE (PRODUCTION, IMPORTS, TRANSPORTATION AND STORAGE, PROCESSING, DISTRIBUTION);
- IT EXPANDS THE COMMERCIALIZATION FOCUS FROM ONE MARKET SEGMENT (RETAIL) TO FOUR (RETAIL, FOOD SERVICE, FOOD-PROCESSING, INDUSTRIAL);
- IT INCLUDES A VARIETY OF SIDE-BAR DISCUSSIONS AND APPENDIX MATERIALS TO ADD CONTEXT TO THE NARRATIVE AND RECOMMENDATIONS. THE APPENDICES INCLUDE TECHNICAL DATA SHEETS FOR VARIOUS SALT PRODUCTS (REGIONALLY AVAILABLE BULK SEA SALT, BAGGED DEICING SALTS, ANIMAL FEED SALTS, AND POOL SALTS).

The key developments since 2012 in the five respective value-chain components are as follows:



- **PRODUCTION:** PANSEH AND AMURT ARE TEAMING WITH LOCAL PRODUCERS TO CONSOLIDATE MODERNIZED BASINS TO IMPROVE AND EXPAND SEA SALT PRODUCTION IN ANSE ROUGE, INCLUDING INFRASTRUCTURE IMPROVEMENTS FOR TRANSPORTATION AND STORAGE.
 - HURRICANE MATTHEW IN OCTOBER 2016 HAD A DEVASTATING IMPACT ON HAITIAN SEA SALT PRODUCTION AND PRICING. THE PRODUCTION SYSTEM IS SLOWLY RECOVERING FROM THAT EVENT. TWO SUBSTANTIAL EFFORTS ARE UNDERWAY TO IMPROVE AND EXPAND SEA SALT PRODUCTION IN ANSE ROUGE: A 47-PRODUCER CONSORTIUM, COORDINATED BY PANSEH, TO INTRODUCE THREE-STAGE PRODUCTION, AND THE REVITALIZATION OF THE AMURT POND SYSTEM.
- **IMPORTS:** HAITI REMAINS A NET IMPORTER OF SALT, BUT THE OVERALL IMBALANCE HAS IMPROVED SINCE HURRICANE MATTHEW. THE ONGOING DEVALUATION OF THE HTG (FROM HTG 41/USD 1 IN JUNE 2012 TO HTG 93/USD 1 IN JUNE 2019) ALSO HAS MADE IMPORTED SALT RELATIVELY MORE EXPENSIVE.)
- **TRANSPORTATION AND STORAGE:** AS PART OF THE PANSEH AND AMURT INITIATIVES, A COMMON WAREHOUSE AND JETTY WILL BE CONSTRUCTED IN ANSE ROUGE, AS WILL A SMALL SELF-PROPELLED BARGE. THE RESULT WILL BE IMPROVED COST OF TRANSPORT AND AVAILABILITY OF PRODUCT IN KEY DESTINATION MARKETS, I.E., PORT-AU-PRINCE, CAP-HAITIEN, ARCAHAIE, AND MIRAGOANE.
- **PROCESSING:** THE CURRENT CONGREGATION DE SAINTE CROIX SALT-PROCESSING FACILITY AT DELMAS – 2 WAS INAUGURATED IN DECEMBER 2014, COMPLEMENTING THE EXISTING MSPP FACILITY AT CITE MILITAIRE MANAGED BY THE CONGREGATION DE SAINTE CROIX (CSC). THE DELMAS FACILITY HAS SINCE BEEN EXPANDED THREE TIMES. IT IS THE ONLY SALT PROCESSING FACILITY IN HAITI AND THE LARGEST SINGLE BUYER OF HAITIAN RAW SEA SALT. CAPABILITIES INCLUDE BRINE-WASHING OF LOCAL SALT, PRODUCTION OF SINGLE (KIO3) AND DOUBLE-FORTIFIED (KIO3+DEC) PACKAGED SALT, AND PRODUCTION OF BOTH COARSE AND FINE SALT.
- **DISTRIBUTION:** THE FORTIFICATION LAW REQUIRING IODIZATION OF SALT HAS BEEN LARGELY DISREGARDED IN THE RETAIL AND FOOD SERVICE SEGMENTS (EXCEPT FOR DONATED SCHOOL LUNCH PROGRAMS) AND MORE BROADLY ACCEPTED IN FOOD PROCESSING (PRIMARILY BOUILLON CUBE PRODUCTION AND LARGE BAKERIES). THE RATE OF IDD IS STILL CONSIDERED A MAJOR PUBLIC HEALTH ISSUE.

The key gaps in the value-chain components, which are identified in the paper, are:

- **PRODUCTION:** THE QUALITY OF HAITIAN SEA SALT (GRANULE-SIZE, PURITY, MOISTURE), EVEN FOR THE FEW PRODUCERS USING MODERN THREE-STAGE SYSTEMS IS STILL MATERIALLY UNCOMPETITIVE WITH IMPORTED COARSE SEA SALT. THE PRODUCTION SYSTEM CONTINUES TO UTILIZE “VOLUME AND VISUAL” INSTEAD OF “WEIGHT AND SPECS” EMPLOYED ELSEWHERE (THUS, TRADE IS BASED ON NON-STANDARD BAGS OF “GOOD” SALT VERSUS PRICE PER MT AGAINST STANDARD SPECIFICATIONS). INADEQUATE INFRASTRUCTURE (LINED SIDE-WALLS, BRINE-PUMPS, HARVEST EQUIPMENT TO ALLOW HARVESTING ON A SALT-FLOOR VS. MUD-FLOOR, NEAR-POND STORAGE FACILITIES, ETC.) ADVERSELY IMPACTS SALT QUALITY AND WORKING CONDITIONS.
- **IMPORTS:** THE HAITIAN SEA SALT INDUSTRY REMAINS VULNERABLE TO LOWER COST, HIGHER QUALITY SALT IN THE REGION ESPECIALLY FROM SOLAR SEA SALT PRODUCED ELSEWHERE IN THE REGION BUT IMPORTED IN BULK AND/OR VIA TRANS-SHIPMENT FROM THE DOMINICAN REPUBLIC.
- **TRANSPORTATION AND STORAGE:** THE COST OF TRANSPORT OF UNPROCESSED SALT, ON A PER TON BASIS, IS MATERIALLY UNCOMPETITIVE WITH IMPORTED BULK COARSE SALT. THE INFRASTRUCTURE TO AGGREGATE SUPPLY AND ENSURE ADEQUATE SUPPLY OF PRODUCT TO PROCESSORS AND CUSTOMERS IS LACKING.
- **PROCESSING:** INSTALLED CAPACITY IN PORT-AU-PRINCE IS ADEQUATE TO SUPPLY A SIGNIFICANT PORTION OF THE NATIONAL DEMAND FOR THE FOOD SERVICE AND FOOD-PROCESSING MARKET SEGMENTS. HOWEVER, IT IS NOT ADEQUATE TO SUPPLY THE ENTIRE RETAIL SEGMENT. THE MARKET NEEDS ADDITIONAL PROCESSING CAPACITY IN THE NORTH (EITHER AT ANSE ROUGE OR CAP-HAITIEN) TO AVOID DOUBLE TRANSPORT COSTS TO NORTHERN MARKETS.

- **DISTRIBUTION:** THE SALT FORTIFICATION LAW GENERALLY IS NOT ENFORCED, NOR IS IT CLEAR THAT TARIFFS ARE BEING ENFORCED ON IMPORTED SALT FROM THE DOMINICAN REPUBLIC. THE WIDESPREAD AVAILABILITY OF OPEN-MARKET UNFORTIFIED SALT, PER “TI-MARMITE” (APPROXIMATELY 700 GRAMS SCOOPED BY A CAN FROM AN OPEN BAG AS SOLD IN THE INFORMAL MARKET) IS A MAJOR CHALLENGE TO THE DISTRIBUTION OF PACKAGED FORTIFIED SALT.

The key initiatives recommended to achieve the desired benefits to livelihoods and health include:

- DIRECT SUPPORT FOR PRODUCTION SYSTEM INFRASTRUCTURE TO ENSURE COMPETITIVE QUALITY VERSUS REGIONAL IMPORTS
- DIRECT SUPPORT FOR A MORE COST-EFFECTIVE TRANSPORTATION SYSTEM FOR SALT PROCESSING AND END-USER DISTRIBUTION WAREHOUSES
- INCENTIVIZE THE CONSTRUCTION OF NEW PROCESSING CAPACITY IN THE NORTH OF HAITI, MOST LIKELY IN CAP-HAITIEN
- ENSURE THE ENFORCEMENT OF TARIFFS ON SALT IMPORTED FROM THE DOMINICAN REPUBLIC
- INCENTIVIZE THE DISTRIBUTION OF FORTIFIED SALT VIA THE FLOUR AND YEAST DISTRIBUTION NETWORK TO BAKERIES AND FOOD SERVICE OPERATORS
- ENSURE ENFORCEMENT OF THE FORTIFICATION LAW AMONG END-USERS OF SALT IN THE FOOD SERVICE AND FOOD-PROCESSING MARKET SEGMENTS (E.G., SCHOOLS, COMMUNITY KITCHENS, BAKERIES)
- EXPLORE EXPORT PROGRAMS ON AN OPPORTUNISTIC BASIS FOR PACKAGED POOL SALT, ANIMAL FEED SALT, AND/OR DEICING SALT
- ADOPT “PREVENTION OF IDD VIA PASSIVE DISTRIBUTION” AS A POLICY PRIORITY RELATIVE TO USI



To the point: Why Salt

Salt is an ideal carrier for food fortification as it is universally consumed at equal rates, independent of economic status. Dietary diversification, micronutrients, and micronutrient supplementation are methods suggested by The World Health Organization (WHO) to combat micronutrient deficiencies. Cargill salt has provided technical assistance in the manufacture of co-fortified salt

ALLEN, L.H., BENQOST, B., DARY, O., R. GUIDELINES FOR FOOD FORTIFICATION WITH MICRONUTRIENTS, WHO, GENEVA, SWITZERLAND, 2006.

In summary, significant opportunities exist in the Haitian salt value chain that would benefit the livelihood of thousands of Haitians and the health of millions. Acting to close the identified gaps will spur development in a critical industry and achieve regional competitiveness on a sustainable basis.

This paper reaffirms the objectives that it shares with the 2011 TechnoServe study sponsored, in part, by the Haiti Integrated Finance for Value Chain and Enterprises (*HIFIVE*) project:

- IMPROVED LIVELIHOODS FOR 50,000 HAITIANS DIRECTLY INVOLVED IN PRODUCTION AND COMMERCIALIZATION OF SALT
- IMPROVED HEALTH FOR ALL HAITIANS AT RISK OF IDD

Other gaps have been identified and new objectives are added (as well as recommendations to close those gaps) to address them. The new objectives are designed to achieve Haitian self-sufficiency and regional competitiveness in:

- IMPROVING THE SALT VALUE CHAIN IN HAITI TO ACHIEVE SELF-SUFFICIENCY RELATIVE TO IMPORTS, AND REGIONAL COMPETITIVENESS RELATIVE TO EXPORTS
- ADOPTING A NEW POLICY OBJECTIVE OF “IDD PREVENTION” IN PLACE OF “USI” (CITING SUPPORT FROM THE 2016 INTER-AGENCY REPORT THE HAITI IDD PREVENTION PROGRAM) EMPHASIZING THE PASSIVE DISTRIBUTION OF IODINE
- INCREASING IODINE INTAKE SHOULD BE IMPLEMENTED IN CONJUNCTION WITH EFFORTS TO REDUCE OVERALL SALT CONSUMPTION

INTRODUCTION

Salt plays a role in many facets of Haitian life, primarily with food and health, but also with various aspects of industry. The prevalence of salt in the Haitian diet allows diseases such as IDD to be combated by fortifying salt with iodine supplements. Salt is a fundamental component in industrial processes such as water purification and tanning. However, the lack of reliable access to large-scale quantities of *clean* salt in Haiti severely hampers the country's ability to provide health benefits and clean water to its population. By expanding access to clean salt, Haiti can successfully fortify salt and rejuvenate demineralization systems in beverage and industrial processes. Furthermore, clean salt will not only benefit the health of the Haitian population—it will improve Haiti's ability to develop economically and compete regionally.

This paper reflects the results of a recent study focused on providing an updated assessment of the Haitian salt industry, and expanding upon earlier findings published, including the 2011 TechnoServe study. Working in conjunction with the University Notre Dame Haiti Program (UNDHP), the Congregation de Sainte Croix (CSC), PANSEH (a project implemented by *Développement International Desjardins* (DID), a Canadian NGO), and salt industry professionals, this paper outlines steps to make the Haitian sea salt industry regionally competitive and makes recommendations on how to more effectively leverage Haiti's salt industry to improve the health of the Haitian population.

Recent advancements by AMURT (a US-based NGO) and PANSEH to upgrade and expand farming capacity in the Anse Rouge region have brought an increased urgency to this process. These projects have the potential to greatly increase the quality and quantity of solar salt production when formal production begins in the fall of 2020. This, coupled with the increased production from traditional salt farmers recovering from the devastation of Hurricane Matthew in October 2016, may test the local salt supply and demand balance. The increased volume will be evaluated along with the associated changes in quality, grade, and cost to understand the potential for disruption of the market equilibrium. Any meaningful changes in the market equilibrium—either in price or volume—may have consequences for the sustainability of local production, and current and future imports or exports of salt.

The study focuses on the entire supply chain in Haiti, including Haitian salt farmers' future production capabilities in terms of quality and pricing relative to current regional suppliers. For Haitian-produced salt to be competitive, it must compete on four variables: quantity, quality, price, and grade. The US salt market is evaluated to determine export opportunities that may be available. Import trends, particularly with respect to the Dominican Republic, are examined for competitive changes in the volume of fine salt used by food processors and bouillon makers, which account for a high percentage of edible salt. The report includes an assessment of the ability of the Haitian sea salt industry to meet current quality standards at a competitive regional price for several categories of the US salt market (e.g. bagged deicing, pool salt, and animal feed).

Infrastructure improvements in the Anse Rouge region and connectivity with other markets in Haiti are important considerations of this study. Pending port improvements will be noted as producers attempt to transport salt from Anse Rouge to destination markets *via* shipping, subject to the resolution of property claims.

Recognizing that the health of Haiti depends, in part, on the cooperation of the salt industry, this assessment measures the advances that have been made since 2012, with current projects helping to accelerate progress towards meeting critical health needs, such as protecting Haiti's population from IDD. IDD damages fetal brain development, resulting in a 10%-15% loss in IQ, and in some cases more extreme disabilities.¹

The purpose of this study is to assess the critical segments of the supply chain for salt in Haiti. Starting with production, the study maps the process flow from production to consumption. The section on processing focuses on progress achieved since the 2011 TechnoServe study. The section on distribution addresses how the consumer market has become more commercialized and complex. Public policy and the supply chain provide insights on how the supply chain can be better leveraged to improve the health of Haitians, especially with respect to salt iodization.

The assessment identifies developments since 2012, key issues to be addressed, and emerging issues that may be of consequence in the next 12 to 24 months. The report concludes with a series of recommendations focused on the principle that the health of Haiti depends on a robust salt industry.

¹ "Assistance to Feed Insecure People in Crisis Situation-Salt Iodization Strategies," Micronutrient Initiative, Haiti, August 2010.

BACKGROUND

Since 1996, Efforts have been ongoing since 1996 to improve the production of local salt to meet quality standards for iodization:

1998	UNICEF donated three iodine spraying machines to MSPP
2001	Minister of Public Health introduced universal salt iodization as a National Strategy
2001	MSPP contracted with the University of Notre Dame to manage salt Iodization
2006-2009	Micronutrient Initiative and World Food Program to improve production of local salt to meet standards for iodization
2006-Present	AMURT constructs modern salt works in Magazen with an estimated capacity of 15,000 MT/year
2010-2012	OXFAM America works with salt expert Dr. John Cox and Accenture Development Partners to develop modern salt works in Anse Rouge with an estimated capacity of 200,000 MT/year
2010-2012	Identified bulk deicing salt in the US identified as the best potential market for exporting Haitian salt
2012-Present	PANSEH pilot project underway to modernize basins in Anse Rouge with an estimated capacity 6,500 MT/year

The 2011 TechnoServe study was one of several reports focused on the Haitian salt industry from the perspective of economic development of USI.²

Beginning in 2010 and culminating in 2012, several studies assessed the technological feasibility of transforming the existing salt basin into modernized saltworks that could satisfy Haiti's need for iodized salt and enable the export of Haitian produced solar sea salt. In developing a plan for a commercially viable salt industry, the studies were to consider opportunities to maximize economic and social benefits to the community.³ The 2011 TechnoServe study recommended, in part:

- MODERNIZING DOMESTIC PRODUCTION VOLUMES AND QUALITY
- IMPROVING CAPACITY TO PRODUCE AND COMMERCIALIZE IODIZED SALT
- DEVELOPING A STRATEGY FOR FUTURE EXPORTS
- SECURING PUBLIC POLICY SUPPORT TO IMPROVE PRODUCTION AND FORTIFICATION
- TAKING STEPS TO MITIGATE ANTICIPATED RISKS ASSOCIATED WITH ADOPTING MODERN PRODUCTION METHODS AND VULNERABILITY FROM NATURAL DISASTERS

² Ibid. See also, "OXFAM, Haiti Livelihoods: Salt Market Assessment," Accenture Development Partners, March 2011; "Salt Iodization: Challenges to Improving Salt Production Quality and Recommendations for Pursuing Iodization," Andrew Tyan, John Hopkins Bloomberg School of Public Health, August 2010; Diagnostic Report for OXFM America Visit Conducted July 19-21, 2011 Exploratory Visit Report: Production Cooperatives, 2011; "Techno-Economic Feasibility Study to Improve the Salt Industry of Commune Anse Rouge," Cox & Speller, November 2011; "The Haitian Sea Salt Industry, An Analysis and Strategic Growth Plan," TechnoServe, September 2011; "A National Strategy for The Salt Industry in Haiti," Cox & Speller, March 2012; and "The Haitian Sea Salt Industry, A Commercialization Strategy," TechnoServe, March 2012.

³ "Techno-Economic Feasibility Study to Improve the Salt Industry of Commune Anse Rouge," Cox & Speller, November 2011.

In November 2011, Cox & Speller issued the first of two papers on improving the Haitian salt industry. The first paper focused on improving the salt industry of Anse Rouge and cited an earlier report from OXFAM America that estimated production volumes of more than 200,000 MT/year if existing salt basins (in the Magazen region) were modernized.⁴ This estimate was later reduced to 15,000 MT/year on the premise that the targeted quantity would supplant the annual level of imports. The program was scaled down from all-inclusive number of 1,400 salt basins to approximately 300 as a pilot project. The concept of a pilot project was intended to entice greater participation by demonstrating the success of the project on a smaller scale.⁵

Subsequent to the 2011 TechnoServe and Cox & Speller reports, a second “Position Paper” was drafted on the technical and commercial aspects of the national salt industry for Haiti. The position paper reiterated the findings of the 2011 reports with two crucial changes. First, the presumed aims of the National Salt Strategy prioritized maintaining the “well-being and livelihoods of everyone engaged in salt production whilst, at the same time, maintaining or preferably reducing retail prices.”⁶ Second, the focus of the initiative expanded beyond Anse Rouge “to support all existing salt producers in all production areas – so that all communities...have access to high quality, low priced fortified salt.”⁷

Each of the earlier studies raise concerns that modernization of existing saltworks in Haiti may ultimately produce volumes several times greater than domestic demand. Unless new production is regionally competitive, the oversupply could depress prices and adversely impact a majority of salt producers. Cox & Speller warned that “The industry is threatened by cheaper, better quality of salt from nearby neighbors and, if it does not modernize, the livelihoods of the already impoverished salt producing communities will suffer.”⁸ They further observed that “the only way price stability can be achieved is by ensuring that any excess production over domestic demand is exported.”⁹ Enthusiasm for accessing the export market was tempered by the recognition that it would not produce salt that could be available solely for iodization in Haiti and that significant investment in a salt-exporting jetty is needed to enable export by sea.

Nonetheless, “From the standpoint of a National Salt Strategy, the purpose of salt exports is to ensure the modernization does not lead to over-production in Haiti and so create commercial problems for the salt industry.”¹⁰ Plus, the export industry could increase local employment and income for the salt workers, making it worthwhile in its own right. The 2011 TechnoServe study framed the Haitian salt industry as a value chain starting with workers. progressing to end-markets.



⁴ Ibid.

⁵ “A National Strategy for The Salt Industry in Haiti,” Cox & Speller, March 2012.

⁶ Ibid.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

The end game envisioned by TechnoServe anticipated that modernization of production would enhance quality and boost volumes, enabling:

- IODIZATION OF LOCALLY PRODUCED SALT
- REPLACEMENT OF CURRENT IMPORTS FROM THE DOMINICAN REPUBLIC WITH DOMESTIC SALT
- ACHIEVEMENT OF PRODUCTION LEVELS, QUALITY STANDARDS, AND UNIT COSTS REQUIRED FOR INTERNATIONAL COMPETITIVENESS

This paper acknowledges the valuable work done by many organizations to advance the effectiveness of the supply chain for the Haitian salt industry to improve the health, livelihood, and economic stability of the Haitian people.



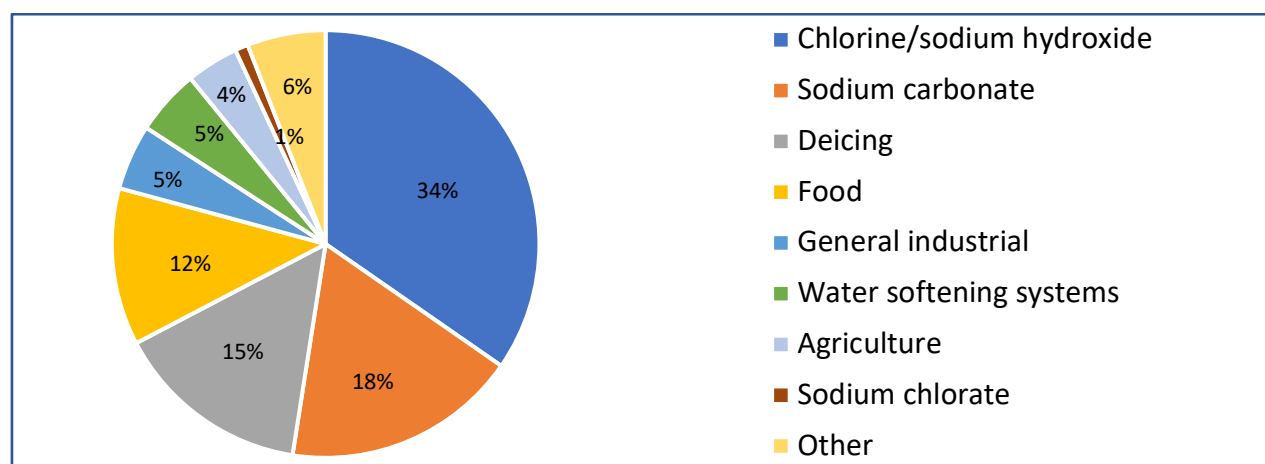
MARKETS FOR SALT

The Haitian salt market generally is unchanged in terms of volume since the 2011 TechnoServe study.¹¹ Domestic production, imports, and consumption fluctuate because of disruptions following natural disasters but remain much the same over time. Global trends currently are of little significance to Haiti; more important are anticipated increases in domestic production, advancements in salt processing and distribution, and economic stability. The 2011 TechnoServe study estimated annual domestic demand to be around 50,000 MT: 40,000 MT for consumption and 10,000 MT for industrial use. Recent estimates lower the consumption to 36,000 MT: 30,000 MT for consumption and 6,000 MT for industrial use.¹²

Commercial salt production in North America and the Caribbean influence the price of salt imported into the Haitian market. Activity within these regions provides insight on market trends which, at some point, may be useful in identifying potential challenges or opportunities. Understanding the North American and Caribbean markets is critical in gaining an appreciation for what is regionally competitive vis-à-vis quantity, quality, price, and grade.

The Haitian salt market, which is limited to food and industrial uses, participates in a small percentage of the overall global market. Domestic production of items such as bagged deicing, food salt, pool salt, and animal feed is used exclusively in-country—these items are not yet exported to other potential markets.

GLOBAL SALT CONSUMPTION BY MAIN USE¹³



¹¹ 2011 TechnoServe study.

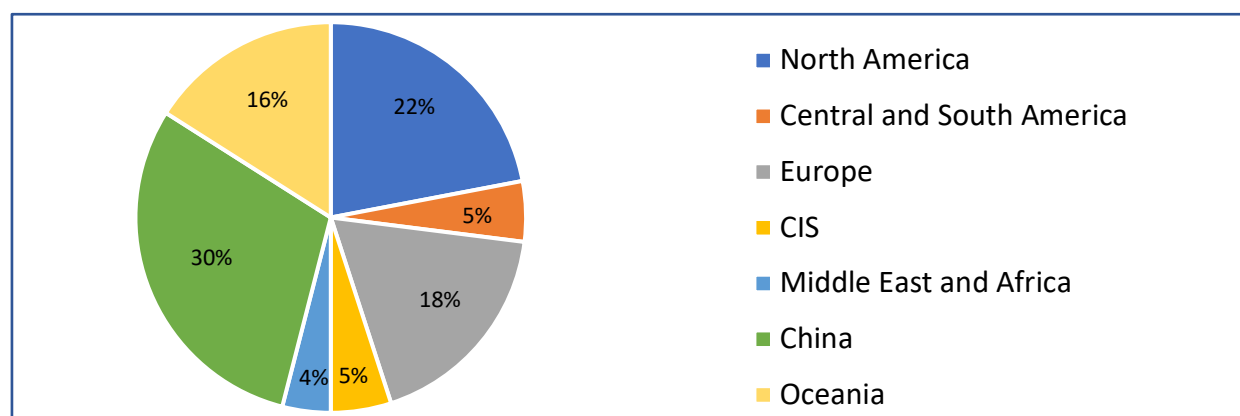
¹² "Preliminary Balance of Edible Salt, Technical Interagency Visit of the Haiti Iodine Deficiency (IDD) Prevention Program," UNICEF, September 2016.

¹³ The Global Salt Market, HIS Markit, Dr. Stefan Schlag Leon Beraud. "Figure 3: Breakdown of Global Salt Consumption by Main Uses" p.3, June 2018.

NORTH AMERICAN MARKET

North America is a leader in both consumption and production, with deicing salt as its primary type of imported salt. China continues to increase its share of global imports to supplement its domestic salt production.

GLOBAL CONSUMPTION BY WORLD REGION¹⁴



The North American market is a US-centric market with the US being both the largest producer and the largest importer. Chile, Canada, and Mexico are the top exporters to the US. Road deicing accounted for about 43% of total salt consumed and the vast majority of salt imports.¹⁵ Nearly all of the Chilean rock salt exported to the US is for the deicing market.¹⁶ At one time, the Dominican Republic exported deicing salt to the US but that flow diminished with the downturn of salt production in the Dominican Republic since 2012.

Imports of deicing salt vary depending on weather conditions. Slightly colder temperatures and an increase in winter storms in 2018 required more salt for bagged deicing. US state and local governments sought to replenish supplies of rock salt. The increase in demand, coupled with production interruptions at mines in the US and Canada, caused many buyers to experience increased unit prices for rock salt.¹⁷ The higher prices for deicing salt present an opportunity for producers of coarse granular salt to enter the US market.¹⁸

Pool salt is another emerging outlet for coarse granular salt. Saltwater chlorinated pools have rapidly become the preference of the residential pool market, accounting for 75% of all new-in-ground pools in the US. The increasing popularity of saltwater chlorinators ensures that the consumption of salt in the US swimming pool market will continue to expand.¹⁹

¹⁴ Id., "Figure 4: Breakdown of Global Consumption by World Region," p. 4, June 2018.

¹⁵ USGS Mineral Commodity Summaries, February 2019.

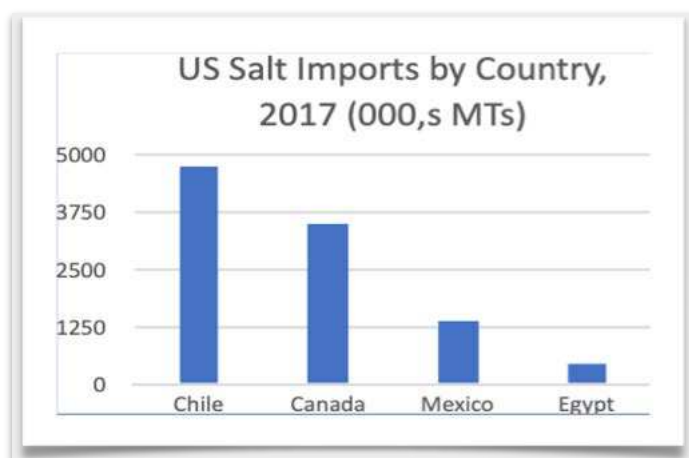
¹⁶ "Salt: Global Industry, Markets and Outlook to 2025," Fifteenth Edition, p. 21, 2016.

¹⁷ USGS Mineral Commodity Summaries, February 2019.

¹⁸ "International Salt Trends to 2026," Roskill, p. 20, June 2018.

¹⁹ Salt: Global Industry, Markets and Outlook to 2025, Fifteenth Edition, Roskill, p. 291, 2016.

MAJOR TRADE FLOWS OF SALT, 2017(TO US)²⁰



SOURCE: USGS MINERAL COMMODITY SUMMARIES 2019.

NOTE: THE FOUR COUNTRIES REPRESENT 81% OF US SALT IMPORTS, WHICH WERE 12.6 MILLION IN 2017. CHILE SURPASSED CANADA AS THE LEAD COUNTRY OF ORIGIN FOR SALT IMPORTS.

- THE US IS THE WORLD'S SECOND LARGEST IMPORTER OF SALT
- CHILE AND CANADA WERE THE TOP SALT EXPORTERS TO THE US IN 2017
- ECONOMICALLY VIABLE IN 2017 FOR MEXICO TO SHIP TO ASIA DUE TO LOW VESSEL RATES

Transportation costs are a critical factor to consider in exporting salt. In addition to achieving competitive costs of production, favorable shipping rates are needed to make exporting salt economically feasible.²¹ The vast majority of salt shipments are done in bulk vessels versus containers. Bulk shipping rates from Caribbean salt production ports to the US east coast (USEC) dipped as low as 13 USD/ton in 2016, but these rates are increasing and are expected to continue to rise in the foreseeable future.

Higher shipping rates will impact the international salt market and those countries with a high proportion of exports. In 2015, Chile and Mexico exported 84% and 88% of total salt produced, respectively.²² The export-oriented salt industries of both countries stand to be disrupted as shipping rates increase. This is especially true in the case of Mexico, as it currently is a top exporter to Asian countries such as Japan, China, South Korea, Taiwan, and Indonesia.²³

²⁰ International Salt Trends, Roskill, page 18, June 2018.

²¹ "The Global Salt Market. IHS Markit," Dr. Stefan Schlag Leon Beraud. p. 5, June 2018.

²² Salt: Global Industry, Markets and Outlook to 2025, Fifteenth Edition, Roskill, Table 57, p. 125, 2016.

²³ International Salt Trends, Roskill, p. 4, June 2018.

NORTH AMERICA APPARENT CONSUMPTION OF SALT, 2006-2015 (KT)²⁴

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
US	52,816	52,314	60,866	59,123	55,565	57,881	46,182	51,605	64,511	68,859
Canada	11,971	8,873	11,268	11,038	7,247	8,835	8,611	8,997	10,757	10,347
Mexico	2,299	1,398	1,268	1,277	1,103	416	2,632	1,722	1,325	1,236
Total	67,091	62,591	73,405	71,443	63,921	67,137	57,430	62,329	76,598	80,445

NORTH AMERICA PRODUCTION OF SALT, 2006-2015 (KT)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
US	44,390	44,570	48,070	46,010	43,320	45,010	37,200	40,300	45,300	48,000
Canada	14,460	11,970	14,224	14,566	10,539	12,603	10,852	12,210	14,170	14,179
Mexico	8,378	8,859	8,809	7,445	8,430	8,812	10,798	9,416	10,250	9,088
Total	67,228	65,399	71,103	68,021	62,289	66,425	58,850	61,926	69,720	71,267

The ability to access the US market depends in part on meeting the prevailing market price per segment. These prices differ significantly between the type of salt based on quality, chemical composition, and consumer use. Indicative prices by segment range from USD 35/MT for bulk solar deicing salt to USD 400/MT for packaged fine salt.

MARKET PRICE BY SEGMENT USD /MT

Bulk Solar Deicing Salt	35 CIF USEC
Packaged Deicing, Pool, Animal Feed Salt	175 FOB USEC warehouse
Packaged Fine Salt	400 FOB USEC warehouse

²⁴ Salt: Global Industry, Markets and Outlook to 2025, Fifteenth Edition, Roskill, Table 228, 2016.

CARIBBEAN MARKET

Production and consumption in the Caribbean are noteworthy to identify pockets of production that have been successful in achieving commercial scale and are regionally competitive in the export markets. For example, all Bahaman salt is produced by K+S Morton Salt subsidiary Morton Bahamas. Most of Morton Bahamas output is exported to the US for deicing. Like other countries, production and consumption of salt in the Bahamas are driven by the US demand for deicing and various industrial salts.²⁵ Salt in Bonaire, produced by a subsidiary of Cargill Salt, is similarly produced by a single, export-oriented operation.²⁶ By contrast, the Dominican Republic, which was once a steady producer and frequent exporter, has become almost totally reliant on imports from Chile and Bonaire.

CARIBBEAN SALT PRODUCTION, 2006-2015, (KT)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bahamas	1,152	578	420	768	1,311	713	660	957	1,493	1,500
Netherlands Antilles	343	404	343	304	337	300	400	400	400	400
Cuba	266	141	157	266	272	281	216	222	243	250
Dominican Republic	50	50	50	50	27	19	20	20	20	20
Total	1,811	1,173	970	1,388	1,947	1,313	1,296	1,599	2,156	2,170

CARIBBEAN SALT CONSUMPTION, 2006-2015 (KT)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bahamas	187	87	-193	-42	375	67	290	263	405	793
Netherlands Antilles	132	150	87	186	273	288	397	400	400	400
Cuba	266	142	173	282	274	282	217	223	244	251
Dominican Republic	77	78	79	91	42	-21	64	48	80	68
Total	662	457	146	517	964	616	968	934	1,129	1,512

²⁵ Id., at p. 37-38.

²⁶ Id., at p. 40.

The Caribbean market is also noteworthy for the commercial consolidation of salt producers with a single company largely responsible for production in a specific country. This pattern is evident in the Bahamas, Bonaire, the Dominican Republic, and Jamaica, as well as elsewhere in the South American region, namely Chile and Colombia. In several instances, the commercial consolidation impacts production and distribution across the region.

HAITI

While the Haitian salt market is mostly unchanged in terms of volume since 2012, there have been multiple developments in each segment of the supply chain. There is a growing awareness that the different components that make up the Haitian salt industry form a supply chain, meaning that changes to any one component will reverberate to each of the others. By recognizing the connectivity of each link in the chain, policy and production decisions can be made collectively to benefit the Haitian salt industry. An end-to-end perspective can help connect the entire supply chain to domestic consumption and niche opportunities in the export market.

The Haitian salt market is effectively a series of markets, each often operating as a market within a market. Sub-markets encounter differing patterns of supply and demand, as well as different arrays of vendors and customers. Salt prices vary from market to market and are prone to seasonal fluctuations. Despite such segmentation, each component of the Haitian supply chain is vulnerable to economic repercussions following natural disasters or civil unrest.

Consumer demand for salt in Haiti continues to follow the pattern noted in the 2012 TechnoServe report: consumption (through retail to households, food service to schools and restaurants, food-processing to bakers, etc.) and industrial use (including ice and beverage producers, water treatment facilities, leather producers, etc.).²⁷ Consumption includes edible salt, whether produced domestically or imported, that is intended for human consumption as food-grade salt. Industrial salt is used in various industrial processes and is not intended for human consumption.

Edible food salt is distributed through three distinct channels: retail, food service, and food processors. The retail channel is further divided between sales in the informal market through street vendors and sales of branded salt in neighborhood markets or grocery stores. Retail salt sold through street vendors per *“ti marmite” generally is unprocessed and unfortified salt sold in 700-gram cans in the informal market produced locally or imported from the Dominican Republic.* By contrast, packaged salt typically is processed, packaged, and fortified salt imported from other countries in the region, plus Bon Sel Dayiti+ produced in Haiti by CSC.

Consumption patterns for edible salt have shifted from retail table salt to processed foods and food service providers (including schools, hospitals, and similar institutions).²⁸ The increased consumption of salt through food processors and food service providers suggests a greater reliance on imported salt and a corresponding reduction in the consumption of domestic salt. The changing consumption pattern may have consequences for other segments of the supply chain.

Changes in consumption patterns for edible salt need to be understood to assess the implications for three healthcare initiatives that leverage the salt industry: The Program for Prevention of Iodine Deficiency Disorders, Lymphatic Filariasis, and micro-nutrient programs. Fortified salt is an emerging subset and accounts for a growing

²⁷ “The Haitian Sea Salt Industry: A Commercialization Strategy”, TechnoServe, p. 19, March 2012.

²⁸ Iodine Intake Through Processed Food: Case Studies from Egypt, Indonesia, The Philippines, The Russian Federation, and Ukraine, 2010-2025, Nutrients, 2017; “Use of Iodized Salt in Processed Food”, World Salt Symposium, Iodine Global Network, Salt Lake City, June 20, 2018.

percentage of edible salt. The use of salt as a vehicle for food fortification in poor areas of rural subsistence is commonly the only choice to reach remote or inaccessible portions of the population.²⁹

MAPPING THE LOCAL SUPPLY CHAIN

OVERVIEW

This report extends the value chain diagrammed in the 2011 TechnoServe study by introducing additional categories that play important roles in their own right and are vital links in facilitating the success of the entire supply chain:



Production was a primary focus of earlier papers and continues to be a primary focus of this paper because of the ongoing question of whether Haiti can produce sufficient salt—in terms of quality, volume, and unit cost—to be regionally competitive. This section will highlight the individual and collective efforts of several organizations and their work to enhance the competitiveness of salt produced in Anse Rouge. These organizations focus on four objectives to which each strategy and action is linked:

- INCREASE THE COMPETITIVENESS AND PROFITABILITY OF THE INDUSTRY
- DEVELOP NEW MARKETS FOR QUALITY HAITIAN SALT
- INTEGRATE HEALTH ASPECTS INTO THE INDUSTRY
- ADDRESS EMPLOYMENT, WORKING STANDARDS, WORKER PARTICIPATION

PANSEH, the Canadian-based NGO (National Support Program for Structuring Entrepreneurship in Haiti) and AMURT, a US-based NGO (Ananda Marga Universal Relief Team) have sponsored several programs to coordinate the participants and the strategies to modernize the salt industry in Anse Rouge.

Imports are considered separately from production because the import market operates much differently with fewer participants and much larger volumes. The import market is prone to commercial influences such as quality standards, supply certainty, and cost competitiveness. Processing is a necessary component of a supply chain for the salt industry as it serves to wash, grade, fortify, and bag raw salt prior to entering the marketplace. Processing operations also sort and package various types of salt as they transact with commercial buyers meeting the desired specifications of respective market channels: retail table salt, food processors, food service, and industrial. Although the 2011 TechnoServe study recommended that Haiti “improve capacity to produce and commercialize iodized salt,” there was only a brief mention of salt processing operations, one of which was in its early stages. Transportation is a key variable that may determine the commercial viability of the Haitian salt industry. Assuming competitive levels of quality and volume can be achieved, moving salt through the supply chain becomes the major challenge. In addition to calls of previous studies to modernize saltworks, the Haitian transportation system (by both land and by sea) needs to be modernized to lower the unit cost of salt as it makes its way to end-users.

²⁹ Salt Reduction and Iodine Fortification Strategies in Public Health, World Health Organization, 2014.

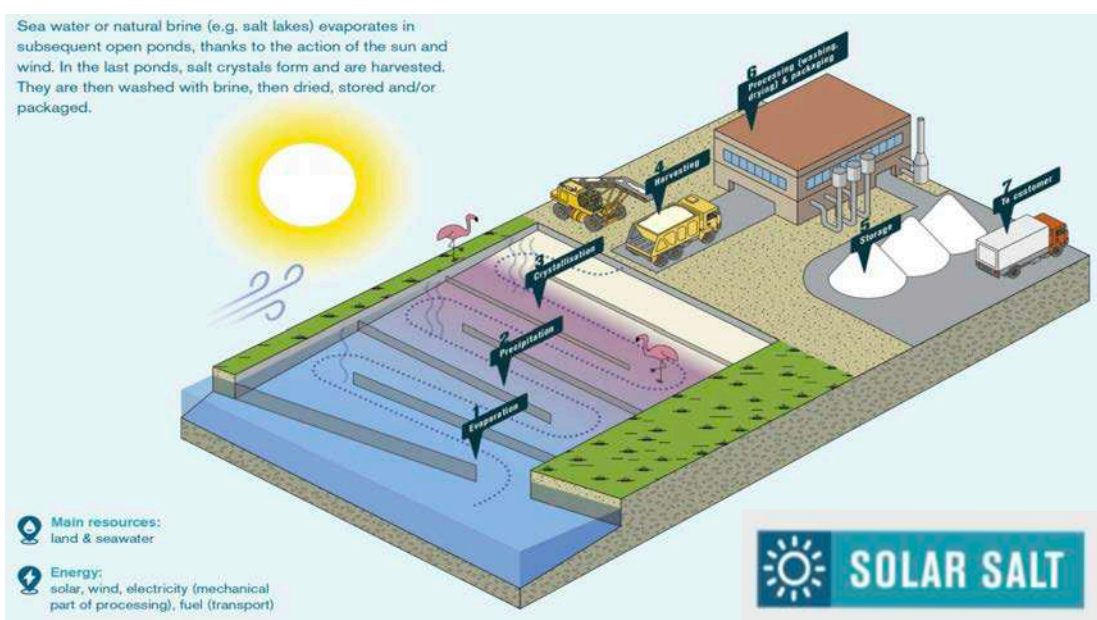
Distribution is perhaps the most important link in the supply chain, as it is through distribution that salt enters the marketplace. End-users in the marketplace establish the demand for products as their purchasing preferences drive volume, quality, and price. Sales data and purchasing habits inform other parts of the supply chain to establish baselines and timelines for production, transportation, processing, and storage. Changes in the Haitian salt market merit consideration to effectively balance supply and demand.

PRODUCTION

OVERVIEW

Salt production is mostly located along the northwestern coast of the Artibonite province, including Grande Saline, Gonaïves, Magazen, Anse Rouge, Coridon, and Caracol. Salt works around Anse Rouge have been described as the potential “flagship salt enterprise” in Haiti. The Anse Rouge area currently produces 70%-80% of total salt production in Haiti.

Salt quality is determined by production methods and infrastructure. The vast majority of Haitian salt is produced in unlined, single-pond, mud-floor basins. The result is regionally uncompetitive salt quality (high in foreign material, non-NaCl solids, magnesium, small crystal-size, high moisture, etc.). The PANSEH pilot project, the AMURT facility, and Ryswick Eugène are the only producers utilizing, or planning to utilize, modern production methods.



In most parts of the world, solar evaporation salt production uses a modern method, often referred to as a three-stage system, consisting of a series of interconnected basins, allowing seawater to flow and evaporate quickly. The basins for the modern salt productions are divided into three parts depending on the function they play in the process of evaporation and crystallization. The first area is a reservoir, or concentrator basin. The second basin serves as a crystallizer (this is where the crystallization of the NaCl salt and harvest takes place), leading to a third basin called a “desalting stage” (this is where the residual NaCl salt is recovered before bittern brine is removed).³⁰

Salt production is subject to weather and natural disaster risks such as extended seasonal rains, earthquakes, hurricanes, etc. The most recent and severe example was the extensive damage inflicted by Hurricane Matthew in October 2016.

Practices, processes, and issues are largely unchanged from those cited in reports written by Cox & Speller or TechnoServe in 2011-2012.

³⁰ Business Plan Proposal Industrial Micro-Park Anse Rouge, AMURT- Haiti and APSCAR (Salt Producers Association, Anse Rouge), 2016.

Highlights of the items that are largely unchanged include the following:

- SALT PRODUCERS IN HAITI ARE ESTIMATED AT 2,500-3,000, MOST OPERATING ONE TO TWO SMALL BASINS (0.12 HA) USING A SINGLE-POND SYSTEM.
- HAITIAN SALT PONDS ARE AT RELATIVELY HIGH RISK OF STORM SURGES FROM THE SEA AND FLOOD WATERS FROM THE LAND. VARIATION OF ANNUAL PRODUCTION IS +/- 25% ON A TYPICAL YEAR AND MUCH HIGHER ON EXCEPTIONAL YEARS.
- THREE- STAGE SYSTEMS ALLOW CALCIUM SALTS TO FORM IN THE FIRST STAGE, WHILE SODIUM CHLORIDE IS DEPOSITED IN THE SECOND STAGE “CRYSTALLIZER,” AFTER WHICH MAGNESIUM-BITTERN BRINES ARE DISPOSED OF THROUGH A THIRD STAGE.
- MODERN THREE-STAGE SYSTEMS USE ELEVATED CRYSTALLIZERS (TO ALLOW REMOVAL OF BITTERNS BY GRAVITY), WITH LINED SIDEWALLS (TO PREVENT FOREIGN MATERIAL FROM ENTERING THE SALT), LOW DIKES (TO ALLOW WIND MOVEMENT AND HIGH EVAPORATION RATES), AND WEIGHT-BEARING SALT FLOORS (TO ALLOW MECHANIZED SALT HARVESTING).
- WORKING CONDITIONS FOR SALT LABORERS IN HAITI ARE CHALLENGING DUE TO A LACK OF INFRASTRUCTURE, MECHANIZATION, AND REGULATION.
- SALT WORKERS ARE EXPOSED TO OCCUPATIONAL HAZARDS, SUCH AS PROLONGED CONTACT WITH SALT CRYSTALS, BRINE, AND INHALABLE SALT DUST.
- THERE IS A NEED FOR MODERNIZATION OF THE SALT WORKS AND THE USE OF PROTECTIVE EQUIPMENT TO REDUCE THE PHYSICAL STRESS OF MANUAL LABOR.
- COMPETITIVE SALT PRICING REQUIRES BOTH COMPETITIVE PRODUCTION COSTS AND TRANSPORTATION COSTS. TRANSPORTATION COSTS TYPICALLY ARE THE LARGEST COMPONENT OF SALT’S DELIVERED-MARKET COST.

Haiti currently is estimated to produce 24,000 MT of coarse solar salt per year (estimates prior to Hurricane Matthew in 2016 ranged as high as 40,000 MT). Projects under development in Anse Rouge (the new PANSEH grower-consortium pilot project, and re-launch of the AMURT salt project) could add another 20,000 MT of annual production. Full capacity for AMURT is projected to reach 64,000 MT with the modernization of adjacent salt basins in Anse Rouge, although it may take many years to achieve this volume.

Indirectly, the production system has been impacted by several factors:

- DEVALUATION OF THE CURRENCY
- INCREASED FUEL COST
- SOCIAL UNREST IMPACTING CONSUMPTION AND DISTRIBUTION PATTERNS
- POLITICAL UNREST IMPACTING REGULATORY AGENDAS
- INVESTMENTS AND CAPITAL AVAILABILITY



PROGRESS SINCE 2012

The most significant developments since 2012 have been:

- ORGANIZATION OF PRODUCERS TO WORK COLLECTIVELY AND COOPERATIVELY
- EDUCATING AND TRAINING AT ALL LEVELS IN THE INDUSTRY
- MODERNIZATION PROGRAMS UNDERTAKEN IN ANSE ROUGE SALT BASINS
- RESILIENCE OF SALT PRODUCERS TO RECOVER FROM NATURAL DISASTERS AND OTHER ECONOMIC, SOCIAL, OR POLITICAL ISSUES THAT IMPACT THE INDUSTRY



ORGANIZATION OF PRODUCERS³¹

An important first step in achieving competitiveness in the salt industry is to build consensus and coordinate the strategies and actions of the respective participants. Beginning in 2015, PANSEH sponsored a series of initiatives to organize the producers in Anse Rouge to mobilize them around a shared vision recognizing that the industry faced severe constraints and had operated for decades as an artisanal community of small-batch salt basins. Among the challenges are ongoing disputes with respect to property rights and a lack of understanding of the overall value chain and what role producers can or should play in achieving quality and competitiveness.

PANSEH's first actions were to promote the cooperation of stakeholders to equip the salt industry with intervention strategy and an action plan based on a broad consensus. Discussions were held with operators at all points in the chain to raise awareness. Meetings were held with potential partners to better align interventions. The discussions highlighted the need to focus on the production link, since the quality of salt by traditional methods common in Anse Rouge is a major obstacle to market development; a local consultation table (CAFESA) was established in August 2016 to bring together producers, the municipal agricultural office, the town hall, AMURT, OXFAM, and local transportation representatives to facilitate the discussion of operational objectives, action to be taken, and assistance with the resolution of conflicts between producers.

The association of salt producers of the commune of Anse Rouge (APSCAR) was formed in 2015 to organize the production and marketing of salt and to support the commercial interests of producers. As the only producer in the area, it represents about 350 members. APSCAR is actively involved with CAFESA and partners with AMURT on the build-out of infrastructure projects.

PANSEH fosters coordination of the respective participants in the salt industry starting with workers and extending to producers, supporting organizations, governments regulators, and commercial enterprises in the supply chain.

To the point: Property Rights Are A Major Obstacle to Economic Development

“Without resolution of the Haitian property issues there is little hope for sustained economic development and growth, and without economic change there is almost no hope for combating poverty, increasing educational opportunities, improving health and developing infrastructure.”

HAITIAN IMMOVABLE PROPERTY LAW OBSTACLE FOR DEVELOPMENT, DR. WINSTON W. RIDDICK, PROFESSOR OF LAW, SOUTHERN UNIVERSITY LAW CENTER, HRDF.ORG, MAY 2012

³¹ Daniel Pelletier, Note on PANSEH Intervention Strategy in Salt, Step Report, DID. April 2017.

Emphasis is placed on the involvement of stakeholders in formulating and implementing common strategies. By encouraging exchanges between stakeholders, each party can better understand the mutual dependence, appreciate the value of pursuing the strategy collectively, and build trust.

PANSEH succeeded in organizing producers in Anse Rouge to manage their salt basins together as part of a plan to modernize production. The management structure is a key element not only in the production modernization process, but also in the development of the Anse Rouge region as a whole. Achieving collaboration among producers at the initial stage on the road to improving competitiveness in the sector has always been the greatest challenge in attempting to modernize salt production.

These programs were coordinated with several NGOs and supported by the Minister of Trade and Industry who hailed the achievement a “a victory to go from archaic to modern.”³²

EDUCATION AND TRAINING³³

PANSEH along with AMURT built several platforms to address education and training at various levels in the Anse Rouge area having organized the constituencies into consultation tables, producer associations and worker councils. These platforms facilitate important communications necessary to build trust and practical vehicles to deliver formal or hands-on training including, but not limited to:

- UNDERSTANDING THE OVERALL SHARED VISION
- RESPECTING THE ROLE OF EACH PARTICIPANT, AS WELL AS THEIR LIMITATIONS
- TECHNICAL TRAINING TO ACHIEVE SPECIFICATIONS TO PRODUCE REGIONALLY COMPETITIVE SALT

Training programs to date have focused on the start-up phases of transitioning modern salt production techniques: water management, salt drainage, protecting watersheds, harvesting, and storage. AMURT’s programs include the establishment of education centers, environmental programs focused on the protection of watersheds and promoting forestry, and the formation of ESPRI (a self-help group) for the integrated rural production of salt through a social entrepreneurship.³⁴

MODERNIZATION OF SALT BASIN

PANSEH's intervention in the salt value chain follows a study on priority industries to be supported by the project carried out in 2015.³⁵ The project assists the Ministry of Trade and Industry (MCI) in creating a business climate that is more conducive to the development of Haitian entrepreneurship. PANSEH intervenes in the salt value chain in accordance with an industry approach, the aim of which is to coordinate the strategies and actions of the actors to improve their competitiveness, promote the maintenance and development of existing markets and create jobs. PANSEH thus pursues two objectives:

- *PROVIDE THE MCI WITH AN ADDITIONAL INTERVENTION TOOL TO SUPPORT PRIVATE SECTOR DEVELOPMENT*
- *IMPLEMENT THIS TOOL TO IMPROVE THE COMPETITIVENESS OF THE SALT SECTOR.*

³² “Launch of The Modernization of the Salt Sector,” Installation Ceremony, January 2019.

³³ Daniel Pelletier, Note on PANSEH Intervention Strategy in Salt, Step Report, DID. April 2017.

³⁴ Business Plan Proposal Industrial Micro-Park Anse Rouge, AMURT- Haiti and APSCAR (Salt Producers Association, Anse Rouge), 2016

³⁵ “Sélection des filières à appuyer dans le cadre du PANSEH,” Daniel Pelletier, DID, Novembre 2015.

PANSEH's role essentially is to assist the participants in this process and to support the implementation of a common strategy for the development of the salt industry.

PANSEH's assessment of the salt industry has led it to propose a strategic development plan based on four axes, which integrate the economic, social, and public health issues identified:

- INCREASE THE COMPETITIVENESS AND PROFITABILITY OF THE SALT INDUSTRY
- PROMOTE THE DEVELOPMENT OF MARKETS FOR HAITIAN SALT FROM MODERN PRODUCTION TECHNIQUES
- INTEGRATE HEALTH ASPECTS INTO THE DEVELOPMENT OF THE SALT INDUSTRY
- PUT THE WORKERS AT THE CENTER OF THE SALT INDUSTRY ACTIONS³⁶

In view of the available resources, PANSEH's interventions in the value chain have focused on the process of modernizing traditional salt basins in the Tet Be area near Magazen in the commune of Anse Rouge, an essential first step for achieving competitiveness in domestic production.

After extensive efforts in social engineering with producers and other participants in the project and the completion of the necessary technical studies, a pilot project for modern salt basins culminated with the consolidation of 47 producers. The combined land for the pilot is approximately 18.5 hectares in Tet Be, the commune of Anse Rouge. Producers formed a limited company, SOCOPROSA S.A., in April 2019. The pilot facility consists of five gravity-fed evaporators, six crystallizers installed above sea level with pumping system, and a protective dike on its perimeter. Its construction is supervised by AMURT, which already built a modern 46-hectare salt facility in the area. Work began in May 2019 and is expected to be fully completed by the end of 2020. Estimated annual production is anticipated to reach approximately 6,500 MT of international grade salt, with the first commercial harvest expected in 2020.

The salt modernization program works in close collaboration with women entrepreneurs to improve living conditions and ensure the active participation of women in all links of the supply chain for the Haitian salt industry.³⁷ The creation of the pilot is intended to pave the way to achieve four objectives:

- MODERNIZATION OF ALL TRADITIONAL SALTWORKS IN ANSE ROUGE
- SIGNIFICANT INCREASE IN PRODUCERS' INCOMES
- IMPROVEMENT OF WORKING CONDITIONS (ESPECIALLY FOR WOMEN HARVESTERS)
- ECONOMIC AND SOCIAL DEVELOPMENT OF THE REGION³⁸

Alongside these activities, PANSEH has also contributed to the structuring of the Association of Salt Producers of the Commune of Anse Rouge (APSCAR) and to the creation of the Anse Rouge Salt Affiliate Collective (CAFESA), a local consultation table bringing together representatives of the various links in the chain. These two organizations have become key players in the development of the salt sector in the commune of Anse Rouge.

AMURT has been active in the Anse Rouge region since 2004 and has implemented a series of value chain initiatives:

- WATERSHED PROTECTION

³⁶ "Note sur la stratégie d'intervention du PANSEH dans la filière sel," Daniel Pelletier, Rapport d'étape, April 2017.

³⁷ Valerie Potvin, First Secretary of Canadian Embassy in Haiti, Installation Ceremony, January 2019.

³⁸ "PANSEH Strategic Advisor Launch of the Modernization of the Salt Sector, Installation Ceremony," Daniel Pelletier, January 2019.

- MODERNIZED SALT PRODUCTION
- SALT PROCESSING (PENDING)
- TRANSPORTATION AND HANDLING

The ultimate objective is to improve the livelihood of salt producers in Anse Rouge and, secondarily, to eliminate IDD. AMURT oversees the implementation phase of each initiative before the transfer of management to a local social enterprise. With respect to salt production, management will be transferred to ESPRI SA (Social Entrepreneurship of Integrated Rural Production) operating as ESPRI SEL, a social enterprise developed by AMURT in collaboration with Colorado State University and Quisqueya University.³⁹

ESPRI's modernized salt works will serve as a model to pilot new methods while training producer associations in the neighboring basins. The facility became operational in January 2019, providing full-time employment to 220 women and 35 men. The estimated annual production of the facility is 9,000 MT of salt, roughly 25% of Haiti's salt consumption rate.⁴⁰

An important social objective of ESPRI is to create an incubation program for women entrepreneurs, members of affiliated self-help groups (SHGs) organized in Anse Rouge in 2009 with the help of Kindernothilfe, a German-based Christian charity. Currently, there are 160 SHGs with a total of 3,250 members.



AMURT also supervised the installation of the pilot program for PANSEH to modernize another series of ponds for SOPROCASA. AMURT and PANSEH further collaborated on the construction of roads, an adjacent wharf, and a jetty. While AMURT raised the necessary funds and supervised the installation, the intent is to develop supporting infrastructure that is mutually beneficial to both AMURT and PANSEH.

AMURT production efforts include improvements of adjoining roads to facilitate traffic from the basins to the wharf. They also purchased a backhoe, two bulldozers, and an excavator to accelerate construction of the ponds and assist with harvesting. Consistent with modern harvesting techniques, ESPRI/AMURT intend to establish a salt floor so that harvesting is limited to the upper layer of the ponds.

RESILIENCE OF SALT PRODUCERS

Hurricane Matthew had a severe and lingering impact on pond systems from Gonaïves through Anse Rouge. The damage in Anse Rouge essentially was caused by floodwater from the mountains that filled the basins with mud. Even after the storm waters receded, production was hampered until the basins and dikes were repaired and re-dredged. Subsequent to those activities, it took more than a year for the basins to stabilize, sidewalls to regain a protective salt layer, etc. As a result, an undetermined but considerable number of basins were abandoned.

³⁹ Business Plan Proposal Industrial Micro-Park Anse Rouge, AMURT- Haiti and APSCAR (Salt Producers Association, Anse Rouge), 2016.

⁴⁰ Salt of the Earth, The Story of Women's Improved Well-being Through Modernized Salt Production in Rural Northwest Haiti, ESPRI Sel, 2018.

The overall effect was a loss of overall production during 2016-17 (during which time retail prices in Port-au-Prince and most of Haiti tripled or quadrupled in HTG terms). As production resumed, retail prices softened within six to nine months, although not to pre-storm levels. The quality of salt produced, however, took much longer to recover.

While the production systems are largely back online, Hurricane Matthew demonstrates the vulnerability of Haitian ponds to weather events and the need for access to competitively priced imports—in the case of future events—to avoid disruption to the food supply system.

MAJOR ISSUES TO ADDRESS

The launch of the modernized salt facilities in January 2019 culminates more than 10 years of planning, coordination, and execution. This is an important milestone for improving salt quality, reducing production costs, and increasing productivity. This achievement comes despite delays and setbacks from natural disasters, poor transportation options, and economic turmoil. Recognizing that modernization is a long-term objective, there still remains the challenge of expanding beyond a pilot program. Deliberate execution is required to meet all the other requirements necessary to raise the quality and volume of domestic salt to meet the need for iodized salt, replace foreign imports, and reach quality standards and unit costs to be regionally competitive. From that perspective, the major issues to be addressed still relate to improvements in:

QUANTITY: THE PRIMARY OBJECTIVE IS TO ALIGN QUANTITIES BY MARKET SEGMENT, VERSUS IN TOTAL. FOR EXAMPLE, CURRENT PRODUCTION OF COARSE SALT FAR EXCEEDS DOMESTIC DEMAND FOR LOWER-QUALITY INDUSTRIAL SALT (PRIMARILY ICE-MAKERS), WHILE VOLUME IS INSUFFICIENT FOR FOOD-GRADE COARSE SALT NEEDED IN RETAIL, FOOD SERVICE, AND FOOD-PROCESSING MARKET SEGMENTS—INCLUDING ZERO PRODUCTION, CURRENTLY, OF COARSE SALT THAT CAN BE FURTHER PROCESSED INTO FINE GRADE SALT.

- AS A RESULT, NON-FOOD-GRADE SALT FLOODS INTO THE RETAIL MARKET, DEPRESSING PRICES FOR COMPETITIVE FORTIFIED SALT, AND MAKING USE OF THE SALT MARKET FOR PUBLIC HEALTH INITIATIVES (E.G., PREVENTING IDD) VERY CHALLENGING. FURTHER, END-USERS WITH PARTICULAR NEEDS ON SPECIFICATIONS ARE REQUIRED TO IMPORT SALT AT PREMIUM PRICES AND LOGISTICAL HURDLES.
- THE BASIC “QUANTITY” ISSUE TO ADDRESS, THEREFORE, IS TO ALIGN PRODUCTION VOLUMES BY MARKET SEGMENT.⁴¹

QUALITY: THE PRIMARY OBJECTIVE IS TO COMMUNICATE THE COARSE-GRADE QUALITY SPECIFICATIONS NEEDED BY END-USERS OR SALT PROCESSORS. FOR PRACTICAL PURPOSES THAT INVOLVES FOUR BASIC FACTORS: CHEMICAL PURITY, FOREIGN MATERIAL, CRYSTAL SIZE, AND MOISTURE CONTENT. ADVISING PRODUCERS OF THE SPECIFICATIONS THAT CUSTOMERS NEED, AND COMPETITORS CAN OFFER, STARTS A CONVERSATION THAT EVENTUALLY LEADS TO FURTHER CONVERSATIONS OF THE PRODUCTION PRACTICES AND CAPITAL INVESTMENTS REQUIRED TO COMPETE.

- IN MORE SPECIFIC TERMS, TO BE COMPETITIVE WITH IMPORTS AND/OR PREPARE FOR OCCASIONAL EXPORTS, HAITIAN SALT QUALITY NEEDS TO BE MINIMUM 98.0% NaCl, MAXIMUM 1.0% FOREIGN MATERIAL, MINIMUM 40% RETAINED ON AN 8 MM SCREEN, AND MAXIMUM 2.4% SURFACE MOISTURE. THOSE SPECIFICATIONS ARE COMMONLY ACHIEVED THROUGHOUT THE REGION BUT ARE SIGNIFICANTLY ABOVE THE AVERAGE HAITIAN SALT QUALITY.
- EXPORT MARKETS, SUCH AS BAGGED POOL SALT, ANIMAL FEED, OR DEICING SALT, HAVE MORE RESTRICTIVE SPECIFICATIONS AND WOULD REQUIRE FURTHER PROCESSING AND PACKAGING TO BE COMPETITIVE.
- THE BASIC “QUALITY” ISSUE TO ADDRESS, THEREFORE, IS TO ALIGN QUALITY SPECIFICATION BY MARKET SEGMENT.⁴²

PRICE: THE PRIMARY OBJECTIVE IS TO UNDERSTAND THE PRICE POINTS OF COMPETING ALTERNATIVES BY MARKET SEGMENT. HAITIAN PRODUCERS ENJOY A CERTAIN PRICE ADVANTAGE DUE TO THE INHERENT HIGH COST TO TRANSPORT RELATIVELY SMALL QUANTITIES OF SALT

⁴¹ See Appendices 1-4, Cargill technical information.

⁴² Ibid.

TO A SMALL MARKET WITH HIGH IMPORT TARIFFS. THAT ADVANTAGE CREATES AN UMBRELLA UNDER WHICH HAITIAN PRODUCERS CAN ENJOY RELATIVELY HIGH PRICES FOR DOMESTIC MARKETS—EVEN IF CREATING DIFFICULTY FOR COMPETING IN EXPORT MARKETS.

- FROM A PRODUCER’S STANDPOINT, TO BE SUSTAINABLE COMPETITIVE ON UNPROCESSED COARSE SALT, THE TARGET PRICE IS USD 70 PER MT DELIVERED PORT-AU-PRINCE WAREHOUSES FOR IMPORT QUALITY SALT (SEE ABOVE). ABOVE THAT PRICE, AND/OR BELOW THOSE SPECS, HAITIAN SALT IS AT RISK OF BEING DISPLACED BY IMPORTED COARSE SALT.
- EXPORT MARKETS ARE SOMEWHAT MORE DIFFICULT TO DEFINE, FROM A PRODUCER’S STANDPOINT, AS THE EXTRA PROCESSING AND PACKAGING INVOLVED LIMITS PARTICIPATION TO A SALT PROCESSOR AND/OR PRODUCER’S GROUP WITH SIGNIFICANT INVESTMENT IN PROCESSING EQUIPMENT.
- FOR PURPOSES OF THIS PAPER, THE TARGET PRICE FOR THE THREE IDENTIFIED PRODUCTS (POOL, ANIMAL, DEICING) IS MAXIMUM USD 175 PER TON IN CONTAINERS DELIVERED CUSTOMER WAREHOUSES IN USEC PORTS. ASSUMING PAP-USEC CONTAINER RATES OF USD 65-USD 70 PER TON (USD 1,200 PER 20 ’CONTAINER), AND USD 10-USD 15 PER TON DISCHARGE/DELIVERY RATES AT USEC PORTS, THE TARGET PRICE FOR EXPORT SALT IS USD 100 PER TON FOB DOCK IN PALLETS OF SHRINK-WRAPPED POLY-SEALED 25 LB. BAGS, INCLUDING ALL PROCESSING AND EXPORT COSTS.
- THE BASIC “PRICE” ISSUE TO ADDRESS, THEREFORE, IS TO UNDERSTAND COMPETITIVE PRICES BY MARKET SEGMENT.⁴³

GRADE: THE PRIMARY OBJECTIVE IS TO UNDERSTAND THE GRADE REQUIRED BY EACH MARKET SEGMENT. I.E., TO EDUCATE PRODUCERS ON WHAT GRADE OF SALT IS REQUIRED BY GROUPS OF END-USERS—AND WHY. FOR EXAMPLE, THE GRADES REQUIRED BY A BEVERAGE MANUFACTURER, A BAKER, A RESTAURANT, A BOUILLON PRODUCER, AND A TANNER WILL DIFFER. THE ISSUE OF GRADE, IN A SENSE, IS A COMBINATION OF THE QUALITY AND PRICE FACTORS LISTED ABOVE.

- THE BASIC “GRADE” ISSUE TO ADDRESS, THEREFORE, IS TO UNDERSTAND HOW EACH MARKET SEGMENT USES SALT.

EMERGING DEVELOPMENTS

From almost every perspective, the emerging developments will mostly be a continuation of the current effort to modernize local salt production and increase its production and quality standards to be regionally competitive. As the industry matures, it will set its sights on new standards for quantity, quality, price, and grade. At each milestone, there will be new opportunities to participate more fully in the supply chain, provide greater volumes of salt to achieve better health for Haiti, and improve the working conditions and standards of living for those engaged in salt production. There will be a continued focus on:

- **MODERNIZATION OF ANSE ROUGE SALTWORKS:** ONCE BOTH PILOT SITES COME ONLINE FROM PANSEH AND AMURT, THERE SHOULD BE CONTINUOUS PROCESS IMPROVEMENTS FROM THEIR THREE-STAGE SYSTEMS TO IMPROVE SALT PURITY. BY REMOVING THE CONCENTRATED BRINE-BITTERNS FROM THE CRYSTALLIZERS, AND HARVESTING OVER SALT FLOORS, THE CRYSTALLIZING POND SHOULD YIELD HIGH PURITY (UP TO 99% NaCl). OUTPUTS FROM MODERNIZED SALTWORKS SHOULD BEGIN PRODUCING MEANINGFUL VOLUMES OF HIGH-QUALITY SALT.
- **SUPPLY AND DEMAND BALANCE:** COMMUNICATION AMONG THE PRODUCERS AND WITHIN THE SUPPLY CHAIN WILL BE NECESSARY TO MAINTAIN A SUPPLY AND DEMAND EQUILIBRIUM. THERE IS A SIGNIFICANT REWARD IF AND WHEN COMPETITIVE (PRICE AND QUALITY) SALT CAN BE PRODUCED. THIS INCLUDES REDUCING THE HARD CURRENCY IMPORTS CURRENTLY REQUIRED, BEING ABLE TO OPPORTUNISTICALLY COMPETE IN EXPORT NICHE MARKETS, CREATING A PATH TO USING SALT IN PUBLIC HEALTH INITIATIVES (IDD, LF, ANEMIA, ETC.), AND ATTRACTING CAPITAL TO A SECTOR DESPERATELY IN NEED OF CAPITAL INFUSIONS.

⁴³ Ibid.

- **EXPANDING MODERNIZATION THROUGH EDUCATION AND TRAINING:** THE PILOT PROGRAMS AT PANSEH AND AMURT WERE INTENDED TO SERVE AS A “PROOF OF CONCEPT” IN AN EFFORT TO CONVINCE OTHER SALT PRODUCERS TO ADAPT TO MODERN SALT- MAKING TECHNIQUES. WHILE THE SUCCESS ACHIEVED BY PANSEH AND AMURT MAY SET A POSITIVE EXAMPLE, EDUCATIONAL TRAINING AND INVESTMENT ARE ESSENTIAL TO CONVERT THE REMAINING SALTWORKS TO COMPETITIVE STANDARDS. TRAINING PROGRAMS WILL NEED TO INTRODUCE MODERN PRODUCTION AND MANAGEMENT TECHNIQUES UNDERSTANDING THAT MANAGING WITH A COMPANY OR COOPERATIVE REQUIRES TECHNICAL AND MANAGERIAL SKILLS THAT ARE DIFFERENT FROM MANAGING INDIVIDUAL BASINS. THERE ARE PLANS TO WORK WITH INTERNATIONAL SALT EXPERTS AND COLLEGES TO DEVELOP LOCAL TRAINING PROGRAMS.

IMPORTS

OVERVIEW

Imported salt continues to account for a significant portion of salt consumption and industrial usage in Haiti. Salt imports peaked following the earthquake in 2010 and remained steady before tailing off in 2016. While data for imports in 2017 and later is incomplete, a secondary peak of imports is expected to be evident given the impact of Hurricane Matthew in 2016.

TABLE 1

HAITIAN SALT IMPORTS (000'S) (USD)⁴⁴

Year	2010	2011	2012	2013	2014	2015	2016
Dominican Republic	\$1,640	\$1,710	\$1,210	\$1,200	\$1,220	\$1,140	\$580
Mexico	\$287	\$364	\$378	\$353	\$561	\$497	\$414
US	\$99	\$336	\$88	\$71	\$219	\$109	\$206
Colombia	\$198	\$94	\$142	\$68	\$59	\$44	\$69
Jamaica	\$18	\$152	\$151	\$41	\$14	\$15	\$5
UK	\$20	\$17	\$156	\$81	\$58	\$9	\$0
Algeria	\$0	\$48	\$4	\$2	\$0	\$0	\$0
Netherlands	\$45	\$54	\$17	\$10	\$42	\$54	\$46
TOTAL	\$2,307	\$2,775	\$2,146	\$1,826	\$2,173	\$1,868	\$1,320
Metric Tons	15,000	19,000	11,000	10,000	11,500	11,000	7,000
Price Per Metric Ton	\$154	\$146	\$195	\$183	\$189	\$170	\$189

The Dominican Republic and Mexico are the leading sources of salt imports, while Colombia, the US, and the Netherlands account for most of the remainder. Data showing types of salt imported is not available but includes bagged solar, bagged evaporated, bulk solar, and packaged retail.

⁴⁴ OEC – Where Does Haiti Import Salt From, Atlas Media, MIT, EDU, 2018. “Where Does Haiti Get It’s Salt”; <http://oec.world/en/visualize/line/hs92/import/hti/show/2501/1995.2017/>.

Imported salt comes in a variety of types ranging from coarse salt shipped in bulk quantity to containers of bagged fine salt. Containerized fine salt and coarse bulk salt from the Caribbean region arrive in Port-au-Prince on commercial vessels. Bagged coarse and fine salt also enter Haiti in trucks from the Dominican Republic. Imported fine salt supplies the demand for high-quality salt required by food processors, bouillon makers, school lunch providers, and various retailers.

TABLE 2

HAITI SALT MARKET⁴⁵

Annual Demand: 36K MT
Food-Grade Segments: 30K MT*
<ul style="list-style-type: none"> • 10K MT FINE SALT, PRIMARILY FOOD-PROCESSING (BOUILLON AND BREAD) • 20K MT COARSE SALT IN RETAIL, FOODSERVICE, FOOD PROCESSING
Industrial Segments: 6K MT
<ul style="list-style-type: none"> • 6K MT COARSE SALT, PRIMARILY WATER-TREATMENT AND TANNING
Annual Supply: 36K MT
Haitian Production: 24K MT
<ul style="list-style-type: none"> • 24K MT COARSE SALT, PRIMARILY IN ANSE ROUGE AND GONAIVES
Imports: 12K MT

**calculated as 7.5g/d per person, 10.7M population*

Imported salt serves two purposes in Haiti. First, imports are critical to supplement or replace domestic production following natural disasters such as hurricanes or other market disruptions. Second, imports account for most salt intended for higher value, quality-critical applications in all four market segments (retail, food service, food processing, industrial). In 2019, as was the case in 2012, domestic salt production is more suitable for lower-value, non-quality critical applications such as ice-making. Unfortunately, this lower-value product also makes up the vast majority of retail salt sold per “ti marmite” in street markets.

Port-au-Prince is the primary port of entry for imported salt, although Cap-Haitien is now better equipped following recent improvements to its port facilities. Salt imported as bagged coarse salt from the Dominican Republic is generally delivered at prices ranging from USD 140-USD 190. Some of the price fluctuation is attributed to price increases following natural disasters, production shortages experienced during the rainy season, or quality and grade differences in purity. Imported bulk coarse salt is delivered at significantly lower prices and is of materially better quality.

Salt imports entering through Port-au-Prince are often referred to as “formal” imports insofar as the transaction is officially tracked, inspected, and generally subjected to a 20% tariff.⁴⁶ Informal imports enter Haiti from the Dominican Republic at the northeast border through Dajabon⁴⁷ and into the south at various points along the border. Solar salt imported into the north is produced in the Monte Cristi region. At one time, when mines were operating in the Dominican Republic, rock salt entered Haiti along the southern border.

⁴⁵ Preliminary Balance of Edible Salt, Technical Interagency Visit of the Haiti Iodine Deficiency (IDD) Prevention Program, UNICEF, September 19, 2016.

⁴⁶ A combination of formal tariffs and administrative fees.

⁴⁷ “The Haitian Sea Salt Industry: A Commercialization Strategy,” TechnoServe, March 2012.

ADVANCES SINCE 2012

Several changes have occurred since 2012 affecting imports into Haiti:

- *PORT FACILITIES WERE EXPANDED AND MODERNIZED*
- *DOMINICAN REPUBLIC SALT PRODUCTION DECLINED AS IMPORTS SURGED*
- *CORPORATE MULTINATIONALS CAME TO ACCOUNT FOR MOST SALT IMPORTS*
- *PRICE OF IMPORTED SALT INCREASED 135% FROM 2012 TO 2019, IN TERMS OF LOCAL CURRENCY*

While improvements to the port facilities in Port-au-Prince enable a reliable flow of salt imports *via* containers or bulk vessels, port operations still encounter periodic disruptions from natural disasters. While the mix of countries exporting salt into Haiti remains relatively the same, changes in the Dominican Republic's salt industry and the emergence of commercial trans-shipment from Chile *via* the Dominican Republic are two catalysts for pronounced changes to the Haitian salt industry.

Developments in the Dominican salt industry impact the flow of imports into Haiti. Dominican production of salt has diminished since 2012 as many solar salt facilities in the north are idled and rock salt mines in the south are shuttered. Production which once was approximately 60,000 MT now is reported to be roughly 20,000 MT.⁴⁸ The decline in domestic production within the Dominican Republic is likely to reduce the volume of informal salt entering Haiti, but the lack of source data makes this difficult to measure.

Declining salt production within the Dominican Republic is offset by a surge of imported salt from Colombia, Chile, and Bonaire. For example, the trade value of salt imported from Chile increased five-fold from 2011 to 2017, accounting for 50,000 MT (assuming a delivered price of USD 50 per MT at Santo Domingo).⁴⁹ Much of this increase is a result of two multinationals: Brinsa SA and Quala SA.

Brinsa SA, a Colombia-based salt producer, is the largest salt processor and importer in the Dominican Republic. Operating under the Refisal brand name, Brinsa imports include evaporated salt from Colombia and coarse salt imported from Chile and Bonaire. Brinsa, a Dominican subsidiary, produces milled-solar salt with imported coarse salt. The Refisal brands have been marketed in Haiti since 2014, available through food distributor AFDSA. The imported products include 25 kg bags of fine salt for food processing and food service, 1 kg sachets for retail, and specialty retail packages for grocery stores



Quala SA, a Colombia-based food processor and distributor, is a key player in the bouillon market selling under the Don Poyo brand in Haiti and the El Criollito brand in the Dominican Republic. Pacific Foods SA, a wholly owned subsidiary of Quala in Haiti, purchased SunFood SA in late 2018. As such, Quala now owns and operates the only Haitian facility dedicated to the production of bouillon cube. Together, the Don Poyo and El Criollito brands are estimated to account for over 60% of the Haitian bouillon market.

⁴⁸ "Salt: Global Industry Markets & Outlook to 2025", Fifteenth Edition, Roskill, Dominican Republic Salt Production, p, 22, 2016.

⁴⁹ DESANTIS/UNSD Nations Comtrade Database.

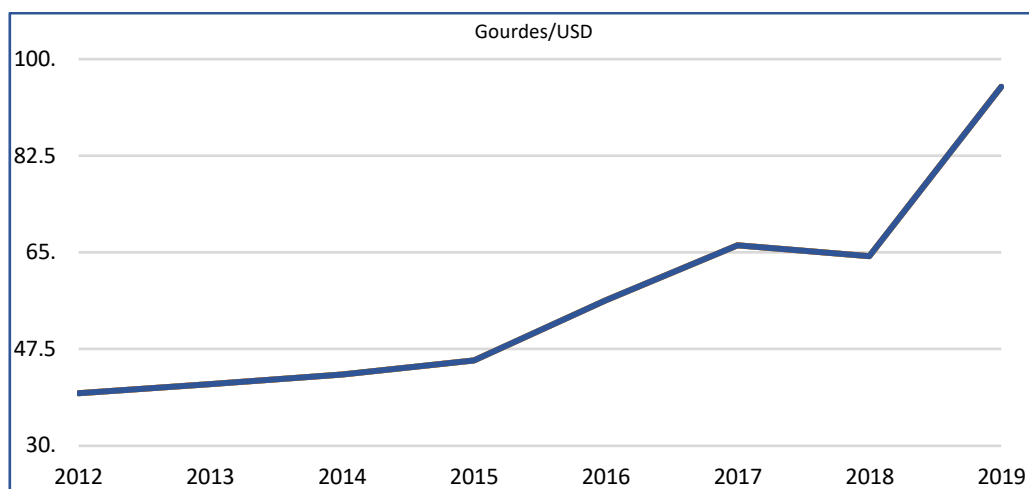
SunFood, and now Pacific/Quala, are major consumers of imported fine salt. Given that bouillon is made primarily with salt, Quala/Pacific Foods bouillon products make up about one-third of the estimated consumption of salt distributed through the retail market segment. The use of iodized salt as a raw material by both Sun Food and Pacific Foods means that their bouillon brands are a major source of iodine in the Haitian diet.⁵⁰

The price of imported salt in terms of local currency climbed steadily since 2012 when the exchange rate was HTG 40 per USD. (See table 3) The exchange rate increased to HTG 77.65 per USD beginning in 2019 and rose sharply to HTG 93.90 per USD. Imported bagged fine salt, which cost HTG 11,000/MT in 2012, costs HTG 25,850 as of June 30, 2019, assuming a constant price of USD 275/MT, duty-paid, delivered to Port-au-Prince. In terms of local currency, the price of imported salt increased 135% from 2012 to 2019.



TABLE 3

FOREIGN CURRENCY CHART⁵¹



United States Dollar to Haitian Gourde Exchange Rate

MAJOR ISSUES TO ADDRESS

Imports are likely to continue at a similar level for the foreseeable future as select customers in all four market segments require quality specifications that domestic production currently is unable to achieve. Increases in the volume of domestic salt production are unlikely to displace foreign imports until the quality and cost become regionally competitive.

The concentration of salt imports among commercial enterprises may allow for further economies of scale and streamlining of the supply chain. However, these improvements may come at the expense of smaller enterprises and raise the bar for domestic producers.

⁵⁰ Ibid.

⁵¹ Corporate Actions data provided by Thomson Reuters.

At the same time, cooperation of larger, more formal, commercial enterprises could expedite the distribution of iodized salt, and products containing iodized salt, to a broader segment of the population. As stated in the 2016 Inter-Agency Task Force report, achieving 100% use of iodized salt in the food service and food-processing market segments would prevent IDD in Haiti. As such, a key recommendation of this report is to aggressively pursue the use of iodized salt in food service (especially school lunch programs) and food-processing (especially bakeries).

EMERGING DEVELOPMENTS

Political instability in the region continues to debilitate the Haitian economy. The end of low-priced, seller-financed oil from Venezuela in 2017 triggered a shortage of fuel, a spike in fuel costs, and economic instability. The rapid decline of the HTG *vis-à-vis* the USD triggered a corresponding rise in the cost of foreign imports denominated in local currency. While these circumstances will challenge importers, the economic disruption may further hamper domestic production, leaving open the prospect for increased foreign imports, even at a higher price.

Dominican importers may attempt to exploit future market opportunities for both low-grade and food salt. These imports may be the result of re-opening the Baharona rock salt facility, re-starting solar salt production in Monte Cristi, or additional trucking of imported Chilean salt from the Dominican Republic into Haiti. Efforts to restart domestic production face numerous regulatory challenges and require investment funding.⁵² While the chances of reviving the Dominican salt industry are doubtful, the possibility of imports of Chilean salt from the Dominican Republic entering Haiti depends on the commercial strategy of the country's largest salt supplier, Brinsa, S.A. Commercial salt suppliers may play an important role in expanding access to iodized salt to the extent that imported salt is already fortified with iodine as retail salt or imported by food processors.

⁵² Expert Interview, July 23, 2017.

PROCESSING

OVERVIEW

Post-harvest processing of agricultural commodities, including salt, is a standard component of agricultural/food supply chains. Processing is designed to transform raw materials into ingredients suitable for use by end-users in various market segments. Mature markets typically aggregate raw material near production areas and locate final processing and packaging near end-users. This allows for economies of scale in transportation, processing, and distribution.



To the point: Healing

Inspired by Fr. Tom Streit, the University of Notre Dame Haiti Program, partnering with the Congregation de Sainte Croix, seeks to achieve the elimination of Lymphatic Filariasis (LF), a mosquito borne disease that affects more than two million Haitians, and aid in reducing iodine deficiency disorders.

Processing was not critically evaluated in previous papers, although there was a recommendation to improve the capacity to produce and commercialize iodized salt. Without a processing facility, earlier diagrams of the value chain for salt in Haiti depict a fairly direct link between farm-to-table, inferring that raw salt was ready for market without much need for washing, grading, or sorting. Since then, the University of Notre Dame Haiti Program, with the collaboration of Cargill Salt, provided technical and financial assistance to the Congregation de Sainte Croix in 2014 to build a salt processing plant at Delmas near Port-au-Prince. CSC transforms both local and imported raw salt into ingredients entering the marketplace. It also fortifies a portion of this salt with potassium iodate and potassium iodate plus DEC to help meet the health objectives of Haitian Ministry of Health.

In addition to health benefits, a processing facility helps stabilize the salt market by balancing supply and demand. A facility's centralized storage with access to both domestic and imported salt can mitigate risks of disruptions to the salt supply. From a regulatory perspective, as a central facility, the processing operation is relatively easy to regulate *vis-à-vis* setting and monitoring quality standards.

PROGRESS SINCE 2012

Progress since 2012 is highlighted by the establishment of a commercially viable salt processing facility operating as a social enterprise to improve the health of Haitians by fortifying salt. The establishment of the CSC Delmas processing facility has achieved two strategic objectives to commercializing iodized salt: (i) the operation of the facility demonstrates an industrial capability to transform raw salt in preparation for entering the market, which demonstrates the development of technology, automation, industry know-how, and project management; and (ii) the facility operates as a social enterprise, using business principles and marketplace strategies to more effectively address the humanitarian needs of lymphatic filariasis and IDD.

The CSC Delmas facility remains Haiti's sole salt processing facility. Located in Port-au-Prince, the facility was expanded in three separate phases to increase capacity, improve processing techniques, introduce advanced automation, and expand storage facilities for both raw salt and finished product. Current capacity is approximately 10,000 MT/year, representing 25% of Haiti's estimated annual salt usage or more than 80% of estimated usage of salt in the food service and food-processing market segments. A brine-washing system was installed to process raw Haitian salt to meet quality specifications for various end-users.

Key features of the processing facility are its central role in fortifying both local and imported salt, as well as supplying food processors and food service operators with iodized salt. By expanding into the food industry, particularly the bakeries and bouillon makers, iodized salt is reaching a wider population in which consumption patterns have shifted away from in-home use of salt.

The processing facility is pivotal to the successful development of the Haitian salt industry as it enables the industry to:

- IMPROVE DOMESTIC SALT QUALITY
- PROVIDE HIGH QUALITY PROCESSED SALT THAT CAN BE IODIZED
- MITIGATE RISKS OF SUPPLY AND DEMAND
- SUPPLY INDUSTRIAL SALT FOR WATER PURIFICATION AND OTHER USES.



To the point: Cost Effective

“The delivery of DEC through BON SEL DAYITI+, a Haitian social salt enterprise, may represent a significantly more cost-effective option than tablet based distribution for accomplishing LF elimination.”

MICHAEL, E. & SHARMA, S., SMITH (2019). ECONOMIC PERFORMANCE AND COST-EFFECTIVENESS OF USING A DEC-SALT SOCIAL ENTERPRISE FOR ELIMINATING THE MAJOR NEGLECTED TROPICAL DISEASE, LYMPHATIC FILARIASIS. PLoS NTDs 13(7): e0007094

The Delmas facility is operated by the CSC Salt Project, whose mission statement reads “ministering in Christ’s name, the Congregation de Sainte Croix Salt Project aims to eliminate LF and prevent IDD in Haiti through the production, processing and distribution of co-fortified salt.” Supported by the University of Notre Dame Haiti Program, the project provides fortified salt competitively in the retail, food service and food-processing segments while supplying unfortified salt profitably in the industrial segments.

The CSC Salt Project operates as a social enterprise using business principles and marketplace strategies to more effectively address the humanitarian needs of LF and IDD. Fortified salt is sold to consumers who use it not as an additive to their diet, but as a replacement for the unfortified salt they have been using. Margins from selling industrial salt fund the costs of diethylcarbamazine (DEC) and potassium iodate (K103) for co-fortified salt.

As a social enterprise operating at break-even, the CSC Salt Project is a sustainable salt business that efficiently distributes co-fortified salt to reduce LF and IDD rates in Haiti. Salt is the easiest and cheapest way to get DEC, which kills parasites that spread the disease, and iodine to the population. DEC salt intervention has been demonstrated to be an effective method to combat the transmission of LF. The CSC Salt Project has become financially sustainable by selling unfortified salt to commercial enterprises for industrial uses, such as water purification.

MAJOR ISSUES TO ADDRESS

The salt industry of Haiti would benefit from:

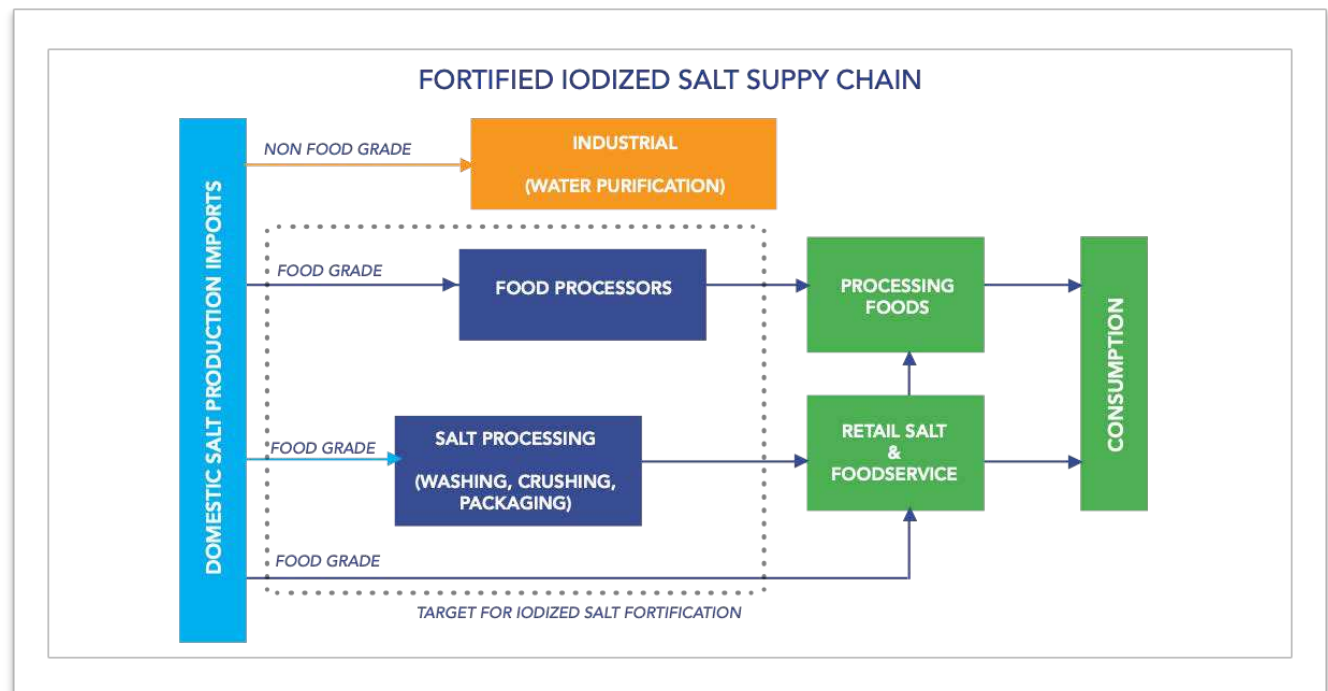
- ADDITIONAL SALT PROCESSING CAPACITY IN THE NORTH (EITHER ANSE ROUGE OR CAP-HAITIEN) TO BOOST AVAILABILITY OF FORTIFIED SALT AND REDUCE FREIGHT REDUNDANCIES
- ENCOURAGE THE ENFORCEMENT OF THE 2017 FOOD FORTIFICATION LAW, STARTING IN THE FOOD SERVICE AND FOOD-PROCESSING SEGMENTS, AND EVENTUALLY THE RETAIL SEGMENT
- AN EDUCATIONAL EXTENSION SERVICE FOR SALT INDUSTRY EDUCATION, COMMUNICATION, CO-OPERATION AND FUNDING

Processing capacity is not yet sufficient to meet objectives for raising quality or volumes so that unit costs can be regionally competitive. Another salt processing facility in the north with similar processing capacity would enable the salt industry to increase national capacity to approximately 50% of annual national demand and over 100% of annual demand for the food service and food-processing market segments.

Establishing an educational extension service would ensure the continuity of technical support for both producers and processors. It would serve as a continued source of knowledge for industry know-how, market trends, and best practices. It can also partner with an existing Haitian academic institution such as the University of Notre Dame Haiti. The extension service can model itself after the agricultural extension service established in the US where industry representatives collaborate with academia to establish best practices on a continuing basis. This may be similar to the consultation tables and producer organizations in place in Anse Rouge to support production.

EMERGING ISSUES

Once legislation is finalized and enacted with regulatory monitoring and enforcement in place, stakeholders must consider the appropriate means to ensure continued cooperation of all the participants in the supply chain to maximize the impact of improving the health of Haitians through fortified salt.



Public policy can leverage the commercial supply chain to cost effectively achieve its healthcare objectives.

DISTRIBUTION

OVERVIEW

Distribution issues within the Haitian salt value chain involve a variety of activities and actors. In developed markets, distribution to end-users flows from the salt processor. In Haiti, however, salt often flows from the producer directly to the end-user, thus requiring the end-user to “process” the raw product for use (e.g., consumers rinsing raw salt at home). As such, salt distribution in Haiti involves almost all actors in the value chain to reach end-users in the four market segments. Inherent in such a system are inefficiencies, such as a lack of raw product aggregation, sub-optimal shipment sizes, and mismatched quality specifications. The result is an invitation for imported salt products that more effectively and efficiently meet end-user requirements.

To understand the challenges facing the Haitian salt distribution system, it is important to first understand the needs of end-users in each segment, including the type of salt required: coarse vs fine, evaporated vs solar, packaged vs bulk, fortified vs. unfortified, etc. The following chart overviews each market segment:

	RETAIL	FOODSERVICE	FOOD-PROCESSING	INDUSTRIAL
Estimated Annual Volume	18,000MT	7,000MT	5,00MT	6,000MT
Edible/Non-Edible	Edible	Edible	Edible	Non-Edible
Market	Retail Consumers	Restaurants, Schools, Kitchens	Food manufacturers and as an ingredient in food production	Industrial processors
Sales Breakdown	<p>90% sold as unprocessed, coarse, unfortified salt per “ti marmite” (700-gram cans) in informal market</p> <p>10% sold as processed, coarse or fine, fortified salt per 0.5 to 1.0 kg sachets in formal market</p>	<p>75% sold as unprocessed, coarse, unfortified salt per 25-50 kg bags via informal wholesale market</p> <p>25% sold as processed, coarse of fine, fortified salt, primarily through donation programs</p>	<p>50% sold as unprocessed, coarse, unfortified salt per 25-50 kg bags, primarily to bakers</p> <p>50% sold as processed, mostly fine, fortified salt per 25 kg bags, to larger bakers, bouillon producers</p>	<p>50% sold as unprocessed, coarse salt per 25-50 kg bags, primarily to ice manufacturers</p> <p>50% sold as processed, coarse salt per 25-50 kg bags, primarily for water-treatment and tanning</p>
Estimated Price per MT	<p>USD 185 - USD 200 per MT average price per “ti marmite” in Port-au-Prince (12-13 HTG, 94 exchange rate)</p> <p>USD 900 - USD 1000 per MT average price for imported canisters of evaporated salt (HTG 60)</p>	USD 185 - USD 240 per MT average price in Port-au-Prince	USD 185 - USD 275 per MT average price in Port-au-Prince	<p>USD 185 - USD 250 per MT average price in Port-au-Prince</p> <p>USD 175 - USD 200 per MT average in east-coast U.S. ports</p>

ADVANCES SINCE 2012

The overall flow of various salt products through the value chain is roughly unchanged since the 2011 TechnoServe study. For purposes of this report, that entails the following assumptions:

- 2,500-3,000 PRODUCERS, SOME OF WHOM SELL DIRECTLY TO END-USERS
- 300-400 SALT WHOLESALERS
- OVER 2,000 SALT RETAILERS
- 80% OF SALT PRODUCTS PASS THROUGH PORT-AU-PRINCE, 20% STAYS IN THE NORTHERN TIER OF HAITI
- PORT-AU-PRINCE SALT DISTRIBUTION OCCURS PRIMARILY IN CITE SOLEIL, CROIX DE BOSSALES, AND WHARF JEREMIE
- SALT IS SOLD BY VOLUME, NOT WEIGHT, AND VOLUMES ARE NOT STANDARDIZED
- SALT QUALITY SPECIFICATIONS ARE NOT STANDARDIZED, EXCEPT AMONG LARGER-SCALE END-USERS
- DOMINICAN SALT IS A MAJOR SUPPLIER TO CAP-HAITIEN, AND SEASONALLY TO PORT-AU-PRINCE
- PHYSICAL INFRASTRUCTURE FOR EFFICIENT STORAGE, HANDLING, AND TRANSPORT OF SALT IS LACKING

Notwithstanding the items above, there have been some important developments affecting the distribution of salt in Haiti since 2012, as summarized below.

MARKET PARTICIPANTS:

- **PRODUCERS:** MOST PRODUCERS SELL TO TRANSPORTERS AND WHOLESALERS BASED IN PORT-AU-PRINCE. A HANDFUL OF LARGER PRODUCERS ARRANGE TRANSPORT AND MARKETING DIRECTLY TO END-USERS. THOSE PRODUCERS TEND TO HAVE DIFFERENTIATED QUALITY THAT COMMANDS A MARKET PREMIUM OF 25%-30%. PRODUCERS MAYBE ADVERSELY AFFECTED IF THE 2017 FOOD FORTIFICATION LAW WERE TO BE FULLY IMPLEMENTED AND ENFORCED. PROGRAMS WILL BE NEEDED TO HELP TRANSITION WORKERS THAT MAY BE DISPLACED BY THE CHANGES.
- **PROCESSORS:** THE CSC PROCESSING FACILITY AT DELMAS-2, PORT-AU-PRINCE DISTRIBUTES DIRECTLY TO END-USERS IN EACH OF THE FOUR MARKET SEGMENTS, AS WELL AS INDIRECTLY THROUGH A NETWORK OF WHOLESALERS AND DISTRIBUTORS. DISTRIBUTION IS FOCUSED ON THE GREATER PORT-AU-PRINCE METRO AREA, INCLUDING THE DISTRIBUTION OF CO-FORTIFIED SALT IN LÈOGÂNE.
- **WHOLESALERS:** THIS SECTOR REMAINS LARGELY UNCHANGED FROM 2012. IT HAS THE POTENTIAL TO BE DISRUPTED IF THE 2017 FOOD FORTIFICATION LAW WERE TO BE FULLY IMPLEMENTED AND ENFORCED. IF THAT WERE EVER TO BE THE CASE, WHOLESALERS WOULD BE FORCED TO DRAMATICALLY SHIFT THEIR SUPPLY-CHAINS AND DISTRIBUTION PATTERNS TO ENSURE FORTIFIED SALT WAS MADE WIDELY AVAILABLE IN THE RETAIL, FOOD SERVICE, AND FOOD-PROCESSING SEGMENTS.
- **RETAILERS:** ANECDOTAL EVIDENCE SUGGESTS THAT FOOD DISTRIBUTION THROUGH FORMAL MARKETS (I.E., SUPERMARKETS) HAS BEEN REDUCED AS A RESULT OF THE SOCIAL-POLITICAL UNREST SINCE 2017. THE ASSUMPTION IS THAT FORMAL MARKETS ACCOUNTED FOR 10%-15% OF RETAIL FOOD DISTRIBUTION PRIOR TO 2017, AND 10% OR LESS FROM 2017 UNTIL NOW.

MARKET SEGMENTS:

RETAIL: RESULTS OF THE 2018 NATIONAL SURVEY OF UIC LEVELS AMONG WOMEN OF CHILD-BEARING AGES UNDERSCORES THE CHALLENGES OF MARKETING FORTIFIED SALT TO RETAIL CONSUMERS. SURVEY RESULTS SHOWED THAT ALMOST 75% OF RESPONDENTS HAD NEVER HEARD OF IODINE AND/OR THE POTENTIAL CONSEQUENCES OF IODINE DEFICIENCY.



- THAT LACK OF AWARENESS AMONG RETAIL CONSUMERS, COUPLED WITH AN ESTIMATED 90% OF RETAIL SALT BEING DISTRIBUTED VIA INFORMAL MARKETS WITHOUT REGARD TO THE FORTIFICATION LAW, MAKES FOR A CHALLENGING ENVIRONMENT TO DISTRIBUTE FORTIFIED SALT IN THE RETAIL SEGMENT.
- THIS REPORT’S RECOMMENDATION IS TO PURSUE IDD PREVENTION PRIMARILY THROUGH “PASSIVE” DISTRIBUTION OF KIO₃ VIA THE FOOD SERVICE AND FOOD-PROCESSING MARKET SEGMENTS. AS OUTLINED IN THE 2016 INTERAGENCY REPORT,⁵³ SUCH AN APPROACH WOULD DISTRIBUTE SUFFICIENT IODINE IN THE POPULATION TO PREVENT IDD IN HAITI.

FOODSERVICE: SIMILAR TO RETAIL DISTRIBUTION, THE FOODSERVICE DISTRIBUTION NETWORK IS LARGELY UNCHANGED FROM 2012. THE DUAL NATURE OF SALT DISTRIBUTION WITHIN THE SEGMENT, HOWEVER, IS SEEN IN THE DIFFERENCES BETWEEN FORMAL AND INFORMAL FOODSERVICE OPERATIONS.

- FORMAL OPERATIONS (SUCH AS LARGER RESTAURANTS, HOTELS, AND NGO-SPONSORED SCHOOLS AND COMMUNITY KITCHENS) TYPICALLY RECEIVE FOOD PRODUCTS THROUGH A CENTRALIZED SERVICE, SUCH AS ASSOCIATED FOOD DISTRIBUTORS, SA,⁵⁴ FONKOZE-HAITI,⁵⁵ OR WFP/PAM.⁵⁶ AS SUCH, THEY ARE MUCH MORE ACCESSIBLE FOR DISTRIBUTION OF FORTIFIED SALT.
- SMALLER FOODSERVICE OPERATIONS, HOWEVER, ARE GENERALLY SERVED BY WHOLESALERS DISTRIBUTING UNPROCESSED, UNFORTIFIED SALT. FEW SMALL-SCALE FOODSERVICE OPERATORS ARE AWARE OF THE AVAILABILITY OR IMPORTANCE OF FORTIFIED SALT. WHILE THE CHALLENGE OF EDUCATING AND EFFECTING CHANGE IS SIGNIFICANT, DOING SO BY TARGETING THE THOUSANDS OF ENTITIES INVOLVED IN FOODSERVICE WOULD BE MATERIALLY LESS CUMBERSOME THAN TARGETING MILLIONS OF INDIVIDUALS INVOLVED IN RETAIL.

FOOD-PROCESSING: THE MOST SIGNIFICANT CHANGE HAS INVOLVED THE GROWTH OF BOUILLON CUBE CONSUMPTION SINCE 2012. THE HAITIAN BOUILLON CUBE MARKET IS ESTIMATED AT 5.5-6.0 MILLION CUBES PER DAY (COMPRISED OF 70+% SALT). AS SUCH, BOUILLON REPRESENTS ONE OF THE PRIMARY CHANNELS THROUGH WHICH TO DISTRIBUTE SALT IN HAITI.

- THE DON POYO BRAND, PREVIOUSLY PRODUCED BY SUNFOOD SA, IS THE MARKET LEADER OF BOUILLON IN HAITI. SUNFOOD WAS ACQUIRED IN 2018 BY QUALA.⁵⁷ IT CURRENTLY OPERATES AS PACIFIC FOODS SA AND CONTINUES AS ONE OF THE LARGEST SINGLE BUYERS OF SALT IN HAITI.
- BAKERIES REPRESENT THE LARGEST COLLECTIVE BUYER OF SALT CONSUMED IN THE FOOD-PROCESSING SEGMENT. BAKERIES TYPICALLY USE 1.5%-2% SALT IN A BREAD RECIPE GIVEN WHEAT-FLOUR CONSUMPTION IN HAITI, THE ESTIMATED SALT USE IN BAKERIES IS 3,500-4,000 TONS ANNUALLY.

⁵³ Preliminary Balance of Edible Salt, Technical Interagency Visit of the Haiti Iodine Deficiency (IDD) Prevention Program, UNICEF, September 19, 2016.

⁵⁴ <https://www.afdhaiti.com>.

⁵⁵ <https://www.fonkoze.org>.

⁵⁶ <https://www1.wfp.org/countries/haiti>.

⁵⁷ <https://www.quala.com.do>.

- LARGER BAKERIES ARE VERY PARTICULAR ABOUT PRODUCT SPECIFICATIONS. AS SUCH, THEY GENERALLY HAVE USED IMPORTED, IODIZED FINE SALT. GIVEN THE LOGISTICAL CONSIDERATIONS OF IMPORTING INGREDIENTS, HOWEVER, SEVERAL BAKERIES HAVE SWITCHED TO USING LOCALLY PROCESSED, FORTIFIED FINE SALT.
- THE MAJORITY OF BREAD PRODUCTION, AND THUS SALT CONSUMPTION, AMONG BAKERS IS SCATTERED AMONG SMALL-SCALE LOCAL BAKERIES THAT HAVE LITTLE AWARENESS OF, OR ACCESS TO, FORTIFIED SALT. THESE BAKERIES TYPICALLY BUY UNFORTIFIED COARSE SALT THROUGH INFORMAL MARKET SUPPLIERS.
- SIMILAR TO SMALL-SCALE RESTAURANTS AND FOOD SERVICE OPERATORS, THE EDUCATION AND MARKETING NEEDED TO EFFECT CHANGE TO SALT FORTIFICATION IS CONSIDERABLE. HOWEVER, THE CHALLENGE IS SOMEWHAT MITIGATED BY THE SMALLER NUMBER OF BAKERIES INVOLVED (IN COMPARISON WITH MILLIONS OF RETAIL CONSUMERS) AND THEIR RELIANCE ON IMPORTED PRODUCTS FOR OTHER INGREDIENTS (FLOUR, YEAST, SUGAR, ETC).

INDUSTRIAL: WATER-TREATMENT FACILITIES FOR BEVERAGE AND WATER COMPANIES CONTINUE TO REPRESENT THE LARGEST DEMAND FOR SALT IN THE INDUSTRIAL SEGMENT. THESE OPERATIONS HAVE GROWN SINCE 2012 AS BEVERAGE PRODUCTION UNITS HAVE BEEN EXPANDED OR BOILER SYSTEMS HAVE BEEN UPGRADED. GIVEN THE TECHNICAL NATURE OF THE EQUIPMENT INVOLVED, INDUSTRIAL USERS ARE THE MOST QUALITY-SENSITIVE OF THE FOUR MARKET SEGMENTS.

- THE WATER-TREATMENT PROCESS TYPICALLY USES SIZED (GRATED) COARSE SALT WITH NO ADDITIVES. MOST USERS REQUIRE IMPORTED COARSE SALT TO MEET INGREDIENT SPECIFICATIONS. HOWEVER, AFTER PRODUCTION TRIALS, SOME HAVE BEEN ABLE TO INCORPORATE BRINE-WASHED HAITIAN COARSE-SALT.
- ANOTHER SIGNIFICANT USE OF HIGHER-QUALITY COARSE SALT IN THIS SEGMENT IS FOR LEATHER TANNING. PRODUCTION OF LEATHER GOODS IN HAITI HAS SHOWN STEADY GROWTH SINCE 2012, A DEVELOPMENT THAT HAS, IN TURN, GENERATED A STEADY INCREASE IN SALT USAGE.
- ICE MANUFACTURERS ARE THE LARGEST USER OF LOWER-QUALITY COARSE SALT IN THE INDUSTRIAL SEGMENT. THE DEMAND FOR ICE APPEARS TO BE ROUGHLY UNCHANGED SINCE 2012. LONGER TERM, HOWEVER, SALT CONSUMPTION FOR ICE SHOULD DECREASE AS THE ELECTRICAL GRID EXPANDS TO MAKE REFRIGERATION AVAILABLE ON A WIDE-SPREAD BASIS.



The potential to export industrial salt has been investigated frequently since 2012. The concept is to leverage inbound-outbound container imbalances to access large salt markets in the US. For example, an inbound rate from Miami to Port-au-Prince is USD 2,500 per 20-foot sea freight container vs the outboard rate from Port-au-Prince to Miami of about USD 1,100. Each container would hold about 18 MT of bagged salt. Thus, the estimated freight cost for a 20-foot container from Port-au-Prince to Miami would be USD 60-USD 65 per MT.

That relatively cheap container freight allows access to three industrial markets in particular: bagged salt for animal feed-manufacturing in the southeastern US, bagged salt for pool-salt markets in Florida, and bagged salt for residential/commercial deicing use in the northeastern US. The value of all three markets is currently a nominal USD 175 per ton delivered the USEC, or about USD 110 per MT FOB dock in Haiti.

Economic considerations aside, salt quality remains the most significant barrier to accessing those export markets. Even brine-washed Haitian salt does not currently meet the product specifications (moisture, purity, and crystal size) required in any of those three markets (pool salt, bagged deicing salt, and animal feed salt) (see appendix for technical datasheets). Further processing and production improvements would be needed to achieve purity, sizing, and moisture requirements. As such, the export of industrial salt from Haiti remains an undeveloped opportunity. The required changes and economic feasibility will require further study.

MAJOR ISSUES TO ADDRESS

Major issues to address in the distribution system may be grouped into three categories: market connectivity, market regulation, and market infrastructure. Achieving progress in those areas would enable the distribution system to be regionally competitive and allow salt to be used as a delivery system in public-health initiatives.

MARKET CONNECTIVITY: HAITI'S SALT INDUSTRY TODAY COULD BE DESCRIBED AS "SUPPLY-PUSH," THAT IS, GROWERS PRODUCE SALT AS BEST AND AS CHEAPLY AS THEY CAN, OFTEN UNAWARE OF END-USER PRODUCT SPECIFICATIONS OR HOW TO ACHIEVE THEM.

- THE SALT INDUSTRY IN GENERAL, AND THE DISTRIBUTION SYSTEM IN PARTICULAR, WOULD BE BETTER SERVED IF A "DEMAND-PULL" APPROACH WAS ADOPTED, THAT IS, TO START WITH THE NEEDS, REQUIREMENTS, AND COMPETITIVE ALTERNATIVES OF THE END-USERS IN EACH MARKET SEGMENT.
- FOSTERING SUCH MARKET CONNECTIVITY BETWEEN SUPPLIERS AND CONSUMERS WOULD LEAD TO MORE INFORMED DECISIONS ON PRODUCTION TECHNIQUES, CAPITAL INVESTMENTS, MARKETING PLANS, ETC. AN EXTENSION SERVICE LINKING STAKEHOLDERS SUCH AS PRODUCERS, PROCESSORS, UNIVERSITIES, AND BANKERS WOULD BE A MAJOR STEP FORWARD IN THAT PROCESS.

MARKET REGULATION: HAITI'S SALT INDUSTRY TODAY CAN ALSO BE DESCRIBED AS INFORMAL. THAT IS, WHILE MARKET PARTICIPANTS ARE PROFESSIONAL AND ADEPT, THERE IS LITTLE CONSENSUS ON QUALITY STANDARDS, WEIGHTS AND MEASURES, OR REGULATORY OVERSIGHT.

- SUCH INFORMALITY RESTRICTS THE DISTRIBUTION SYSTEM. FORMALIZATION WOULD ALLOW THE INDUSTRY TO BECOME MORE COMPETITIVE REGIONALLY AND PROVIDE A MECHANISM TO DISTRIBUTE FORTIFIED SALT THROUGHOUT THE COUNTRY.
- THIS REPORT PROPOSES THAT THE MOST EFFECTIVE REGULATORY STEPS ARE TWO-FOLD: FIRST, ENSURING THAT ALL BAKERS AND SCHOOLS USE FORTIFIED SALT AS INGREDIENTS; AND SECOND, ENSURING TARIFF COLLECTION ON ALL IMPORTED SALT, ESPECIALLY ANY DOMINICAN SHIPMENTS. THESE MEASURES WOULD IMMEDIATELY IMPROVE PUBLIC HEALTH AND ENGENDER A "DEMAND-PULL" ENVIRONMENT IN SALT PROCESSING AND PRODUCTION INFRASTRUCTURE.

MARKET INFRASTRUCTURE: HAITI'S SALT INDUSTRY SUFFERS FROM AN UNCOMPETITIVE INFRASTRUCTURE. THAT INCLUDES PRODUCTION SYSTEMS (SINGLE-POND VS. THREE-POND SYSTEMS, UNLINED CRYSTALLIZERS, HAND-HARVESTING VS. MECHANICAL HARVESTING, ETC.), AGGREGATION AND TRANSPORT (CENTRAL WAREHOUSING, EFFICIENT SHIPMENT SIZES, ETC.), AND PROCESSING (BRINE-WASHING, SIZING, FORTIFICATION, AND PACKAGING).

- THE PANSEH/AMURT PILOT PROJECT WILL MAKE A SIGNIFICANT IMPACT ON PRODUCTION SYSTEMS, AGGREGATION, AND TRANSPORT. THAT INCLUDES THE TRIAL PRODUCTION SYSTEM, SHIPPING JETTY, SALT STORAGE WAREHOUSE, AND SELF-PROPELLED BARGE TO BE DEVELOPED.
- THE DEVELOPMENT OF A SECONDARY PROCESSING PLANT IN THE NORTH (EITHER AT ANSE ROUGE OR CAP-HAITIEN) WOULD ASSIST IN IMPROVING PROCESSING. IT WOULD PRIMARILY SERVE THE NORTHERN TIER OF HAITI, ROUGHLY 20% OF THE NATIONAL MARKET. THE PREFERRED LOCATION, BUSINESS PLAN, AND OPERATING MODEL WOULD BE SUBJECT TO FURTHER STUDY (SINCE THE NORTHERN MARKETS OFFER FEWER OPPORTUNITIES FOR HIGHER-MARGIN SALT PRODUCTS AND SERVICES).

EMERGING DEVELOPMENTS

The Haitian salt distribution system will be impacted by a number of emerging developments. The following issues should be monitored, as they will have the most significant effect, directly or indirectly, on distributing salt in Haiti:

- FULL IMPLEMENTATION OF THE STAPLE-GOODS FORTIFICATION LAW
- CAPITAL AVAILABILITY FOR INFRASTRUCTURE UPGRADES
- CURRENCY DEVALUATION AFFECTING RELATIVE COSTS OF IMPORTED VS. LOCAL PRODUCTS AND TRANSPORTATION

TRANSPORTATION AND STORAGE

OVERVIEW

Transportation, handling, and storage costs for salt in Haiti fall into two distinct categories, depending on whether the raw materials are sourced domestically or imported from abroad. Domestic salt produced largely in the north is assembled in small batches and transported on an ad hoc basis by small barges or less than truck-load quantities to wholesalers or processors in the Port-au-Prince area. The method of transportation of salt is effectively determined by the location of the salt basins: producers located near the ocean prefer shipment by sea and those inland near roads typically rely on truck transport. Costs for shipping and handling vary seasonally due to weather conditions; longer-term cost fluctuations are encountered with natural disasters.

Imported salt arrives directly in Port-au-Prince in commercial bulk vessels of unprocessed Caribbean coarse salt and in containers of bagged fine salt from various locations. Imported salt also flows into Haiti informally (i.e., salt which enters the country unregistered and, thus, without being tariffed) through the Dominican Republic. Despite traveling much longer distances, both bulk and container route vessels utilize state-of-the-art logistics, shipping, and handling techniques that reduce unit cost per MT. Containerized fine-salt shipments entail a much higher transport cost per ton than either bulk coarse vessels or bagged coarse domestic transportation. Such shipments, however, offer a distinct value for customers requiring particular quality specifications.

High Transportation and handling costs were highlighted in the previous TechnoServe and Cox & Speller papers as an impediment to salt commercialization. “Transportation costs are high not only because of the low value/high weight nature of salt, but because of the inefficiency of salt commercialization in Haiti – as salt is frequently transported twice before reaching the retail markets (once to Port-au-Prince and then on to the end-market).”⁵⁸ The cost of transportation and handling to wholesalers (80% goes to Port-au-Prince) was estimated at USD 54/MT in 2011.⁵⁹ In the 2016 study by Gary Paul, the cost of shipping bulk salt represented 68%-75% of the cost of salt transported by land and 40% when salt is transported by sailboat.⁶⁰ As such, transportation costs continue to be the largest component in the cost of salt.

Water transportation for bulk salt into or within Haiti is dependent on the larger port facilities in Port-au-Prince and Cap-Haitien. Domestic shipments originate from smaller ports



⁵⁸ “The Haitian Sea Salt Industry,” TechnoServe, September 2011.

⁵⁹ Ibid.

⁶⁰ “Study of the Transport Link of The Salt Chain of Pertaining to The Production of Anse Rouge,” Final Version, Gary Paul, July 2016.

in the north, which tend to lack storage capacity and mechanized loading equipment of adequate draft to accommodate larger ships or barges. Bagged salt in small batches generally is loaded on barges with 100-200 MT capacity or shuttled by smaller boats to barges offshore for shipment to Port-au-Prince. Bulk imported salt is brought into Port-au-Prince in 3,000-7,000 MT vessels. Both bagged salt in barges and bulk salt in vessels incur additional unloading, handling, and loading costs at the port before reaching wholesale purchasers for further processing, bagging, and distribution.

Salt transported by boat takes as long as two weeks and requires another five to seven days for loading and unloading. The risk of loss at sea is relatively high given that the boats are small sailboats between six to seven meters in length with a capacity of 12-38 MT.⁶¹ Payment by sea is in made two installments: in advance and the balance after delivery.

Truck transport is much quicker, generally 24-48 hours, but is more expensive. Payment is made in advance (one month) and there is often an extended waiting period. There is some risk of loss with truck transport, especially on the unpaved road from Anse Rouge to Gonaïves, as trucks navigate through the Morne Lapierre mountains and valleys.



The TechnoServe report indicated that shipping and handling cost per MT for domestic, Dominican, and regional salt were roughly equivalent even though the distance involved, and the method of transport were quite different.

Transportation costs for imported bulk-coarse salt benefit from economies of scale as larger quantities transported tend to lower the unit cost. Although geographic proximity might suggest a competitive advantage for domestic producers, published data from available sources suggest that the domestic costs for transportation and handling are comparable to costs for imports due to poor infrastructure.

Storage costs were not separately analyzed in 2011, perhaps because storage capacity for salt inventory or reserves has not been prevalent except to a small degree with larger wholesalers. Estimates on the volume of salt storage indicate that current capacity is inadequate to hedge seasonal imbalances, much less provide necessary reserves in the event of longer-term supply disruptions from natural disasters.

PROGRESS SINCE 2012

Transportation costs in recent years have been affected by several factors:

- *TRANSPORTATION INFRASTRUCTURE WAS RESTORED AND IMPROVED FOLLOWING A SERIES OF HURRICANES*
- *DOMESTIC TRANSPORTATION COSTS REMAIN RELATIVELY HIGH*
- *FUEL COSTS SURGED BEGINNING IN 2017*

Transportation costs reflect the challenges faced as a result of frequent natural disasters. Improvements to the transportation infrastructure are delayed when reconstruction is required to repair roads and bridges following

⁶¹ Ibid. Conversion formula:

- 80-250 BARIK OF SALT. EACH BARIK IS +/-333 POUNDS
- $80 \times 333 = 2,200$ PER MT = 12.11 MTS
- $250 \times 333 = 2,200$ PER MT = 37.84 MTS

natural disasters. Public expenditures increased to rebuild after Hurricane Matthew in 2016.⁶² Improvements to infrastructure after Hurricane Matthew better equipped the infrastructure to the force of Hurricanes Irma and Maria in 2017.⁶³

The government of Haiti, with the support and cooperation of the World Bank and others, dedicated resources to strengthen the network of national highways to improve rural connectivity, support resiliency after natural disasters, and link small farmers to commercial markets.⁶⁴ By reconnecting national roads and repairing or replacing bridges, these projects restored and improved access for remote communities to other parts of Haiti.

Improvements to the transportation infrastructure were implemented by the Ministry of Public Work with technical support from the United Nations Office of Project Services.⁶⁵

Port modernization is underway for each of Haiti's international seaports, as well as other port facilities in the country. The sea port network provides access to the markets in the north of the country that are geographically separated from Port-au-Prince by mountain ranges. The Haitian government, with assistance from USAID, is modernizing both infrastructure and operations in Cap-Haitien to provide bulk cargo services to accommodate larger ships.⁶⁶ Similar projects are underway at the two major ports in Port-au-Prince and, on a lesser scale, at the anticipated jetty in Anse Rouge, subject to the resolution of property rights and the approval of the National Port Authority (AFN).



The 2016 study by Gary Paul found the cost of transportation to be relatively high, with transportation and handling costs accounting for as much or more than two-thirds of total costs. Either by land or sea, transportation costs were double the cost of the salt.⁶⁷ This study was prepared shortly before hurricane Matthew in October 2016. Accordingly, some of the conditions regarding price, volumes, and quality may have changed significantly since then. In many cases, it increased the cost of transportation vis-a-vis the cost of the salt purchased from producers.

Imports from the Dominican Republic track to domestically produced salt from Monte Cristi and the Dajabon area in the north, and Chilean-sourced bulk salt imported into Santo Domingo. Domestically produced salt flows into Cap-Haitien for consumption in the northern provinces. Bulk salt, sourced primarily from Chile, is trans-shipped via truck from Santo Domingo to Port-au-Prince.

Transportation costs for Dominican shipments align with costs incurred domestically to ship from the Anse Rouge area to Port-au-Prince and bulk shipments from the Caribbean region.

Salt imported into Haiti is transported by commercial vessels, container ships, and trucks. Shipments of bagged, evaporated fine salt arrive from Mexico or Europe in containers. Bulk coarse salt is shipped in commercial vessels

⁶² "How Trade is Helping Haiti Recover and Grow its Economy," World Bank Blogs, September 2014.

⁶³ "Haiti-Market Overview," Haiti Country Commercial Guide, February 2019.

⁶⁴ "Reconstructing Haiti's Transportation Infrastructure Following Natural Disasters," The World Bank, October 2016.

⁶⁵ "I am Proud to Build Road Infrastructure," Relief International, The World Bank, May 2018.

⁶⁶ "Port Modernization Report," USAID.Gov/Haiti, August 2018.

⁶⁷ "Study of the Transport Link of the Salt Chain of Pertaining to the Production of Anse Rouge," Final Version, Gary Paul, July 2016.

from Bonaire. Fine bagged salt from Chile enters on trucks through the Dominican Republic. Shipping rates have been relatively steady since 2012, except for a spike in 2016.

Importers of bulk shipments reduce the unit cost per ton with advanced logistics, commercial scale, and mechanized handling. Regional shipments of bulk vessels encounter shorter distances but tend to use smaller or mid-size vessels. Imports from Chile travel greater distances but typically use larger vessels to lower the unit cost per ton. Imports from Mexico in containers incur higher shipping costs, although these costs are offset by the higher gross margins of fine salt. The quality of brine-washed Haitian coarse salt still is not adequate for further processing into fine salt.

TABLE 4⁶⁸

WHOLESALE COST OF SALT 2019*

Cost Components	Domestic	Dominican	Regional Bulk	Regional Containers
Raw Materials	\$25	\$25	\$25	\$100
Shipping	\$30	\$30	\$35	\$125
Portage and Handling	\$20	\$25	\$23	\$10
Tariffs	\$0	\$0	\$12	\$40
Sub-Total	\$75	\$80	\$95	\$275
Washing	\$30	\$0	\$0	\$0
TOTAL	\$105	\$80	\$95	\$275

**Delivered Port-au-Prince*

While cost comparisons in Table 4 (expressed in US dollar terms) are more difficult with the devaluation of the HTG, the cost for shipping and handling domestic salt decreased against foreign imports largely as a result of ongoing devaluation. This decrease is tempered by the surge in fuel costs, which are more closely tied to the dollar. For example, the cost per liter of gasoline in local currency was HTG 40 in 2012, and by June 30, 2019, the cost per liter was HTG 57. Increases in fuel costs are also prone to periodic spikes caused by fuel shortages.

Fuel costs for maritime imports are expected to rise in the near future as new global pollution standards take effect calling for improved energy efficiency, as well as the reduction of carbon emissions and greenhouse gases. The anticipated rate increases will recoup the higher cost of cleaner fuel and the cost of retrofitting vessels with new energy efficient technology.⁶⁹

The current costing structure for domestic salt could provide a competitive advantage if the quality of domestic salt was comparable to imports. In most cases, domestic salt requires further brine washing and processing before entering the next steps in the supply chain. The incremental cost for brine washing causes the all-in cost of domestic salt to exceed the cost of imports of coarse salt. As previously noted, even if brine-washed, the quality of Haitian coarse salt is not adequate for further processing into fine salt.

⁶⁸ Current Estimates Quoted by Experts Within the Haitian Salt Industry

⁶⁹ "Low Carbon Shipping and Air Pollution Control," In Focus, International Maritime Organization, 2019.

MAJOR ISSUES TO ADDRESS

In addition to the calls of previous papers for the modernization of salt production, improvements and modernization of transportation (by land and sea) are necessary to lower the unit cost per ton and enable Haitian salt to become regionally competitive. Concurrent with the ongoing modernization of transportation is the need to increase storage capacity, preferably near production sites.

Completing the reconstruction of the national highway network and the modernization of the port facilities are the first steps in building a more efficient transportation system. To achieve cost savings and compete against imports, additional enhancements in logistics are necessary to balance supply and demand, lower costs of distribution, and expand storage facilities as a buffer against natural disasters.

Transportation of salt from the Anse Rouge region continues to be a challenge due to the lack of a paved road to Gonaïves, the instability of land transport, and the lack of local port facilities. Concerns over security have caused two key markets (CITE 'Soleil and Croix de Bosssards) to experience reductions in trading volume as more salt is diverted to the new, more secure facilities at Wharf Jeremy.

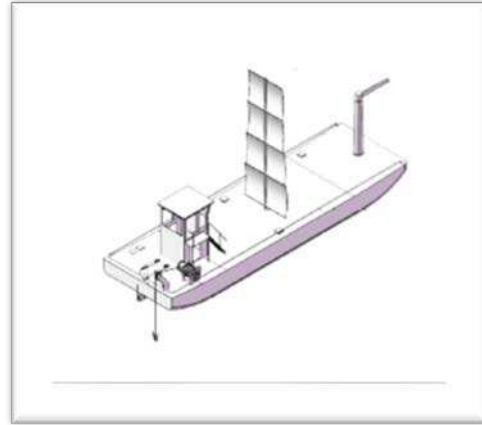
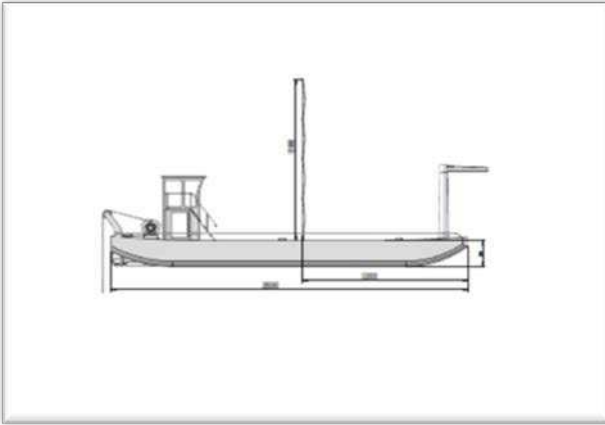
With estimates of losses up to 80% or more, the Anse Rouge region encountered a sharp reduction in its number of sailboats in recent years, most of which is attributed to inclement weather, such as hurricanes. Many boats were owned by local producers who cannot afford to replace lost sailboats. Sailboats from Tortuga, now banned from other Caribbean Islands and the US, have been used in an attempt to fill the gap. Their success is mixed because, unlike the Anse Rouge sailboats closely tied to the salt basins, the Tortuga sailboats often pick up salt in Anse Rouge without a purchase commitment in Port-au-Prince.

The decline in maritime traffic is partially offset by an increase in truck transport with small trucks generally carrying 10 MT*and a few larger trucks carrying as much as 20-25 MT.⁷⁰ However, unlike maritime transport, which is almost exclusively salt, truckers view salt transport as secondary, making truck transport sometimes unavailable, more expensive, or both.

Focusing solely on the transportation near the PANSEH/DDI and AMURT facilities, improvements are needed for both road transportation and completion of the jetty at the Magazen Lagoon. Routes 1 and 5 could serve as cost-effective pipelines if properly graded, maintained and, in some sections, paved. This could increase capacity between Gonaïves, Anse Rouge, and Cap-Haitien, presumably at lower costs if the routes can accommodate larger trucks to reduce the shipping cost MT.

⁷⁰ "Study of the Transport Link of The Salt Chain of Pertaining to The Production of Anse Rouge," Preliminary Report, Gary Paul, May 2016. Conversion formula:

- 1 Bag = 30 US Gallons Dry = 291 Pounds
- 150 Bags = 43,650 Pounds = 19.84 MTS
- 200 Bags = 58,200 Pounds + 26.45 MTS



Improvements to transportation infrastructure increase the potential for streamlining the overall supply chain. Better transportation enables greater connectivity from production through consumption. This connectivity, in turn, should lead to further advancements in logistics and overall supply chain synergies.

EMERGING DEVELOPMENTS

Domestic production will continue to be challenged by foreign imports as the competitive landscape will be defined in terms of quantity, quality, cost, and grade. Inherent advantages of proximity to local markets are relevant only where locally produced salt is of the same caliber as foreign imports. Anticipated production from Anse Rouge will benefit from a weaker HTG but may encounter higher transportation costs given the increase in fuel costs.



THE INDUSTRIAL MICRO-PARK IS IN CLOSE PROXIMITY TO THE MAIN AREAS OF SALT PRODUCTION IN ANSE ROUGE, AND NEXT TO A PROTECTED COVE IDEAL FOR SHIPPING.

The tendency for “boom and bust” market conditions caused by periodic production peaks and shortages could be tempered by expanded storage capabilities. The need for additional storage capacity will become more critical with the anticipated increases in domestic production from Anse Rouge. Nevertheless, the most efficient storage of solar salt is in the crystallizer ponds themselves, holding extra tons as expanded salt-floors, rather than in bulk warehouses or bagged storage sheds. Salt can also be stored in an uncovered stockpile but is subject to loss from shrinkage due to rain.

In Anse Rouge, AMURT, in partnership with PANSEH, is developing an Industrial Micro-Park (IMP) at the Magazen lagoon. With funding only for the earth infrastructure, a jetty for local shipping is being constructed at a wharf nearby the adjacent salt basins operated by ESPRI SEL and SOCOPROSA S.A. The jetty, projected to be completed

in December 2020, is approximately four meters wide and 60 meters long and is situated close to the main road in Anse Rouge. This jetty will serve primarily salt producers that transport salt to locations in Haiti, sea transporters that transport goods within Haiti, and other types of local Haitian trade. Based on initial specifications, the jetty is designed to accommodate barges with up to 150 MT of loading capacity.⁷¹

AMURT is also sponsoring two barges with 100 MT load capacities, each of which can make two trips per week to a wharf identified close by the Lafito Port near Port-au-Prince, a distance of approximately 80 nautical miles. The dimensions are 26 meters long by 8.4 meters wide by two meters deep. The barges will be propelled by twin inboard diesel engines but also will be equipped with a sail to take advantage of strong winds and reduce fuel. The combined shipping capacity is estimated to be +/- 17,600 MT per year. The barge will be operated by a local social enterprise, but an independent logistics company will manage all maritime operations. The first barge is scheduled to arrive in December 2020. Cost estimates per MT suggest a reduction from current market rates as AMURT achieves economies of scale and benefits from a crane onboard the barge to expedite loading and offloading.

Subject to funding and the overall situation in Haiti, AMURT intends to complete the industrial micro park over time. The contemplated additions include a modernized pilot production facility in Anse Rouge and expanded storage capacity at the wharf. There are also plans to build a processing facility and wharf adjacent to the Lafito port in an effort to access regional markets through container ships.

Land transport in Haiti has been disrupted by extended civil unrest. The road from Gonaïves to Port-au-Prince was the target of several efforts to obstruct truck traffic, the most notable being the damage to the bridge at Caberet. Shipping salt by truck to Anse Rouge is especially difficult given the lack of fuel, advance payment requirements, recurring social strikes, and concerns for security. Cost, at this time, is impractical to estimate given that almost shipments have stopped.

Improvement to the major port facilities, especially at Port-au-Prince, will benefit large transportation by both barge and vessel by lowering transportation costs per ton and related handling costs. Advancements in logistics and tighter management of dedicated supply chains may create barriers of entry in the commercial marketplace for more informal supply chains and salt producers. Furthermore, there may be a cascading effect if edible salt distribution becomes further concentrated within a small number of commercial food processors or retail distributors.

Another possible result of improving the transportation system is reducing the retail cost of salt for Haitian consumers, enabling fortified salt to be more affordable, producing not only a favorable economic outcome but also a corresponding health benefit for the entire country.

Economies of scale for lowering transportation costs are available for both domestic producers and foreign importers. Conceptually, economies of scale may benefit both sectors simultaneously if they achieve scale at or about the same time. In the event that one sector outpaces the other, the potential competitive advantage gained by one sector may cause a market disruption at the expense of the lagging sector.

⁷¹ "Business Plan Proposal Industrial Micro-Park Anse Rouge," AMURT- Haiti and APSCAR (Salt Producers Association, Anse Rouge), 2016.

OVERVIEW

Public policy and related regulatory guidelines play a critical role in the success of a supply chain. Public policy is a combination of legislation, implementation, and enforcement intended to reflect the intentions of the public's interest. It consists of what legislators and administrative agencies choose to do—or not do—in response to a particular issue. Policies also are created by those responsible for implementation as they decide how policies will be put into effect, measured, monitored, and enforced. Policies are an outcome of government, and non-government participants each acting on their own interpretations of problems and their respective solutions.⁷²

There are practical limitations to the role of public policy in Haiti. Its political landscape and the frequency of natural disasters handicap the economy and cause the government to operate mostly in crisis mode. The economic consequences of these disruptions cascade to each link in a supply chain, hindering efforts to manage production or to fulfill orders. Within Haiti, the degree of disruption to the supply chain can be contrasted between consequences for large-scale, industrial enterprises operating in the formal economy and consequences for small-scale participants in the informal economy. The informal sector represents the vast majority of the Haitian economy, dominating small commerce, neighborhood sales, and manufacturing that does not require heavy capital investment. The informal economy, by its nature, is difficult to track, measure, or evaluate. Healthcare initiatives that rely on the informal sector have little or no way of measuring effectiveness insofar as the informal economy is immune to public policy, compliance, and enforcement.

The distinction between the formal and informal economic sectors is important because iodine fortification efforts to date generally have targeted retail sales of table salt in the informal economy. The results of the effort are mixed. If public policy were to extend its focus to corporate enterprises operating in the formal economy, it then could leverage businesses accustomed to following public policy and attuned to the related compliance, documentation, and reporting. Size, sophistication, and expertise make enterprises in the formal economy less vulnerable to political upheaval or economic disruption. These characteristics make businesses natural candidates to partner with healthcare agencies to carry out public policy and conduct healthcare initiatives.

Significant progress toward the elimination of IDD has been achieved globally through universal salt iodization. The focus on national elimination programs is often on table salt used at the household level where homemade foods make up the bulk of family diets, particularly in developing countries.⁷³ In these instances, fortifying table salt at the household level enabled the iodization of salt to be effective. Likewise, pursuing iodization in Haiti with table salt will be effective only if homemade foods are the mainstay of family diets and regulation of informal street markets can be achieved.

⁷² "Travis Tokar and Morgan Swink," *Journal of Supply Chain Management*, p. 68-79, April 2019.

⁷³ "Iodized Salt in Baking," Gregory Gerasimov, *IDD Newsletter*, August 2009.

PROGRESS SINCE 2012

There are two major advancements to report since 2012:

- LEGISLATION REQUIRING FOOD FORTIFICATION, INCLUDING SALT IODIZATION.⁷⁴
- A UNICEF/IGN/USAID - INTER-AGENCY STUDY FINDING THAT DISTRIBUTING IODINE VIA PROCESSED FOODS AND BOUILLON CUBES REPRESENT AN IMPORTANT POTENTIAL SOURCE FOR IDD PREVENTION IN HAITI.⁷⁵

The legislation enacted in 2017 requires that all salt for human consumption be fortified, including salt produced domestically or IMPORTED. While the intentions of the legislation make it a positive step forward, implementation is delayed pending the issuance of an application decree.

The 2016 UNICEF study concluded that prior efforts to increase Haitian demand for iodized salt by improving the domestic salt industry and improving coverage have had very limited impact.⁷⁶ Part of the issue lies with the failure to enact national legislation. Another issue is relying on the local salt industry with small-scale artisanal salt farmers producing low-quality raw salt. A silver lining in the study was that, despite the inability to distribute locally produced iodized salt, “There seems to be a sufficient iodine in the diet, primarily due to the use of iodized salt in widely consumed process foods, such as instant noodles, as well as condiments, including bouillon and tomato ketchup meet the daily requirements for iodine in adults.” The study updates the salt consumption patterns in Haiti and draws attention to the significance of salt consumed in larger quantities through processed food and food service. Given the mixed results of targeting table salt to achieve adequate iodine coverage, the study highlights the opportunities for much greater coverage presented by passive distribution through the food system.

MAJOR ISSUES TO ADDRESS

There are several key areas where public policy could make the supply chain more effective in improving the health of the Haitian people.

- FINALIZE LEGISLATION AND RELATED APPLICATION DECREES FOR IODIZED SALT
- SHIFT THE FOCUS FROM USI AND RETAIL SALT TO PASSIVE CONSUMPTION THROUGH PROCESSED FOODS AND FOOD SERVICE
- ENFORCE COMPLIANCE WITH IMPORT TARIFFS, ESPECIALLY ON SALT ENTERING FROM THE DOMINICAN REPUBLIC

The enacted legislation requiring food fortification is ineffective until an application decree is issued. Finalizing legislative measures is necessary to begin the implementation and enforcement of the new rules.

The UNICEF study sheds light on the changing patterns of salt consumption and identifies practical alternatives for the distribution of iodized salt.⁷⁷ These alternatives shift the reliance away from USI and retail salt toward bouillon cubes, processed food, and food service. A shift away from reliance on table salt opens new opportunities to partner with and leverage the expertise of commercial food processors and bouillon makers, and it provides access to commercial distribution networks, which should broaden the coverage of fortified salt in Haiti.

Salt imported into Haiti, particularly salt entering the informal market from the Dominican Republic, is not consistently levied at the same 20% tariff applied to imports. Furthermore, salt imports that skirt the statutory tariff regime are not likely to comply with new food fortification legislation or meet governments standards.

⁷⁴ The Law on the Fortification of Foods with Micronutrients, The Monitor, Official Directory of the Republic of Haiti, February 2, 2017.

⁷⁵ “Technical Interagency Visit on the Haiti Iodine Deficiency Disorders (IDD) Prevention Program,” July 26-28, 2016.

⁷⁶ Ibid.

⁷⁷ Ibid.

Compliance and enforcement of these guidelines would level the playing field and help ensure fortification of a higher percentage of salt consumed in the food system.

EMERGING DEVELOPMENTS

There soon may be a need to streamline the export process to facilitate the shipment of deicing, animal-feed, and/or pool salt to the US market. The need to streamline stems from the pending increase of salt produced in Anse Rouge. Given that the type of salt from Anse Rouge is not likely to curtail the level of imported salt used by food processors and bouillon makers, some portion of this salt may need to be exported. Public policy could help facilitate container shipments of packaged deicing, animal-feed, and pool salt by rationalizing the current array of fees, inspections, and certificates to make the export process more affordable, feasible, and practical.

Public policy also determines where the producers are allowed to sell their salt. Local salt producers are concerned that modernized salt works will threaten the Anse Rouge market with lower prices for quality salt. In fact, previous attempts to build new facilities triggered social unrest that culminated in the damage to an inoperability of the AMURT facility. Whether the respective parties come to an understanding formally or informally, it is possible that the lower priced, higher quality salt from the new facilities will be restricted from being sold in Anse Rouge and limited to sale only to selected market participants in Port-au-Prince and, in time, to regional export markets. This outcome could essentially bi-furcate the market, creating a two-tier system, each with their own competitive challenges and supply chains. Over time, it remains to be seen whether social issues in a rural area such as Anse Rouge can be reconciled to modernize the salt industry or if these same social issues continue as an ongoing point of contention.

RECOMMENDATIONS

In updating the assessment of the Haitian salt industry, we are mindful of the original objectives of the earlier papers and the priorities of the National Salt Strategy. This paper focused on the progress, as well as the remaining challenges, in the industry by examining the overall supply chain and its primary components. We observed some connectivity but recognize there is room for improvement to ensure that its total contribution is greater than the sum of the parts.

Our perspectives are commercial in nature as we recognize the opportunities to leverage market forces to achieve affordable and sustainable objectives. Socially responsible commercial entities can, and should, form part of the solution for modernizing the Haitian sea salt industry. Together, like-minded NGOs and supportive government regulators, and commercial enterprises can serve as critical contributors in addressing humanitarian needs, accepting of course, that each play separate and a distinct role.

Our recommendations take as a given that the first priority is to improve the health of the Haitian people while recognizing the favorable economic, social and environmental benefits. The key initiatives recommended to achieve the desired benefits to livelihoods and health include:

- DIRECT SUPPORT FOR THE CONTINUOUS IMPROVEMENT OF THE SUPPLY CHAIN RECOGNIZING THAT NEW SKILLS ARE NEEDED AS IT EXPANDS
- IMPLEMENT INCREASED IODINE INTAKE IN CONJUNCTION WITH EFFORTS TO REDUCE OVERALL SALT CONSUMPTION
- ENFORCE THE FOOD FORTIFICATION ACT TO ENSURE IODIZED SALT IS USED IN PROCESSED FOODS (E.G. BREAD AND BOUILLON CUBES) AND FOOD SERVICE
- SPONSOR A NEW COLLABORATION OF PARTICIPANTS IN THE PUBLIC SECTORS OF HEALTH AND EDUCATION, FOOD PROCESSORS, AND FOOD SERVICE, AND THE SALT INDUSTRY TO ENHANCE PUBLIC HEALTH AWARENESS
- SUPPORT EXPORT PROGRAMS TO FACILITATE SHIPMENTS OF POOL SALT, ANIMAL FEED SALT, OR DEICING SALT

To the point: One Project, Two Diseases: Both Preventable

LF is a “neglected tropical disease” affecting 120 million people in 83 countries. LF is caused by tiny, threadlike parasitic worms that attack the lymphatic system, which regulates fluid balance in the body and helps to ensure the proper functioning of the immune system. Manifestations of LF include grotesque swelling of the legs, breast, and genitals, as well as painful bacterial infections.

IDD is the world’s most prevalent cause of cognitive impairment. Haiti was the last country in the western Hemisphere that mandated the iodization of salt, doing so in 2017. Nevertheless, less than 25% of Haitian households have access to iodized salt. Consequently, IDD remains an acute public health problem in Haiti. It causes poor maternal outcomes such as stillbirth, low birth weight, and significant decrease in the IQ of children.

Fortified salt produced, processed, and distributed in Haiti can cost effectively improve the health of Haitians by reducing the incidence of Lymphatic Filariasis and Iodine Deficiency Disorders.

APPENDICES



Technical Information

Bulk Solar Salt - Coarse (Undried)**DESCRIPTION:**

Bulk Solar Salt - Coarse (Undried) is a coarse screened, white crystalline solid obtained by the solar evaporation of Caribbean seawater. The salt is harvested, washed with clean brine to remove surface impurities, drained of excess moisture and screened to size.

COMPLIANCE:

Bulk Solar Salt - Coarse (Undried) is not approved for direct human or animal consumption. It meets the AWWA Standard B200 for Sodium Chloride.

ADDITIVES:

Bulk Solar Salt - Coarse (Undried) contains no additives or conditioning agents.

APPLICATIONS:

Bulk Solar Salt - Coarse (Undried) is intended for general industrial, brining and water treatment applications. This product may also be used for deicing highways and thoroughfares.

PACKAGING AND SHIPPING:

Bulk Solar Salt - Coarse (Undried) is available only in bulk form. Bulk quantities are shipped by rail or truck.

METHODS OF ANALYSIS:

Methods of analysis are taken from the ASTM designation E 534-98, AWWA B200-03 and Cargill.

CHEMICAL ANALYSIS:

Component	Units	Typical	Specification
Sodium Chloride (dry basis) ¹	%	99.65	99.6 min.
Calcium & Magnesium (as Ca)	%	0.08	-
Sulfate (as SO ₄)	%	0.12	-
Water Insolubles	%	0.02	0.15 max.
Surface Moisture ²	%	2.4	3.0 max.

¹By difference of impurities.

²110°C for 2 hours.

SIEVE ANALYSIS:

U.S.S. Mesh	Opening Inches	Opening Microns	Typical	Specification
5/8"	0.625	15875	1	10 max.
1/2"	0.500	12700	3	-
5/16"	0.3125	7940	36	-
5	0.157	4000	45	-
35	0.0197	500	14	-
Pan	-	-	1	10 max.

Note: Sieve analysis is reported as percent retained.

BULK DENSITY:

Parameter	Typical	Specification
Pounds per Cubic Foot	82	79 - 85
Grams per Liter	1315	1265 - 1360

Note: Bulk density is reported as loose (uncompacted).

PRODUCING LOCATION: BONAIRE, N.A.

No. 6030 Revised May 2007

CARGILL SALT

P.O. Box 5621
Minneapolis, MN
55440
1-888 385-7258

NOTICE: All of the above statements, recommendations, suggestions and data are based on our laboratory results, and we believe same to be reliable. Nevertheless, with the exception of data showing an express guaranty (such as in the case of products specifically designed for use as nutrient supplements), all such statements, recommendations, suggestions and data hereinabove presented are made without guaranty, warranty or responsibility of any kind on our part.



Technical Information

Champions Choice® Mix-N-Fine® Salt

DESCRIPTION:

Champions Choice® Mix-N-Fine® Salt is a fine screened, sodium chloride salt crystallized by solar evaporation. The crystallized salt is washed, dried, crushed and screened to a size suitable for animal feeding.

COMPLIANCE:

Champions Choice® Mix-N-Fine® Salt complies fully with requirements for animal feed ingredients as set forth in Title 21 of the Code of Federal Regulations and the feed ingredient definition for salt as defined by the Association of American Feed Ingredient Officials.

ADDITIVES:

Champions Choice® Mix-N-Fine® Salt contains no anti-caking or free-flowing additives.

APPLICATIONS:

Champions Choice® Mix-N-Fine® Salt is specifically screened for blending in animal rations or for free-choice feeding of salt to animals. It is suitable for all animal diets, but it should not be used for direct food applications.

PACKAGING AND STORAGE:

Champions Choice® Mix-N-Fine® Salt is available in 50lb. and 80lb. multiwall paper bags, in mini-bulk bags and in bulk. To improve caking resistance, the product should be stored in a dry, covered area at humidity below 75%.

METHODS OF ANALYSIS:

Methods of analysis are taken from ASTM E 534-98, Cargill and the A.O.A.C. Official Methods of Analysis.

OTHER PROPERTIES:

Champions Choice® Mix-N-Fine® Salt contains no known allergens, and exhibits virtually no microbiological activity.

CHEMICAL ANALYSIS:

Component	Unit	Typical	Specification
Sodium Chloride (dry) ¹	%	99.50	99.3 min.
Calcium & Magnesium (as Ca)	%	0.15	-
Sulfate (as SO ₄)	%	0.2	0 -
Surface Moisture ²	%	0.04	0.2 max.
Water Insolubles	%	0.17	0.3 max.

¹By difference of impurities.

²110°C for 2 hours.

SIEVE ANALYSIS:

U.S.S. Mesh	Opening Inches	Opening Microns	Typical	Specification
1 2	0.066	1168	0 0	1 max.
1 6	0.046	911	90 3 0	-
3 0	0.023	2590	3 5	-
5 0	0.011	7300	3 1	-
P a n	-	-	4	3 max.

Note: Sieve analysis is reported as percent retained.

BULK DENSITY:

Parameter	Typical	Specification
Pounds per Cubic Foot	66	63 - 69
Grams per Liter	1055	1010 - 1105

Note: Bulk Density is reported as loose (uncompacted).

PRODUCING LOCATION: BALTIMORE, MD

No. 6309 Revised February 2009

CARGILL SALT

P.O. Box 5621
Minneapolis, MN
55440
1-888 385-7258

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Technical Information

***Diamond Crystal® Splash Ready™
Pool Salt***
DESCRIPTION:

Diamond Crystal® Splash Ready™ Pool Salt is a white crystalline sodium chloride manufactured under stringent process control procedures. This salt is obtained by the solar evaporation of saline waters. The salt crystals are refined by washing to remove surface impurities, dried, and screened.

COMPLIANCE:

Diamond Crystal® Splash Ready™ Pool Salt is approved for direct use in electric chlorinator systems as a minimum risk pesticide, exempt from EPA registration under section 25(b) of FIFRA and meets the AWWA Standard for Sodium Chloride B200.

ADDITIVES:

Diamond Crystal® Splash Ready™ Pool Salt contains no anti-caking or free-flowing additives or conditioners.

APPLICATIONS:

Diamond Crystal® Splash Ready™ Pool Salt is intended for electric chlorinator systems. To calculate the amount of salt to use, please refer to your Electric Chlorinator System user's manual. The product is water soluble. This eliminates messy system cleaning, providing efficient operation of the chlorinator system.

PACKAGING AND STORAGE:

Diamond Crystal® Splash Ready™ Pool Salt is available in 40 lb. polyethylene bags. To improve caking resistance, the product should be stored in a dry, covered area at humidity below 75%.

METHODS OF ANALYSIS:

Methods of analysis are taken from ASTM E 534-98, Cargill and AWWA B200-03.

OTHER PROPERTIES:

Diamond Crystal® Splash Ready™ Pool Salt contains no known allergens, and exhibits virtually no microbiological activity.

CHEMICAL ANALYSIS:

Component	Units	Specification
Sodium Chloride (dry) ¹	%	99.45 min.
Surface Moisture ²	%	0.2 max.
Water Insolubles	%	0.15 max.

¹By difference of impurities.

²110°C for 2 hours.

**PRODUCING LOCATION: TIMPIE, UT; FREEDOM, OK;
TAMPA, FL; BALTIMORE, MD**

No. 6194 March 2012

CARGILL SALT

P.O. Box 5621
Minneapolis, MN
55440
1-888-385-7258

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EXHBIT 4:



Technical Information

Diamond Crystal® Winter Melt® Ice Melter

DESCRIPTION:

Diamond Crystal® Winter Melt® Ice Melter is a coarse screened, translucent to white crystalline solid obtained from underground salt deposits by physical mining or by solar evaporation of saline water. The mined salt is crushed, screened and hoisted to the surface where it is packaged for distribution. The solar salt is harvested from salt ponds, drained of excess moisture, dried, and screened to size, then packaged for distribution.

COMPLIANCE:

Diamond Crystal® Winter Melt® Ice Melter is not approved for human or animal consumption. It is intended for use only as a deicer on paved road surfaces, driveways and walkways.

ADDITIVES:

Diamond Crystal® Winter Melt® Ice Melter contains no anticaking or free-flowing additives or conditioners.

APPLICATIONS:

Diamond Crystal® Winter Melt® Ice Melter is intended for use as an ice and snow removal agent on highways and other roadways.

PACKAGING AND SHIPPING:

Diamond Crystal® Winter Melt® Ice Melter is packaged in 25lb., 50lb. and 80lb. polyethylene bags and 10lb. plastic bags packed 4 per bale. To improve caking resistance, the product should be stored in a dry, covered area at humidity below 75%.

METHODS OF ANALYSIS:

Methods of analysis are taken from the ASTM designation E 534-98.

CHEMICAL ANALYSIS:

Component	Units	Typical	Specification
Sodium Chloride (dry basis) ¹	%	96	94.0 min.
Calcium & Magnesium (as Ca)	%	0.5	-
Sulfate (as SO ₄)	%	1.0	-
Water Insolubles	%	0.5	2.0 max.
Surface Moisture ²	%	0.5	1.0 max.

¹By difference of impurities.

²110°C for 2 hours.

SIEVE ANALYSIS:

U.S.S. Mesh	Opening Inches	Opening Microns	Typical	Specification
3/8"	0.375	9525	2	10 max.
4	0.187	4760	22	-
8	0.0937	2380	35	-
30	0.0232	590	3	-
Pan	-	-	5	20 max.

Note: Sieve analysis is reported as percent retained.

BULK DENSITY:

Parameter	Typical	Specification
Pounds per Cubic Foot	72	66 - 82
Grams per Liter	1155	1055 - 1310

Note: Bulk density is reported as loose (uncompacted).

PRODUCING LOCATIONS: BUFFALO, IA; CHICAGO, IL; CINCINNATI, OH; DUBUQUE, IA; PORT CARGILL (SAVAGE), MN; PITTSBURGH, PA; CLEVELAND, OH; LANSING, NY, MILWAUKEE, WI
No. 4601 Revised August 2011
Product Codes 25 lb. 7704 50 lb. 7709 80 lb. 7715 4/10 lb. 7997

CARGILL SALT

P.O. Box 5621
Minneapolis, MN
55440
1-888 385-7258

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