ANNUAL REPORT 2018/2019

The Scientific Research Council
P.O. Box 350 Hope Gardens Complex
Mona, Kingston 6

Making Science, Technology & Innovation Work for You

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CHAIRMAN'S MESSAGE

Prof. Errol Morrison *OJ, Hon LLD, Hon DSc, MD, PhD, FRCP (Glasg), FACP, FRSM(UK), FRSH(UK)*

The financial year saw major operational improvements aimed at boosting the performance and national impact of the Council. Improvements were realized in the agency's finances; its bid towards supporting MSMEs in manufacturing, product development and business support; and in its expansion of the accreditation scope for its recognition as an ISO 17025 accredited laboratory.

The Board of Directors is pleased with the progress made by the team in supporting national development through responsible and efficient utilization of its resources and in its efforts at bringing the importance of Science, Technology and Innovation to the awareness of the population.

We wish to recognize the dedication and efforts of the team towards renovating their laboratory facilities through infrastructure upgrade and acquisition of several state-of-the-art scientific equipment in its manufacturing, research and development activities. Funding is also another noteworthy achievement as during the reporting period, new research grants and contracts were secured by the team; and these include a consultancy contract with the Caribbean Development Bank (CDB) to support entrepreneurial training across the region, and a grant from the International Atomic Energy Agency (IAEA) to support its plant-breeding program.

We are encouraged by the output of the SRC as several food, personal care and nutraceutical products developed for entrepreneurs have boosted the productive sector and created new opportunities for entering the local and international market place. This we believe is a key function and tremendous output from the country's national Research and Development Institute.

On behalf of the board of directors, I wish to congratulate the team on its superb performance during the period under review.

EXECUTIVE DIRECTOR'S MESSAGE

Dr. Cliff Riley

The 2018/19 financial year was an excellent one for the SRC, which saw several strategic and operational improvements geared towards driving national impact, useful outputs and meeting the agreed policy directives. The Council continued to place heavy emphasis on its five core operational areas, primarily: Support to Micro, Small and Medium Enterprises (MSMEs); Research and Development; Education and Popularization; Agro-processing and Agricultural production; and Supporting and fostering a culture of innovation. This year saw a heavy focus being placed on supporting MSMEs through training of entrepreneurs across the region, the implementation of funded projects, the establishment and launch of the Science Business Incubator as well as the Science Resource Centre.

The SRC's achievements during the financial year would not have been possible without the extraordinary support received from the Ministry of Science, Energy and Technology, the Ministry of Finance and Planning, our local and International partners, our hard working and dedicated staff, our dynamic management team and a supportive Board of Directors. Throughout the year, several key partnership agreements were formalized with both local and international bodies to support the growth and development of Jamaica through Science, Technology and Innovation. One such partnership was a Technical Cooperation project with the International Atomic Energy Agency (IAEA) to support a robust mutation plant-breeding program aimed at developing Jamaican Ginger and Sweet yam strains resistant to local disease. An agreement was also signed with the Caribbean Development Bank (CDB), to facilitate training and capacity building activities for entrepreneurs across the Caribbean region in climate innovation. The projects were financed through the respective entities and impacted positively on both the R&D and human capital development targets of the SRC during the financial year.

For the reporting period, several innovative strategies were employed to achieve the Council's agreed performance targets. Strategies included, strengthening of local and international partnerships, streamlining of departmental operations (including the establishment of a Biotechnology Department), retooling of laboratories and Food Incubator space, and upgrades to our physical and electronic infrastructures. We were able to successfully maintain our ISO: 9001 certifications in keeping with our customer service requirements, and expand the scope of our ISO 17025 accreditation. We currently have 14 scopes under ISO 17025, and commenced operations to facilitate HACCP certification of the Food Pilot plant. Some of the activities undertaken by the Council's team throughout the financial year are highlighted below:

The Process Development Division continued to support social and economic development through training and food incubator services, environmental management, and support to MSMEs in the manufacturing and food processing industries. Construction/Commissioning of our patented Biodigestor Septic Tank (BST) systems were completed at seven (7) locations across the island, resulting in a pollution reduction of over 478,200 L/day. Biodigester Septic Tank Systems (BST) were completed at two hospitals (Savanna-la-mar hospital, Lucea/Noel Holmes Hospital), three Ministry of Industry, Commerce, Agriculture and Fisheries project sites, one at the May Pen Tax Office in Clarendon, and one at Carron Hall High school in St. Mary. During the reporting period, a total of five (5) feasibility studies were completed and two new projects commenced jointly with the National Housing Trust (Masemure Phase II and Barham Phase II housing schemes).

The Food Pilot Plant played a fundamental role in supporting local manufacturers engaged in agro-processing to take products to market, meet production specifications and facilitate product exports. Support and services were provided in manufacturing, bottling, technical training, processing of meats, factory inspection and thermal processes. Over 80 manufacturers utilized the pilot plant, resulting in production of over 800 metric tonnes of products including jams, jellies, preserves, liquors, and flavored water. More than 70 clients utilized the drying and milling services to process over 9 metric tonnes of spices, fruits and herbs for the local and international markets. The unit also provided technical services for numerous clients for retort inspection, process scheduled, FDA filing as well as facilitated training of over 300 university students through practical hands-on sessions.

The Product Research Development Division played a significant role in driving the application of research to support product development, facilitate trade through delivery of high quality accredited testing services and production of high quality disease free plants. The team provided technical support to more than eighty (80) clients, resulting in the development of some thirty (30) new food and personal care products for clients. Of this figure, 16 were commercialized. The scientific research activities yielded three peer reviewed papers published in notable international refereed journals, one book chapter and over 20 scientific papers presented at local and international conferences. The Biotechnology department continued production activities resulting in production and release of over 90,000 disease free plants to farmers and project personnel across the island. A Temporary Immersion System (TIS) was also procured to support the production of micro-tubers to better meet the needs of local Irish potato farmers. The Council through our strategic partnerships, placed heavy emphasis on bolstering and advancing our plant-breeding program using irradiation technology. The production of disease free Jamaican ginger, Irish potato, sweet potato and sweet yam plants remained a priority due to their high nutritional relevance and importance to the agriculture sector. Emphasis was also placed on the conservation and protection of endemic Jamaican plants through partnerships with the National Environment and Planning Agency (NEPA).

Science Education and Popularization are critical aspects of the Council's mandate. As such, several highly impactful events were hosted in a bid to better sensitize and educate the public on the role, relevance and impact of ST&I on one's personal life and national development. During the reporting period over 10,000 students participated in several activities including the Young Inventors/Innovator competition, Energy for Young Minds forum, and our Noble Laureate's public lecture. Additionally, over 600 entrepreneurs were trained throughout the CARICOM region in climate innovation and business development. We are also proud hosts of one of the largest and most impactful National Science and Technology Conferences under the theme "***ST&I in Business: Facilitating Trade and Global Competitiveness***" with over 500 participants from industry, academia, public sector and international organizations. Regional partnerships were maintained *via* the Caribbean Energy Information Systems (CEIS) to coordinate data sharing activities in renewable energy and petroleum statistics. A partner meeting was also hosted in Trinidad and Tobago to plan and develop strategize to strengthen the network and boost its impact throughout the region.

The Marketing and Corporate Communication Division continued to drive public awareness on the activities of the Council through a series of workshops and tours, as well as community-based activities, conferences and expos and sensitization through different media platforms. The main priorities centered around product development, product standardization and scale-up to support products primarily by MSMEs. Increased entrepreneurial interest was stimulated through workshops in meat processing, wastewater management, biotechnology, and personal care product development. We also improved the visibility of our service offerings to the public by participating in various public exhibitions and events, including the UDOP Conference, and the Denbigh Agricultural Show, among others.

Throughout financial year 2018/19 the SRC through its innovative team and partners played a major role in shaping the socio-economic space in Jamaica through the application of Science, Technology and Innovation. The team is very excited to extend its strategies and innovative approaches in the upcoming 2019/2020 fiscal year, and look forward to the continued support of the various Ministries, Departments and Agencies of the GOJ as well as other local and international partners.

PRODUCT RESEARCH & DEVELOPMENT

Dr. Charah Watson, Manager

OVERVIEW

During the 2018/19 Financial Year, the Product Research & Development Division implemented strategic programmes to support SMEs and agricultural production, as well as coordinate impactful research and develop tactical alliances.

During the period, several peer reviewed publications on research findings were published, and several presentations were made at both local and international conferences. We improved the technical capacity of our team members, as well as benefited from improved infrastructure which impacted positively on staff productivity and effectiveness.

These improvements translated to increased income generated during the period. Overall, income generation for the period under review totaled $34.7M compared to $31.5M in the previous financial year. Improved revenue earnings were seen in all departments. This year saw the Analytical Services Division earning $29.1M, the Food Unit earning $4.0M, the Natural Products Unit earning $601K and the Biotechnology Unit earning $969K.

Continued growth of client base, and income generated is expected in the 2019/20 financial year.

ANALYTICAL SERVICES DEPARTMENT

During the period under review, there was a marginal increase in the number of analyses conducted, moving from17,102 in the previous financial year to 17,902 this year. This was mainly due to increased demand for environmental tests (swabs &air quality) as well as food tests. Water analyses completed moved from 1,578 to 1,905 and food analyses moved from 12,405 to 14,369 for the years compared. The main achievements for the period under review are presented below:

Maintenance of ISSO 9001:2015 and 17025 Certification and Accreditation

The unit underwent both internal and external audits and maintained it accreditation and certification statuses. The ASD was recertified by JANAAC and issued with a new license spanning November 2018 to November 2022.

Infrastructural changes and renovations

A new water system was installed to provide quality lab grade Ultra-Pure and Reverse Osmosis water for analytical testing.

Improvement in Services

During the period, there was improvement in services offered as follows:

- Heavy Metal testing brought in house for water (potable & waste),
- Major contractual project executed for the Water Resources Authority (analysis of waste water), and
- Banana Board for water quality (Jan 2019) towards GGAP certification.

Capacity Building

Team members participated in several technical and administrative workshops. Some of the training included:

- Leading with Emotional Intelligence,
- Training in PCR with Biotech (Microbiology tests),
- ISO/IEC 17011 2017 Conformity assessment, in fulfillment of the requirements for accreditation bodies, and
- Corrective action training at JANAAC.

NATURAL PRODUCTS UNIT

During the reporting period, the Natural Products Unit (NPU) focussed on client projects that were carried over from the previous year. Notwithstanding, the Unit continued to provide opportunities for the development of novel products and creation of businesses, as well as promote innovation and economic growth, through research and development of native materials.

The accomplishments of the unit are highlighted overleaf.

Client Services

There were 86 enquiries addressed during the period. The requests covered plant/oil/essential oil extractions, product development, product testing, requests for workshops, information on specific plants, or request for general information.

From the enquiries, 52 clarification meetings were held and 12 letters of intent were issued. Additionally, 14 proforma invoices were generated from 16 requests for Certificates of Analysis (including castor oil analysis and hydro distillation of pimento berries, lemon grass and ginger powder).

Four projects related to product development were completed, and another five projects were near completion. Two requests were received for consultancy services related to:

(i) Effect of Polyphenols in Jamaican Herbal Teas on Probiotic Bacteria, and
(ii) HPLC Amino Analysis of Plant Extracts.

The former request was completed, however, the latter was cancelled due to technical issues arising with the HPLC equipment.

Training Workshops

Three personal care product development workshops (in bar soap, lotion and body wash) were hosted during the financial year, and resulted in the training of 32 individuals. Strategies will be reassessed to ensure that the types of training workshops being offered fit with current market trends and demands. This should result in more interest and participation from the general public.

Research Projects

There were four research projects at various stages of implementation. A fifth project is in the development phase and should be implemented in the 2019/2020 fiscal year. The research projects undertaken are as follows:

1. Investigation of the Phytochemical and Growth-Inhibition Properties of *Spondias dulcis*

This study is jointly between a private client and the Council. It is aimed at determining the phytochemical profile of native *Spondias dulcis* (June plum) seeds, and to assess various seed extracts for their potential to inhibit the growth of radish seed radicles. Inhibiting radical growth may have implications for use in inhibiting the growth of cancer cells. After several trials, one extract of a given concentration has displayed noticeable radicular growth inhibition properties. Further evaluations are ongoing.

2. Phytochemical Properties, Nutritional Profile and Physico-Chemical Characteristics of *Entada gigas* seeds from an Indigenous Community in Jamaica

Preliminary phytochemical screening and nutritional analysis conducted, revealed the presence of beneficial compounds in the seeds of *Entada gigas* (Monkey ladder or sea bean). The analyses indicated that the seeds possess nutritive values, comparable to other conventional edible legumes and is notably rich in protein. However, the seeds also contain antinutrients such as saponins, which can be reduced by prolonged soaking in water for 21 days (a processing method adopted from the Accompong Maroons). From this investigation, the soaking method was found to be the most effective at significantly reducing the levels of the various phytochemicals including the anti-nutritional components, tannin and saponin (p <0.05). Further studies are ongoing to determine a more suitable processing technique that will significantly reduce the high saponin content, without diminishing the nutritionally beneficial compounds of the seed.

3. Nutraceutical Capsule Development using Jamaican Herbs and Starches

This project is focused on the development of standard capsule formulations using herbal extracts, and subsequent analysis of performance and potency. Turmeric plant material, which served as the active component of the nutraceutical capsule, was previously collected, processed and will undergo phytochemical screening and quantification via HPLC, prior to capsule formulation. The project aims to develop protocols for the development and verification of nutraceuticals utilizing local materials.

4. Evaluation of Anti-Feedant Activity of Five Insecticidal Prototypes against Callaloo Pests

The anti-feedant properties of five plant extracts: Coralita (*Antogonon leptopus*), Guinea Hen Weed *(Petiveria alliacea)*, Coconut Leaf (*Cocos nucifera*), Neem *(Azadirachta indica*) and Seaside Grape (*Coccoloba uvifera*) were investigated for activity against callaloo pests.

Investigations under plot conditions were terminated due to challenges related to abiotic factors. However, due to the promising results of some of the assessed plant extracts, laboratory assays were initiated. Two anti-feedant experiments have been conducted, to test the larvae of two different species of Lepidoptera (*Spoladea recurvalis* and *Spodoptera eridania*) obtained from established cultures, against the hexane extract of coconut leaves. The results suggested that higher concentrations of this extract are potentially effective in retarding the feeding of the test insects. Further assessments will continue as the correct larval stages are bred and become available.

5. Identification and Testing of Medical Cannabis, Cannabis Extracts and Cannabis-Infused Products to support the Regulation of the Industry

This project will facilitate the identification and quantification of the active compounds (cannabinoids and terpenoids) in various cannabis strains grown locally, and subsequently facilitate the development of standardized protocols that can be used for the testing of medical cannabis and products derived from or inclusive of cannabis. Methods for analysis have been identified and the cannabis standards (for HPLC analysis) have been obtained.

Grant Funding for Standard Development

One grant funding document was prepared and shared with a number of local castor oil stakeholders. These included the Jamaica Castor Industry Association (JCIA), Jamaica Promotions Ltd. (JAMPRO) and the Bureau of Standards Jamaica (BSJ). Funding is being sourced through Compete Caribbean/JBU Cluster Project, and Agricultural Competitiveness Programme Bridging Project via the Ministry of Industry, Commerce, Agriculture & Fisheries (MICAF) in the amount of J$13M. These funds will facilitate implementation of the project: ***Standardization of the Physicochemical and Process Parameters in the Commercial Production of Jamaican Black Castor Oil***. There are currently no standards available for the Jamaican black castor oil (in Jamaica) and so, this project will be instrumental in developing the profile for the Jamaican black castor oil, which will then guide standard development process.

Training of Staff

NPU team members were in attendance or participated in the following conferences, seminars, workshops:

<u>Conferences</u>

- The Make Your Mark Middle Managers' Conference April 24-25, 2018,
- SRC Biennial S&T Conference: ST&I in Business, November 19-20, 2018, and
- University Diabetes Outreach Program (UDOP) Conference, May 24-26, 2019.

<u>Lectures/Seminars:</u>

- Mutation breeding for crop improvement,
- The Impact of Oxidative Stress on the Manifestation of Type 2 Diabetes (presented by Channtal Golding on July 12, 2018,
- Low Temperature Food Processing (presented by Mylinda Dosunmu in February 2019), and

- Strategies for Professional Advancement Seminar (hosted by SoSA at the University of Technology).

Workshops:

- Abstract Writing Workshop Faculty of Medical Sciences, UWI, Mona (June 15, 2018),
- Internal Training: Project Development (October 11, 2018),
- SRC/Petrojam Biostatistics Workshop (April 17, 2018 - May 31, 2018),
- In House staff training on 'Emotional Intelligence (July 27, 2018),
- Risk Management Workshop (August 21, 2018),
- Documented Information and Records (September 14, 2018),
- Project Development Workshop (October 11, 2018),
- IAEA Regional Workshop on Project Design Based on the Logical Framework Approach and Best Practices (November 12-16, 2018), and
- Compete Caribbean/JAMPRO Castor Oil Industry Strategy Workshop (January 22, 2019).

BIOTECHNOLOGY UNIT

The Biotechnology Unit continues to be one of the main research centres within the Council. For the period 2018/19 several on-going and new research projects were undertaken. Details of the respective projects are given below:

1. International Atomic Energy Agency (IAEA) Funded Project 2018-2022 (JAM5013)

Establishing a mutation breeding program for ginger and sweet yam, is critical for Jamaica, as these crops are of high economic value. The plants are known for their broad spectrum of biological and pharmacological applications (ginger) and increasing use for the making of pharmaceutical products (yam). However, they are both susceptible to fungal diseases, which severely hamper plant growth and development. Tissue cultured ginger and sweet yam explants were shipped from the SRC to the FAO/IAEA Laboratory for irradiation and X-ray treatment. Both explants were treated with 3 doses of gamma irradiation (as shown by Figure 1) and X-ray treatments respectively (shown in Figure 2).

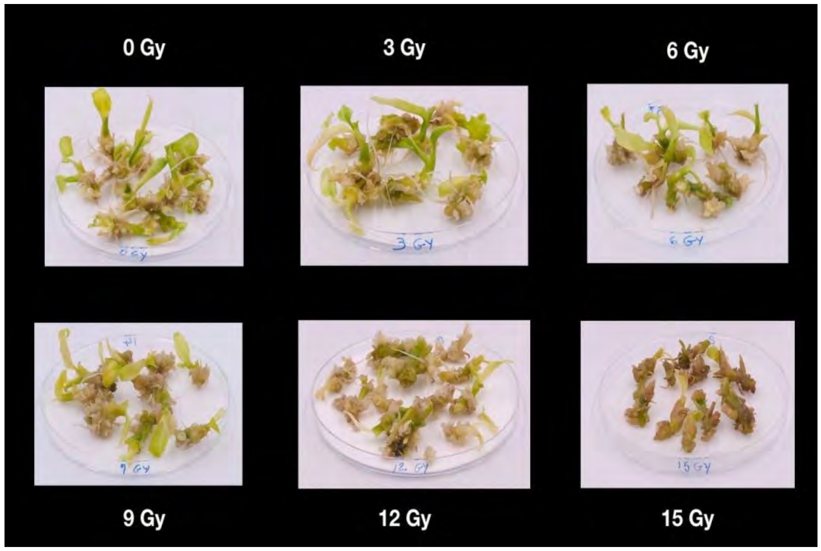


Figure 1. Jamaica blue ginger explants 28 days after exposure to different doses of gamma radiation

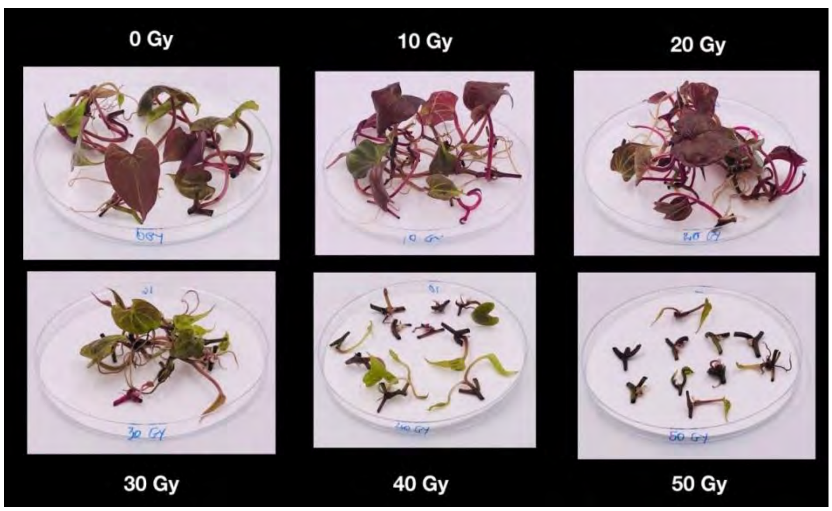


Figure 2. Sweet yam explants 21 days after exposure to different doses of X-rays

The mature plantlets were shipped back to Jamaica and are currently being multiplied *in vitro* at the Council for further investigation and selection of mutants resistant to pathogens. *Phythium aphanidermatum*, *Fusarium oxyporium* and *Ralstonia solanacearum* are being investigated for ginger, and *Collectotrichum gloeosoroides* for sweet yam, both under greenhouse conditions. The resistant or tolerant lines will be selected and multiplied via tissue culture for further evaluation in field trials. It is expected that Gamma ray and X-ray treatments will produce plant lines resistant and or tolerant to the specified diseases.

2. The Endophytic Diversity of *in vitro* Jamaican Ginger (*Zingiber officinale* Rosc.)

Knowledge of the true ecological biodiversity which exists in the Jamaican ginger microbiota is very limited. In response to this, tissue culture of ginger has been considered vital for germplasm conservation and resuscitation of the industry, in response to ginger rhizome rot disease. This is a preliminary report on the bacterial and fungal species identified from three locally-grown varieties of ginger: *Jamaica Blue, Jamaica Yellow and Hawaiian*. These were obtained from ginger rhizomes collected from various parishes within Jamaica (St. Andrew, St. James and Clarendon). Following initiation and establishment, the *in vitro* cultures were evaluated using matrix-assisted laser-desorption and ionisation time-of-flight mass spectroscopy (MALDI-ToF-MS). Morphological examination was used to identify fungal isolates. *Pantoea sp*., *Ochrobactrum sp*., *Tsukamurella sp*., *Acinetobacter sp./Arthrobacter sp*., *Cladosporium sp*. and an *Aureobasidium*-like fungus were isolated from various ginger plant tissues. This is the first report confirming identification of these endophytic microbial species in ginger following *in vitro* establishment. None of these organisms have been recorded as known plant pathogens of ginger, and do not belong to the typical genera which have previously been isolated in Jamaica from ginger namely, *Pythium spp*., *Fusarium spp*., *Ralstonia solanacearum*, *Erwinia* spp. and *Rhizoctonia solani.* Further studies using molecular characterization and phylogenetic methods, are crucial in order to elucidate the roles of these microorganisms in *in vitro* ginger development, plant growth-promoting activity and field acclimatization.

Table 1: Microbial Species Identified in Ginger Cultivars

Cultivar	Microbial Species Identified
J. Blue and J. Yellow **(Source: Unknown)**	*Pantoea sp.*
J. Blue, Garlands, St. James	*Ochrobactrum sp*. and '*Aureobasidium*-like' fungus
Hawaiian **(Source: Unknown)**	*Acinetobacter spp. / Arthrobacter sp.* *Cladosporium sp.*
J. Blue, St. Andrew	*Pantoea sp.* and *Tsukamurella sp.*
*Hawaiian ,*St. James	*Pantoea sp.*
J. Blue and J.Yellow, James Hill, Clarendon	*Pantoea sp*. and *Ochrobactrum sp.*
Hawaiian **(Source: Unknown)**	*Pantoea sp*. and *Ochrobactrum sp.*

3. *In vitro* gene bank

During 2018/19 four types of food crops were initiated. These included cassava, ginger and *Cannabis sp*. The food crops initiated are summarized in Table 2, and Figure 3 shows the varieties from each group.

Table 2. Cultivars collected locally and added to the Gene Bank during 2018/19.

Food Crops	Number of varieties	Common Name
Manihot esculenta	7	Bernard Lodge BRA 383
		Wallen CM2776-5
		Benard Lodge CM516
		Bernard Lodge CM2772-3
		Bernard Lodge CM849
		Wallen Blue bud
		Wallen unknown 001
Zingiber *officinale*	2	Jamaica Yellow
		Jamaica Blue
Cannabis sp.	12	Train wreck
		Guru Sour Mac
		Kosher
		White widow
		Kush
		Razor Back
		Life Sci
		Kosher
		Most wanted
		E1
		E2
		E3

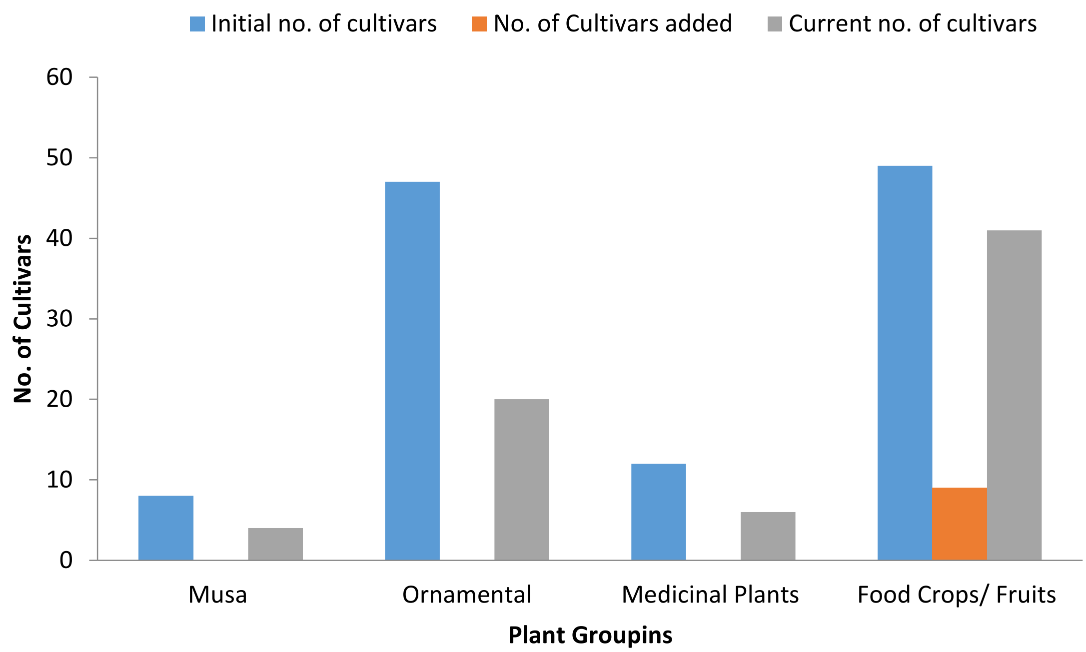


Figure 3. SRC gene bank summary for the year 2018/19.

4. Deuterium labeled pulse grains

The aim of this study was to develop a minimally invasive method to accurately measure protein quality in pulse grains. Doing this, can inform dietary choices consistent with good health. A pilot study was conducted to establish the intrinsic labeling of *Phaseolus vulgaris* (red peas) and to produce 100-1000 g dry weight of peas. For labeling, Deuterium oxide (D_2O) was added to the irrigation water two weeks after anthesis (see Figure 4).

In addition, twenty-five pots with plants were use as controls and treated with water only (400 mL). D_2O labeled beans (605 g) were handed over to UWI for characterization and human protein nutrition trails.

Figure 4. Deuterium oxide labeled kidney beans germinating at Day 45.

Table 3. D_20 labeled beans dry weight post-harvest.

Harvest Date	***Additional D_2O***	***Dry weight (g)***	***Soil mix***
2018/07/11	2.5% - Day 1, 4 & 5 post initial labeling	249.9	Lambert germination soil mix (LM-1)
2018/10/29	None	101.4	- Soil, peat moss, perlite mix (1:1:1) - Newport Fersan nutrition program applied
2018/11/28	2.5% -Day 3 & Day 7 post initial labeling	254.5	-Lambert germination soil mix (LM-1) -Newport Fersan nutrition program applied

5. Propagation of Irish potato (*Solanum tuberosum*) microtuber via Temporary Immersion System (TIS).

Potato is the fourth most important food crop worldwide, and is used as food for humans and animals, and as raw material for the food processing and starch industries. Despite these advantages, potatoes are susceptible to a variety of diseases that reduce yield and tuber quality.

Pathogens accumulate in successive colonies of tubers and in the soil used to grow them. Tissue culture micro-propagation was used to revolutionize the potato industry in the 1970's, and with this technique disease-free plantlets were used to produce healthy seed tubers for farmers (Lutaladio and Castaldi, 2009). However, this method is time consuming and requires acclimatization of plantlets before mini-tuber production. A temporary immersion system (TIS) provides several advantages over *in vitro* micro propagated plants due to the fact that micro tubers produced by the TIS can be stored and transplanted directly into the field without an acclimatization stage (Jimènez et al., 1999). Therefore, the SRC in collaboration with WUSC-Propel utilized the temporary immersion system to produce micro tubers that met farmers' expectations. Optimization of TIS continues to ensure maximum yield and quality of micro tubers generated (Figures 5 & 6). The target is 50,000 micro tubers per annum.

Figure 5. Micro tuber production using Temporary Immersion System (TIS).

Figure 6. Micro tubers produced by Temporary Immersion System (TIS) after 9 weeks.

FOOD RESEARCH AND DEVELOPMENT UNIT

The Food Research and Development Unit continued to play an important role in fostering the growth of the agro-industry. Over 95% of the clients that sought technical assistance from the Unit were interested in adding value to local produce, and in the standardization of homemade recipes for commercialization.

Some of the R&D projects executed to support growth in the food Industry are as follows:

- Conducted shelf life studies on eight (8) verities of onions grown locally
- Conducted preliminary research to determine antioxidant activities of spray dried guava leaf extract
- Developed low glycaemic index beverage
- Development of low glycaemic index Veggie Nugget/Burger with sweet potato base (see Figure 7).

Figure 7. Veggie nugget made from sweet potato base

Research Projects

During the year, the unit held consultations with over sixty (60) clients seeking technical assistance through clarification meetings. Sixty (60) letters of intent (LOIs) were drafted and sent to clients. Of the total number of LOIs sent, twenty-four (24) contracts valuing over J$5.3M were signed for the development and/or standardization of new products for the agro-processing industry. The conversion of LOIs to signed contracts increased from 22% last financial year to 40% for this reporting period.

Eighteen projects (18) projects were completed and handed over to clients during the year. By the end of the financial year, ten (10) projects were on-going, and at varying stages of completion ranging from 60 % to 95% complete.

Nutritional Labelling

A total of one hundred and ninety-six (196) nutrition facts panels were generated during the period, generating over J$1.6M in earnings. Of this figure, 185 were done via database and 11 via analysis.

The total earning of the Food Research & Development Unit for the period under review was just over J$4M.

Workshops

A workshop on Food Additives was conducted and ten (10) participants benefited. The workshop was geared towards assisting SMEs within the food industry better utilize and understand the use of food additives in their various products. The standardization of working recipes for products being manufactured by SMEs were also addressed, as this is a necessary activity for the correct determination of controlled additives such as chemical preservatives.

PROCESS DEVELOPMENT DIVISION

Mrs. Jodi Dunn, Manager

OVERVIEW

The Process Development Division provides sustainable solutions to the productive and non-productive sectors. These solutions are in the areas of process design, process flow and quantification, equipment selection and maintenance, and feasibility studies. The unit also provides information, technical advice, and training, as well as encourages use of our Pilot Plant facilities.

Staff members continued to avail themselves of opportunities provided for training and development, as the division aggressively sought to boost competence and expand capabilities. Several seminars and webinars were attended. Listed below is a few of such:

Webinars & Seminars

- “How Product Developers Affect Food Safety”,
- “Risk Reduction through Better Contract Management”,
- “Step by Step: How to Build a Better Estimate”,
- FSSC 22000 version 4,
- Applying Risk based thinking to Food Safety, and
- Water use optimization & Protected Agriculture Technologies”.

External training workshops

- GMP awareness at Bureau of Standards, Jamaica,
- Coconut Workshop at Caribbean Week of Agriculture in Barbados,
- The Future of the Food-Health Nexus on Caribbean Development, and
- Transitioning from Team Member to Team Leader.

Membership in select professional associations, trade associations and service groups was maintained for the following societies:

- Institute of Food Technologists,
- Professional Engineer status maintained with PERB Jamaica, and
- Jamaica Institute of Environmental Professionals (JIEP).

Membership in these associations helps maintain the quality of information possessed by staff, which in turn impacts service delivery to clients.

WASTE RESEARCH MANAGEMENT & TRAINING CENTRE (WRM&TC)

The primary objective of the center is to reduce pollution through the design and implementation of anaerobic systems, for the treatment of municipal and agro industrial waste. This will generate useful byproducts such as biogas as a source of alternative energy.

Customers desirous of maintaining a green environment has resulted in the demand for the wastewater management services of the SRC.

The suite of environmentally sound wastewater management systems offered during the reporting period was as follows:

(i) the Biodigester Septic Tank for the onsite treatment of domestic sewage

(ii) the Biodigester for the treatment of solid organic waste and

(iii) the Upflow Anaerobic Sludge Blanket Reactor (UASB) for the treatment of liquid waste (sewage, agro-industrial and industrial).

The services offered in Wastewater Management for 2018/19 were centered on the following activities:

1. Consultancy and Contract Research,
2. Monitoring and assessment of wastewater treatment facilities,
3. Feasibility studies for design and implementation of household/decentralized sewage treatment facilities,
4. Feasibility studies for design and implementation of Biodigesters for farms and schools
5. Proposals for the design and implementation of wastewater treatment systems for the agro-industrial and municipal sectors,
6. Awareness sessions and presentations to various sectors, and
7. Monitoring implementation of wastewater treatment systems.

Feasibility Studies/Proposals

Four new feasibility studies were prepared for the implementation of wastewater treatment systems. Proposals were also prepared for assessments carried out at five existing treatment systems. The majority of these feasibility studies/proposals were for the treatment of domestic waste.

Some of the entities for which feasibility studies and proposals were completed were as follows:

- Schools,
- Housing Developments,
- Single Households,
- Industrial entities, and
- Farms.

A comparison of the number of feasibility studies done over a five-year period is given as Figure 8.

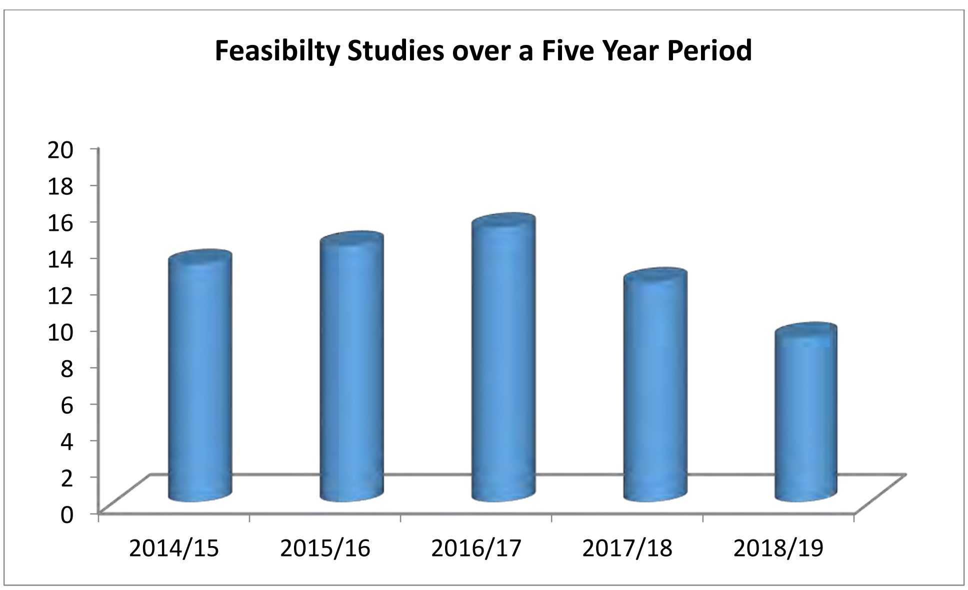


Figure 8. Graph showing the amount of feasibility studies completed over the past five years.

Implementation of Wastewater Treatment Systems

Implementation of anaerobic treatment systems continued to be a major focus of the Wastewater Unit during the reporting period. The year saw the construction and commissioning of one (1) domestic wastewater treatment system and one (1) farm system. These were located at Edinburgh Avenue, Kingston and Carron Hall, St. Mary respectively. Construction activities continued on two (2) domestic wastewater treatment systems in Westmoreland, while commissioning activities were on going for two (2) systems in Kingston and Clarendon.

During the previous year, commissioning activities commenced on eight (8) wastewater treatment systems, and were completed during the reporting period. These systems are located in St. Andrew, St. Thomas, Trelawny, Westmoreland, Clarendon and Hanover.

Figures 9 and 10 show various stages of construction during the reporting period.

Figure 9. Construction activities at Barham Phase II, Westmoreland

Figure 10. Masemure Phase II Wastewater Treatment Plant 80% Complete, Westmoreland

Consultancy Services and Contract Research

Consultancy services continued with three companies as follows:

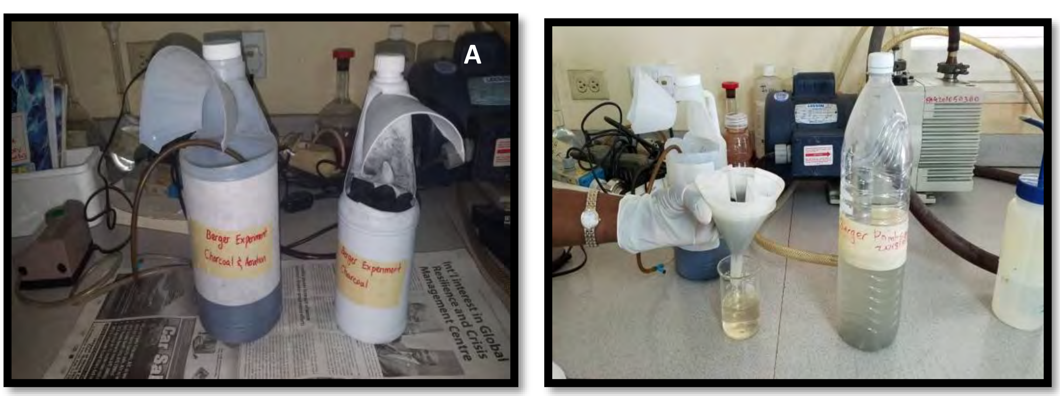
- **Ironshore Construction Company**. We continued monitoring of the system in fulfillment of the National Environmental and Planning Agency (NEPA) Permit and License. Sampling and analysis of final effluent was done during the reporting period. Quarterly reports were prepared and submitted to the NEPA,
- **Logistical Distribution and Services/Grace Distribution Centre**. We continued sampling and analysis of final effluent from two sample points of the wastewater treatment system at Salt Pond, St. Catherine, and
- **Stanmore, St. Ann**. Sampling and analysis of final effluent commenced for a housing development at the above named location.

Figure *11. Sampling site (pond) at Ironshore, St. James*

Sampling and analysis of effluent in fulfillment of SRC's contracts with respect to commissioning continued for:

- Caribbean Products Limited, Spanish Town Road, and
- Berger Paints Jamaica Limited, Spanish Town.

Research on the reduction of Total Nitrogen in wastewater using aeration and charcoal is being carried out on samples collected. Figures 12a and 12b show the experiments set up for the samples taken at Berger Paints Limited.



Figures 12A and 12B. Experimental setup up for Berger Paints Limited samples, using charcoal

Samples were also collected and analyzed for:

- Chas E. Ramson Limited,
- Spur Tree Spices, Marcus Garvey Drive,
- Mavis Bank Coffee Factory, and
- Edge Chem Limited.

Consultancy Services for the Acquisition of NEPA Licenses

Service in the acquisition of NEPA permits and licenses was carried out for a client at DeCarteret Road, Manchester. Confirmation was also obtained from NEPA that permit and license for Rock Spring Farms was granted.

Research

Research work commenced in the following areas:

- Biogas production from horse manure via a set up pilot,
- Reduction of Total Nitrogen in wastewater using aeration and charcoal, and
- A proposal was completed for the following topic: "Wastewater Nutrient Removal Efficiency of Moving Bed Biofilm Reactors (MBBR) on Bio-digester Septic Tank (BST) Effluent".

FOOD PILOT PLANT/FOOD PROCESSING UNIT

In this dynamic period in Jamaica, the Food Pilot Plant/Food Processing Unit continued to provide assistance in the Agro-processing Industry, utilizing science and technology applications to promote growth. During the financial year 2018/19, the Unit saw an increase in the demand for its incubator facility and other services, such as packaging and retorting. However, there was decrease in demand for milling & drying, and for meat processing services.

The year saw the Food Pilot Plant facilitating a pre-certification Audit by Technological Solutions Limited. This was conducted with the assistance of our Hazard Analysis Critical Control Point (HACCP) Coordinator (Mrs. Tiffany Laughton), as we continue to work towards HACCP compliance.

A number of infrastructural works to upgrade the plant was also accomplished during the period. A Chamber Floor Vacuum Sealer was also acquired.

Incubator Services and Equipment Rental

Drying and milling of herbs, spices and fruits declined during the period, but an average of nine (9) clients utilized the facility on a monthly basis for this service.

11, 013 kg of materials were received for processing. The main products were:

- Scotch bonnet pepper
- Guinea-hen weed
- Ginger
- Thyme
- Pimento
- Turmeric
- Lemon grass
- Sweet potato
- Sea moss
- Moringa
- Sorrel in syrup
- Breadfruit
- Escallion
- Green bananas

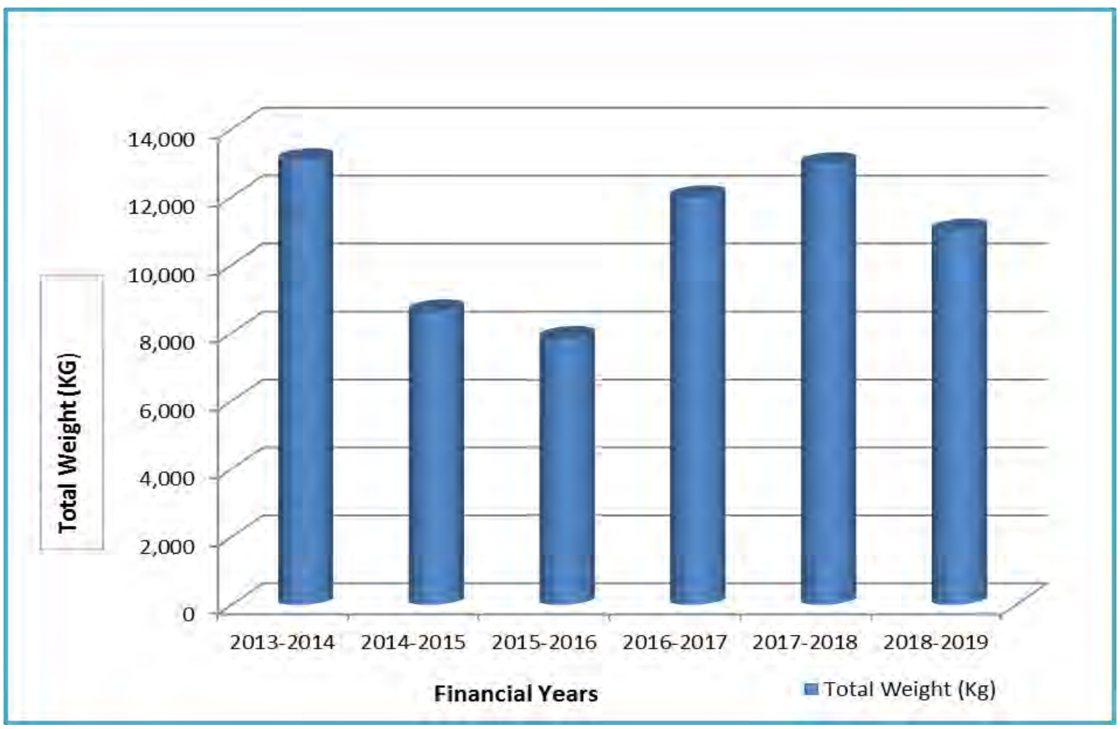


Figure 13. Chart showing the quantity of products dried and milled over six (6) years in kilograms

Meat Processing

Processing and sale of smoked meats has decreased marginally for 2018/19. Over **6,000 kg** of meats were received for processing for both clients and SRC respectively.

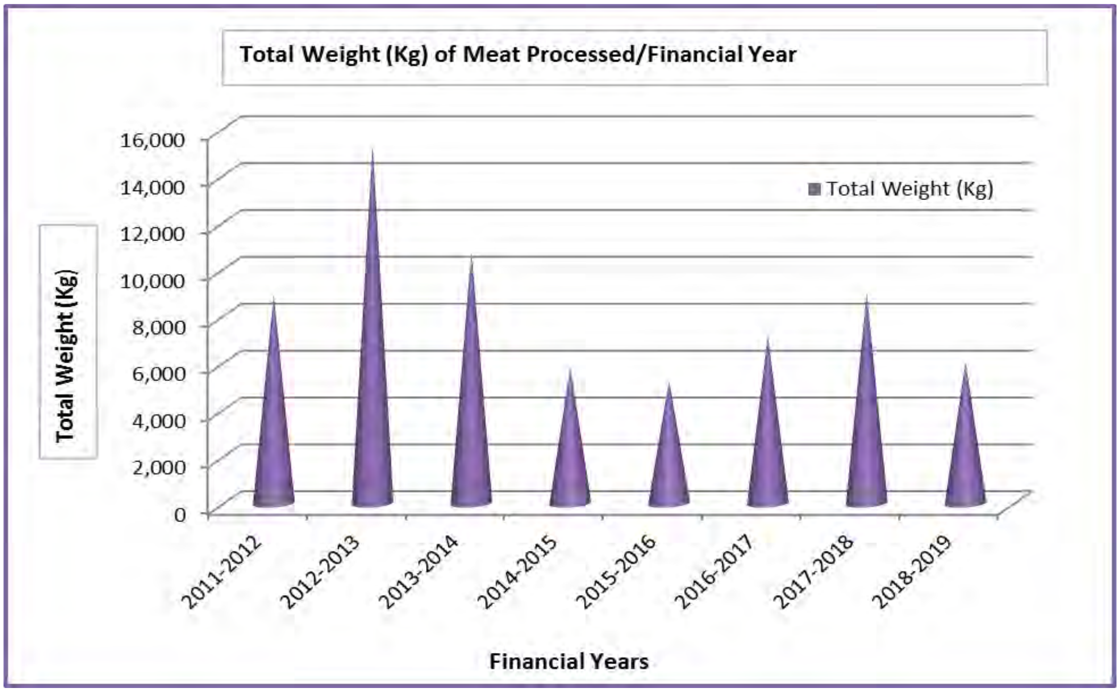


Figure 14. Chart showing the quantity of meat processed over eight (8) years in kilograms

Products processed for clients generally included:

- ✓ Pork carcass
- ✓ Pork legs
- ✓ Chickens
- ✓ Fish
- ✓ Turkey
- ✓ Mutton
- ✓ Beef

The meat products made available for sale from the Food Pilot Plant were:

- ✓ Ham (whole and sliced)
- ✓ Smoked chops
- ✓ Bacon
- ✓ Smoked spare ribs
- ✓ Smoked hocks
- ✓ Smoked chicken (whole)
- ✓ Smoked roasters (chicken)
- ✓ Smoked pigtails
- ✓ Smoked ham bone
- ✓ Jerked chicken sausages

Packaging

Ten clients utilized our packaging services during the period, for the following products: honey, breadfruit flour, gluten-free patties, cornmeal, ground pimento, ground turmeric, ground ginger and assorted herbal tonics.

Heat Treatment

We had continuous demand from one client to provide heat treatment to an assorted number of herbs such as cerasee, guinea hen weed and ground tumeric. The total amount of product treated in this fashion totaled over 3,400 kg.

Pilot Plant Rental

An average of ten clients was facilitated per month during the reporting period. We saw a total of sixteen (16) new clients and twenty (20) existing clients utilizing the space to produce over **69,000 kg** of product. This is represented in Table 4.

Table 4. List of products manufactured at the SRC during 2018/19.

▪ Rum Punch	▪ Guava Drink	▪ Assorted Fruit Purees
▪ All Purpose Seasoning	▪ Spicy Cranberry Sauce	▪ Cinnamon Drink
▪ Honey Mustard Sauce	▪ Coffee Syrup	▪ Tomato Chutney
▪ Mango-Pineapple Sauce	▪ Melon Aloe Vera Flavoured Water	▪ Barbeque Sauce
▪ Spicy Jerk Seasoning	▪ Pineapple Aloe Vera Flavoured Water	▪ Mild Jerk Seasoning
▪ Yellow Pepper Sauce	▪ Assorted Honey Water	▪ Fruitcake Wet Mix
▪ Red Pepper Sauce	▪ Pineapple Jam	▪ Sorrel concentrate
▪ Solomon Grundy	▪ Green Pepper Sauce	▪ Honey
▪ Pepper Mash	▪ Spicy Mango	▪ Mild & Spicy Ginger Pepper Jellies

▪ Assorted Scotch Bonnet Pepper Jellies	▪ Sorrel Topping	▪ Sweet & Sour Sauce
▪ Lemon Grass Flavoured Water	▪ Assorted Beetroot Juices	▪ Ham Glaze

Consultancy Services

The demand for consultancy services continued to increase, especially in Thermal Process Development, such as Scheduled Process for low acid foods, and Process Schedule for acidified foods. Some of the main areas are highlighted below:

- One client was assisted with FDA filing (Home Choice for their Solomon Gundy),
- Scheduled Process for Canned Callaloo in Brine (A2 cans) and Canned Butter Beans (A2) were developed for two (2) clients,
- One client was assisted with vent scheduling (Norsai Enterprise),
- One client was assisted with Process Schedule for Lime Ginger Extract (Home Choice),
- Technical advice and assistance was offered to at least 45 clients in various aspects of Food Technology/Processing,
- Five Coconut Processors and 93 Coconut farmers were assisted with GMP/HACCP awareness training, and
- Retort inspections were conducted at thirteen (13) factories during the reporting period namely Norsai Enterprise, Canco Limited, Grace Food Processors-Meat Division, Ashman Foods, Stanmark Processors, Island Packers, Grace Agro-processors, Southern Fruits & Food Processors Limited, Double Deuce, Mussons, Triple C Limited, Tijule Limited, Goshen Manufacturing & Distributors and Central Food Packers.

Training

Two sets of training were executed this period, for tertiary level students, and a company. These are described briefly below:

Over 150 students were accommodated from 6 tertiary institutions as listed below:

- University of the West Indies,
- University of Technology,
- Northern Caribbean University,
- Shortwood Teacher’s College,

- College of Agriculture, Science and Education, and
- MICO University College.

Student development was facilitated through practical training in several aspects of food processing, which included: meat processing, sauces, canning, manufacturing of chips, minimal processing, flour processing from tubers, dehydration of fruits & vegetables and processing of jams & jellies. Practical demonstrations and regular tours were also conducted for primary, secondary and tertiary level institutions.

Three major company tours were facilitated during the year, as described below:

- A total of 21 participants from the Ministry of Science, Energy & Technology, and the Ministry of Finance were facilitated during the inaugural ***SRC Experience*** on February 15, 2019. The participants experienced firsthand the sausage and chips making processing processes respectively,
- Six (6) participants from HEART/NTA observed demonstrations in canning, can tear down and impulse sealing, and
- Fifteen (15) participants from the FHI360 Teacher Training Programme, received a presentation on different types of food processing techniques, and saw practical demonstration of meat curing.

INFORMATION SERVICES DIVISION

Ms. Kerry-Ann Curtis, Manager

OVERVIEW

The Information Services Division maintained and improved its local and regional impact in public education activities. Of significance was the inclusion of the incarcerated in our training activities, with specific focus on food processing, as a means of job creation upon release. We also facilitated the exposure of secondary level students to regional energy related training, through the CARYFED experience in Barbados. A member of staff assisted the Caribbean Climate Innovation Centre to facilitate GreenTech Start Up Boot camps in Suriname, St. Lucia, The Bahamas and St. Kitts & Nevis. The boot camps engaged over 200 entrepreneurs in business education sessions, rapid prototyping and mentorship. Another member of staff attended the Summer Rivers Institute 2018 at Hamline University, Minnesota. The experience provided training in Events Planning, Principles of Project Management, Differentiated Instruction and Emotional Intelligence Training.

Additionally, the Unit facilitated the visit of Nobel Laureate, Professor Klaus von Klitzing, who delivered a lecture in October 2019.

The impact and variety of activities undertaken, is highlighted below.

CARIBBEAN ENERGY INFORMATION SYSTEMS

The activities of the Caribbean Energy Information Systems (CEIS) are regional in nature, and impact twenty (20) island member states. The main energy education programme-Energy for Young Minds (EFYM), executed its three components, vis a vis:

- EFYM platform, designed to assist secondary level students with information for their external examinations,
- the Caribbean Youth Forum on Environment & Development (CARYFED), and
- the CaribSec Energy Management Competition.

Over US $15K was solicited in sponsorship for fulfillment of the various activities.

Caribbean Youth Forum on Environment & Development (CARYFED)

In May 2018 the Jamaica Public Service Foundation and Marathon Insurance Company Limited provided sponsorship for a team of five students and a teacher to participate in CARYFED. The forum is a two-week residential event executed by Project DISCOVERY out of Barbados, under the theme "*The Business of Energy in the Caribbean*". This year's event took place in Jamaica, with participants from Trinidad & Tobago, Barbados, and Jamaica. Our contingent included representatives from Innswood High School, St. Jago High School, St. Catherine High School, May Day High School and Cross Keys High School.

The partnership proved to be very successful as the students and their teacher chaperones worked well together, learned aspects of each island's culture and carried out their community service activity well. Community services projects were at the Young Men's Christian Association (YMCA) and the Glen Hope Golden Age Home. The participants also visited the Wigton Wind Farm, the JPS Hydropower plant, The UWI Energy Efficient Building and The SRC Biodigester & Solar Drying facility. At the University of Technology, the students participated in several lectures to include topics such as "*Green Energy Careers*", *"The Impact of the Energy Sector on National Development",* and *"Technology and Innovation in the Energy Sector".*

Figure 15A and 15B. Students from three Caribbean Islands visit the SRC during CARYFED 2018

The forum culminated with a prize giving and presentation ceremony on July 14, 2018. Special prizes were awarded to different teams for competing in the CARYFED Challenge, which was to design an energy efficient vehicle, incorporating solar energy use.

Pilot Caribbean Secondary Schools Energy Management (CaribSec) Competition

Plans for the CaribSec competition began in 2017, however funding did not come in time to begin the activity in this financial year. With funds coming in towards the end of the reporting period, the competition activities will begin September 2019, and run through to November 2020, culminating with an Awards ceremony.

Seven Jamaican Secondary High Schools are expected to participate in the pilot competition namely: Ardenne High, St Hugh's High, Norman Manley High, Glenmuir High, St. Catherine High, Old Harbour High and Vere Technical High.

External Events

The unit participated in numerous events during the period under review, however the two largest events were the Jamaica Alternative Energy Expo 2018 and the Schools' Science & Technology Societies (SSTS) Invasion at Ferncourt High School in St. Ann. Photo highlights are presented in Figures 16A and 16B for the JAEE Expo, and Figures 17A and 17B for the event at Ferncourt High School.

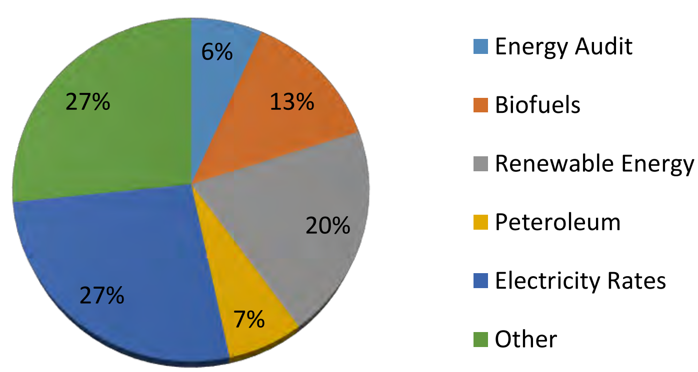
Figures 16A and 16B. CEIS represents the Council at the JAEE, June 15 and 16, 2018.

At the Ferncourt High School, the CEIS team interacted with primary and secondary level students, from various schools participating in the invasion. Information EFYM Programme and Renewable Energy were well received by the students. Some students also participated in an Energy Quiz.

Figures 17A and 17B. The CEIS team engage students at the SSTS Invasion, Ferncourt High School.

Enquiries/Information Requests Satisfied

During the period under review, a total of 15 requests for varied energy information were received and satisfied. The types of requests are presented in Figure 18.



***Other** includes requests participation in events as well as document upload to CIPORE.*

Figure 18. The types of requests received and satisfied during 2018/19

OFFICE OF COMMUNITY DEVELOPMENT

For the year 2018/19, the Office of Community Development continued to support community based activities, while providing support to Council wide activities. The Community Development Coordinator collaborated with the Product Research and Development Division to provide technical training to inmates of the St. Catherine Adult Correctional Center, an all-male facility, as part of its programme to rehabilitate inmates at the institution. Two years of discussions with the Department of Correctional Services, finally bore fruit with the first workshop held in March 2019. During this workshop, a total of 21 inmates were trained in sauce making. The activity was welcomed, as it proved beneficial to the members of the 4H Club, which make various products for their annual competitions.

Collaborative work continued with the Grace and Staff Community Development Foundation, to host a bar soap making workshop in July, 2018. The workshop which was staged in Spanish Town, hosted residents from De La Vega City and adjoining communities. The19 participants, who were all female aged 24 to 42 years, were trained in the theory and practical components for making bar soaps, and produced colourful varieties of soaps under the tutelage of members of the Product Research and Development Division of the SRC. The participants also received training in basic Business Management and Marketing by a staff of our Marketing & Corporate Communications Division. Feedback from the participants led to a follow up workshop on Costing Bar Soaps. This workshop was open to all participants of the bar soap making workshop and other interested persons. A total of 9 ladies were trained on how to determine the sale price for their bar soap products, in order to realise profit. The workshop was facilitated by Dr. Charah Watson, Manager of the Product Research and Development Division.

In an effort to broaden our reach in Community Development activities, we reached out to several funding agencies, to explore areas for collaboration. Discussions were held with the following agencies:

1. Digicel Jamaica Foundation (DJF),
2. Jamaica National Foundation: Social Enterprise Boost Initiative (JN SEBI), and
3. Environmental Health Foundation (EHF).

Officials from these agencies were sensitized to the overall roles and functions of the SRC towards national development, and specifically, our activities in community development. Discussions with EHF officials led to a Community Sensitization Session with members of the Silent Hill Community in Clarendon. The possibility exists for training in agro processing for this community group in the future. Officials from JN SEBI indicated that the SEBI project would close in October, 2018, and so there was no work for collaboration during the period under review. Officials from DJF indicated the possibility for collaboration on upcoming projects. Follow up with said officials however did not bear fruit.

Efforts continued towards assisting the Lime Tree Gardens community group to best utilize their food processing facility. A written proposal was submitted to their Member of Parliament with responsibility for the area, and we await their feedback in order to proceed.

SCIENCE & TECHNLOGY EDUCATION UNIT

The Science & Technology Education Unit (STEU) delivered on its main school based activities, namely:

- Science Summer Camps,
- National Science & Technology Fair,
- Caribbean Youth Science Forum, and
- Essay, Poster, Oratory Competitions.

Science Summer Camps

STEU members increased its participation in summer activities from 2 camps in summer 2017 to 4 camps in summer 2018. The first camp was a collaborative effort between the SRC and the Catholic College of Mandeville. This was followed by the SRC/Hope Complex Science Summer Camp and the Unit's participation in the Meadowbrook Preparatory Summer School. The summer activities culminated with the SRC/GK Parade Gardens STEM Summer Camp which was held at the Grace Kennedy STEM Centre in Parade Gardens, Kingston.

Young Scientists in Action Summer Camp - Catholic College of Mandeville

The five-day event was organized by the Catholic College of Mandeville. Members of the STEU team and the Natural Products Division interacted with 25 campers, who made soaps, lip balms and jams. The incorporation of Chemistry was met with initial resistance by some campers, but by the end of the sessions, they were excited about the subject, and proud of the items they made themselves.

SRC/Hope Complex Science Summer Camp

Twenty-five (25) students from 14 schools in the corporate area participated in the five-day camp which was hosted at the Scientific Research Council. The camp featured activities such as: Children's Guide to Entrepreneurship, Engineering, Product Development, Calculation Time and Waste Management.

A partnership was inked with the Japan International Cooperation Agency (JICA) for the execution of the SRC/Hope Complex Science Summer Camp and the SRC/GK Parade Gardens STEM Summer Camp. JICA representatives developed and demonstrated lessons in drone application, waste management, safety and Japanese culture. Additionally, tours were done at Jamaica Bauxite Institute and the Mines and Geology Division.

Figure 19. Campers and facilitators at the SRC/Hope Complex Camp are all smiles at the Closing Ceremony

SRC/GK Parade Gardens STEM Summer Camp

The camp was successfully executed with sponsorship from the Joan Duncan Foundation, National Commission on Science & Technology, JICA, Coldax Mart Limited, The Gleaner Company Media Limited, C&WJ Co-operative Credit Union Ltd., Kingston Bookshop, Junior Achievement Jamaica and Hope Zoo Preservation Foundation. Forty-four (44) students from 13 schools participated in the camp. Three (3) volunteers assisted with the camp's activities and approximately 30 parents attended the Parenting Session. The Parenting Session included presentations done by representatives from JMMB Joan Duncan Foundation, Coldax Mart Limited and the Violence Prevention Alliance. Campers were exposed to: Entrepreneurship, Robotics and Drones, Adding value to indigenous foods, Product Development, Calculation Time and the Science of Sound.

Following the culmination of the SRC/GK Parade Gardens STEM Summer Camp, a promotional activity was done at St. Aloysius Primary to recognize the school's outstanding performance at the

Camp. The Camp's Top Boy who attends the school was featured in the Gleaner's Children's Own. Copies of the publication were shared with the students and a Science Kit was presented to the Principal by our Executive Director, Dr. Cliff Riley.

Figures 20A and 20B. Campers pour their soap during the Parade Gardens Camp; Parents listen attentively to a representative of the Violence Prevention Alliance at the Parenting Session

National Science & Technology Fair 2019

In response to a Call for Applications, a total of 49 entries were received from 5 primary, 34 secondary and 10 tertiary institutions. These were further shortlisted and 34 entries (7 tertiary, 5 primary and 22 secondary) from 25 schools (20 secondary, 3 primary and 2 tertiary) exhibited at the Fair.

The 2019 staging of the National Science & Technology Fair was held on Thursday, July 4 at the Hope Complex Field, Kingston. Approximately 2,000 persons attended the event. Prior to the event, three regional Ideation Sessions were held over the period February 13-28, 2019. One hundred teachers and students participated in the eastern ideation session, 115 in the western ideation session, and 100 in the central leg. In summary, 315 teachers and students from 48 schools participated in the various sessions. Companies participating in the panel discussion of the ideation sessions were: Scientific Research Council, Jamaica Public Service, 81 Sound Entertainment, Rural Agriculture Development Authority, Grace Kennedy Company Limited, Inter-American Institute for Cooperation on Agriculture, Herboo Corporation, Junior Achievement Jamaica and Montego Bay Marine Park.

Attendees were given the opportunity to demonstrate their understanding of the concepts taught by partaking in a Pitch Competition. The winners at the primary through to tertiary levels were: Old Harbour High, Shortwood Teachers' College, St. Jago High, Horace Clarke High, Chetwood Primary, Montego Bay High School, Montego Bay Community College, Kilsyth Primary, Roger Clarke High and Northern Caribbean University.

Sponsors of the event were: the Youth Employment in the Digital & Animation Industries (YEDAI) Project, Wisynco Group Limited, JMMB Joan Duncan Foundation, National Commission on Science & Technology, Development Bank of Jamaica, LASCO Distributors Limited, Nutraganics, Herboo Botanicals, Digicel Business, ReadyTV, Grace & Staff Community Development Foundation, RadioShack, Hope Zoo Preservation Foundation, Cheetah Toys, Dolphin Cove, BCB Scientific Sales & Services, Total Jamaica and Carlong Publishers. Other partners who contributed to its planning and execution were: Caribbean Maritime University, e-Learning, and the Jamaica Environment Trust.

On the day, 25 organizations displayed their products and services while special presentations were done by: Alicia Lyttle, CEO of Internet Income Jamaica; Jamaica Moves; the University of Technology and Mr. Chris Dehring, Founder and CEO of ReadyTV. The Ministry of Science, Energy and Technology in partnership with the National Commission on Science & Technology also conducted a Science & Technology Youth Policy Consultation with 80 students.

Figure 21. The Honourable Fayval Williams, Minister of Science, Energy & Technology (centre) discusses an application submitted by students of Immaculate High School

A part of the day's offering were tours of the companies within the Hope Complex. Participating companies were CARPHA, Jamaica Bauxite Institute and Mines and Geology. Pre and post event coverage was done by television, radio, Jamaica Information Service, social media and local newspapers.

Subsequent to the competition, Lennon High, third place winner of the secondary category and winner of the award for the Most Environmentally Friendly Innovation and Best Commercial Application participated in the DIA Pitchtank Competition. The school was successful in securing grant funding for Research & Development of the product it had developed.

Vere Technical's Atmospheric Water Generator, developed for the 2017 Science & Technology Fair was also awarded a grant of $255,000 for research and development by the Joan Duncan Foundation (of JMMB).

Following the hosting of the Fair, the Unit Coordinator participated in the World Bank's Implementation Support Mission for the Youth Employment in Digital and Animation Industry Project. The team was pleased with the outcome of the 2018 Fair. It was recommended that further disaggregation of the data be done going forward.

Figure 22. Winners at the primary, secondary, and tertiary levels pose with coordinators and sponsor representatives at Science Fair 2019.

WINNERS OF THE 2019 NATIONAL SCIENCE & TECHNOLOGY FAIR

CATEGORY	WINNING SCHOOL	PROJECT NAME
3rd Place Primary	Half-Way-Tree Primary	Solar Cooker
2nd Place Primary	Seaview Gardens Primary	Fruitensils
1st Place Primary	Seaview Gardens Primary	Styromania
3rd Place Secondary	Lennon High	Cash Bush
2nd Place Secondary	Kingston Technical	Solar Cooker
1st Place Secondary	Vere Technical High	Remote Irrigation Vehicle (RIV)
3rd Place Tertiary	University of the West Indies, Mona	AgriMonitor
2nd Place Tertiary	Northern Caribbean University	P.E.T.S (Pet Eating Timing System)
1st Place Tertiary	Northern Caribbean University	Rootube Hydroponics System
Most Environmentally Friendly Innovation	Lennon High	Cash Bush
Most Innovative Entry	Vere Technical High	Remote Irrigation Vehicle (RIV)
Best Commercial Application	Lennon High	Cash Bush
Best Use of Technology	Herbert Morrison Technical High	Augmented Reality Sandbox

Sustainable Science & Technology Application at Carron Hall High School

Despite ongoing challenges during construction of the biodigester, and expansion of the piggery, the project was completed, and a walk-through and hand over of the manuals for the treatment plant was done in August 2018.

Progress of the project following its completion has been tremendous. One of the gilts was impregnated by artificial insemination and farrowed in November 2019. She gave birth to 15 piglets however five were lost within the first 24 hours. Water from the piggery is now being used to grow cash crops such as pak choi and lettuce. Nutramix, a subsidiary of Caribbean Broilers Group, continued to provide training to teachers and students. They have helped with the maintenance of the piglets by castrating the males and conducting tail docking.

Figure 23. Partner representatives at the official handover of the Biodigester system to Carron Hall High

Approximately one hundred persons (teachers and students) have benefitted from the various trainings organized by representatives from Nutramix. Included in this number are 25 students who are currently in the 10th and 11th grade. These students participated in a number of School Based Assessment exercises which included: the completion of ultrasound, examining the sanitation of the piggery unit, determining the weight of the animals and developing a feed management system.

Fifteen (15) female students from the school also participated in a “Winning Women in Agriculture Seminar” held at the Medallion Hall, Kingston on August 2, 2018. The event was organized to encourage persons to approach farming with a fresh, business oriented and modern purview.

The success of the project so far has prompted the development of similar projects at the school. The confidence level of potential funders has increased given the improvement in the school’s agricultural infrastructure, technology and expertise. Food for the Poor Jamaica has since commenced the construction of an abattoir at the school. This will make it possible for the school to slaughter its own animals, thus reducing costs associated with transportation and cold storage.

The school has also extended its expertise to the rearing of rabbits.

A project hand-over ceremony was held on February 5, 2019. It was supported by project partners (Food for the Poor Jamaica, Digicel Foundation, Caribbean Broilers Group and American Friends of Jamaica), members of the school board, RADA, a representative from the Ministry of Education, Youth and Information, staff and students at the host schools, surrounding schools and members of the community. See Figure 24 below.

Figure 24. Students and teachers look at various aspects of the waste treatment system constructed at the Carron Hall High School

Intuit QuickBooks Desktop Pro 2018 and a HP 14 Laptop/notebook were purchased for the project. The items were sponsored by the Digicel Foundation and will enhance the capacity of the project administrators to accurately record the project’s activities.

Essay/Debate Competition

The competition took on a new format with the oratory component replaced by a debate competition. The submission of essays served as the first stage of the competition, and was used to qualify entrants for the debate component. The Debate Competition utilized the 'World Schools Style' debate format, which is outlined as follows:

- 1st Speaker, allowed 5 minutes,
- 2nd Speaker, allowed 3 minutes,
- 3rd Speaker, allowed 2 minutes, and
- Rebuttal, allowed 1 minute.

Unlike traditional Debate Competitions, our competitors were placed on teams with entrants from different schools. Prior to the competition, entrants were advised of their team mates and were given relevant contact details. Entrants were also advised on whether they were opposition or proposition.

Figure 25. Students present their arguments during the Debate Competition

This year's competition focused on the ban of sugary drinks within schools. Primary and secondary level entrants debated on questions appropriate for their grade levels.

Forty schools entered 88 entries while 24 students from 19 schools participated in the Debate Competition. Support was received from the following partners: The MICO University College, Ministry of Health, Carlong Publishers, University of the West Indies, Mona, Jamaica Association for Debating & Empowerment and Adam & Eve Day Spa.

WINNERS OF THE 2019 ESSAY/DEBATE COMPETITION

CATEGORY	STUDENT	SCHOOL
Primary Essay Overall Best Essay	Jaydan Crawford	Somerton All Age & Infant
Secondary Essay Overall Best Entry, Grade 7-9 Category	Krishawn Green	Lennon High
Secondary Essay Overall Best Essay, Grade 10-13 Category	Shereece Hall	Immaculate High
Primary Category Best Speaker	Abigail Abrahams	Seaview Gardens Primary
Secondary Category Best Speaker	Ronaldo Richards	St. Jago High School
4th Place Primary Debate Competition	Somerton All Age	
3rd Place Primary Debate Competition	Seaview Gardens Primary & Village Primary	
2nd Place Primary Debate Competition	Kilsyth & Porus Primary	
4th Place Secondary Debate Competition	Lennon, St. Mary & Bustamante High	
3rd Place Secondary Debate Competition	Herbert Morrison, Ocho Rios & Green Pond High	

Schools’ Science & Technological Societies (SSTS) Invasion

The inaugural *SSTS Invasion* was held at Ferncourt High School, St. Ann on February 8, 2019. The CEIS, Product Research & Development and Biotechnology Units of the Council participated in the event. External partner companies were: e-Learning, 81 Sound Entertainment, Caribbean Maritime University, and Coldax Mart Limited.

Activities on the day included: Tissue Culture demonstrations, Soap Making, the Science of Sound, Career Talks, Pon Di Rhythm Competition, Energy Quiz, STEM Olympiad, Robotics demonstrations, and displays from Ferncourt’s Biology and Agricultural Department.

Approximately 1,500 Students were impacted by the event. This included students from the surrounding schools of Steer Town Academy, Golden Grove All Age, Bamboo Primary, Claremont All Age, Brown’s Town Primary, Marcus Garvey Technical and Columbus Preparatory.

The second staging of the *SSTS Invasion* was held on March 29, 2019 at Duncans All Age School, Trelawny, with support from CEIS, Biotechnology and Wastewater. Partnering companies that showcased their offerings on the day were Social Development Commission (SDC) and the HEART College of Innovation. The day’s activities included: Tissue Culture demonstrations, Soap Making, Jewellery Making, Pon Di Rhythm Competition, Energy Quiz, and the STEM Olympiad. External schools which participated in the event were Rio Bueno Primary and Refuge Primary.

Figure 26. Highlights of activities held during the inaugural SSTS Invasions at the Ferncourt High School and Duncans All Age respectively

PUBLICATIONS UNIT

For the period under review, the final document for the DISCOVERY Science, Technology & Innovation Snapshots Vol.1 No.1 Magazine was completed after being satisfactorily edited to allow for the material to be more reader friendly. After review, the board of the Scientific Research Council sanctioned that additional copies could be printed. The magazine is a 22-page visually stunning full-colour glossy periodical with the inclusion of photographs and/or illustrations as provided by the authors or as needed as part of the overall graphic design. As the name implies, the magazine covers a range of issues which are topical such as unlocking the secrets of the medicinal plant *Turnera campaniflora*; response of the agricultural sector to climate change; coral reef restoration using climate change resilient coral species; ensuring entrepreneurial and innovation literacy among graduates of tertiary institutions as well as an interview with one of Jamaica's leading scientists and his work on dibenzyl-trisulphide (DTS) in guinea hen weed. The magazine will be uploaded to the SRC website in addition to its limited printing and distribution.

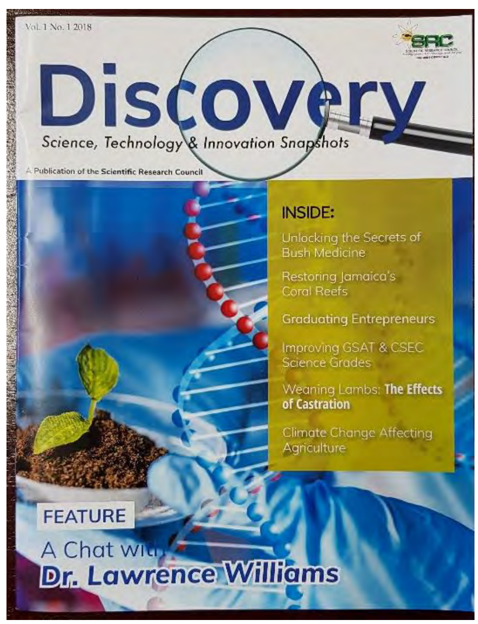


Figure 27. The cover of the first DISCOVERY Newsletter published by the Council

The Jamaican Journal of Science and Technology (JJST) is a refereed Journal which publishes scientific papers based on original data on research of interest and relevance to Jamaica; review papers on current scientific matters and articles relating to policy issues and so forth. Currently the Journal has accepted an interesting mix of manuscripts on the biology of blind cave fish in Jackson's Bay Great Cave, Jamaica; the comparative nutritional analysis of piano grass (*Themeda sp.*), signal grass and African Star grass from Central Jamaica as well as an interesting mathematics paper on the Padawan Hurwitz numbers to name a few. Papers will be uploaded to the SRC website. The unit also sources past SRC Journal articles, from the early days of SRCs establishment (1960), for present day clients who need them for the purposes of current research.

Editorial assistance was provided internally to units of the SRC, including Product Research and Development and the Documentation Centre, as well as other areas.

DOCUMENTATION CENTRE

The Documentation Centre of the Council provides a reference library service to the public, and is a member of the Library and Information Association of Jamaica (LIAJA). The Centre has as part of its collection S&T publications including journals and newsletters, computer databases, photographs, newspaper clippings and other special collections. The primary objective of the Centre is to respond to 85% of requests within two working days. This is done electronically or via physical loans to persons visiting the Centre. A total of four tertiary and secondary level students were accommodated during the period, for internship and community service.

In addition, several presentations were hosted throughout the year to increase public awareness of the application of Science & Technology to life events.

Client Request for Information

During the period under review, a total of one hundred and twenty-eight (128) requests handled and satisfied during the period under review. Requests were mainly for medicinal plants such as guinea hen weed, cannabis, bamboo, food product development, scientists, mushroom growing and small businesses, climate change, essentials oils, genetic food, and plant diseases. This speaks to the growing interest of persons in becoming entrepreneurs, and in particular the medicinal and cosmetic industries.

Visibility Presentations

A total of four quarterly presentations were held during the reporting period. The topics explored are listed below:

- Climate change, and its impact on organization and personal collections; this was presented by Dr Thera Edwards, Map Curator, University of the West Indies,

- Electronic banking: Fraud detection and prevention; this was presented by Mr. Michael Gordon, Group Security Manager, Sagicor Bank,
- Treating your natural hair; this was presented by Mrs. Taniel Smith, Owner and Founder of Tresses Locs and Coils (TLC) Salon from Ontario, Canada, and
- CXC Biology Workshop: tips on how to approach Biology exams to achieve better grades; this was presented by Ms. Kavelle Hylton, Technical Information Officer, SRC.

In addition, a special presentation was held with Nobel Laureate Professor Klaus von Klitzing, of the Max Planck Institute, Germany. His presentation dubbed *"Conversations with a Nobel Laureate"*, was historic, as he announced that there will be an official change to the international units. The seven base units of second, meter, kilogram, ampere, kelvin, mole and candela will remain, however exact numerical values will be assigned to kilogram, ampere, kelvin and mole. These changes were particularly exciting for Physics students, who held him captive with well thought out questions.

Figure 28. Professor von Klitzing is engaged by the of a Physics teacher

Documentation Centre Publications

During the reporting period a total of ten (10) issues of the ST&I NewsBrief magazine were prepared, published and disseminated to staff, as well as 10 issues of Quick Science Facts were disseminated to clients.

HUMAN RESOURCES & ADMINSTRATION

Mrs. Mervelyn Harvey-Doughorty, Manager

OVERVIEW

The 2018/19 year was a successful one for the HR&A Division. We continued to provide a structured Learning and Development Programme for the general staff population, and the leadership Development Programme for members of the management team. Several staff engagement and recognition activities were done that were well received by staff, and we managed to keep attrition below 5%. Several office spaces were renovated throughout the Council, and there was also renovation of bathrooms and laboratory spaces of the Natural Products Lab, and Biotechnology Department. The PRD building underwent a facelift, with painting and tiling of inside common areas.

Our Pilot Plant also underwent several repair activities in preparation for HACCP certification.

Staffing

Seven (7) employees were recruited during the period as follows:

- Research Scientist (2),
- Laboratory Analyst,
- Draughtsman/Construction Engineer,
- Graphic & Web Designer,
- Research Officer, and
- MIS Technical Assistant.

There were four resignations and one termination, resulting in an attrition rate of 4.8%. At the end of March, 2019 the Council's total staff complement was 107 individuals, comprised of:

- 97 staff in established posts,
- 3 temporary employees,
- 3 casual employees, and
- 4 employees in non-established posts.

With specific reference to our permanent employees, 69% are female, while 31% are male.

Staff Learning & Development

Members of staff benefitted from several Learning & Development programmes. Some of the training topics are listed as follows:

- Effective Customer Service (13 persons),
- Events planning (21 persons),
- First Aid Training (12 persons), and
- Employee Engagement & Workplace Wellness (5 persons).

There was also a myriad of training opportunities to enhance the technical skills, including but not limited to:

- Graphic design,
- Horticulture and landscaping,
- Microsoft Excel Levels I, II and III, and
- Public Speaking.

Leadership Training Activities

- **21** employees including Managers and Team Leaders benefitted from internal Leadership Development Training,
- **7** Managers benefitted from external Leadership Development Training, hosted by Cari-Code,
- **5** persons benefitted from Middle Management Conference hosted by Make your Mark Consultants, and
- **3** employees benefitted from external training Coaching Sills for Managers & Supervisors hosted by Make Your Mark Consultants.

Employee Recognition

The annual Staff Awards function was held December 14, 2018. Twelve (12) employees with service ranging from 10-30 years received long service awards. In addition, seven (7) employees received awards for ***Staff of the Year*** per Division. Highlights of the event is given in Figure 29 overleaf.

Figure 29. Highlights of the 2019 Staff Awards Function

Staff Meetings

Three (3) General Staff Meetings were held. A total of 82 employees attended the June, 2018 meeting; 70 employees attended the November, 2018 meeting, and 89 attended the January, 2019 meeting.

Staff Engagement Activities

Staff Socials held during the period under review. The planning was undertaken by Divisions, and were themed as follows:

- *Wakanda*: June 2018, and
- Schoolaz Roll Out: September 2018.

There were also other intra-departmental socials during the period.

Figure 30. Staff members enjoying engagement activities

Recognition of Administrative Professionals

The Administrative Professionals within the Council were recognized during Administrative Professional Week, for their years of service to the Council and to ensure that their work does not go unnoticed. All the administrative professionals received gift certificates.

Health & Wellness Activities

In an effort to address physical well-being of staff, the following activities were undertaken:

- An Aerobics instructor was provided for employees to benefit from guided workout experiences twice per week,
- Nineteen (19) employees participated in the "Sagicor Sigma Run/Walk" held February 17, 2019,
- Employees benefitted from an internal Wellness Presentation on ***"Food & Nutrition"*** in June 2018, and
- Health and Wellness Day was held on September 20, 2018 at the Council. 75% of the staff population participated in various health screening exercise such as ECG, Urine, HIV, Blood Pressure, and Cholesterol.

Property Management

The Property Unit is charged with the responsibility of the following services:

- Safety & Security Management,
- Janitorial Services,
- Transportation services, and
- Building, Equipment & Grounds Management.

In addition to the general day to day activities, several major activities were successfully carried out throughout the Council during the period, some of which included:

- ✓ Extensive electrical work done at the PRD building and in the Biotechnology department,
- ✓ Several renovation activities throughout the Council including repair works, paint jobs, electrical and plumbing works and general beautification of the grounds,
- ✓ Repaired TIS System in the Biotechnology department,
- ✓ Elevated the floor at the Pilot Plant kitchenette to install sink and faucet,
- ✓ Mitsubishi L200 was procured to improve fleet capacity, and
- ✓ Replacement of several defective A/C units and servicing of all other units.

Council Registry

The Registry provides services including Records Management, archiving, photocopying, scanning, mail, courier and bearer services, and provides access to information.

Some of the activities carried out by the Registry included:

- **81 legal size boxes** of archival records were reviewed, indexed and entered into the Win/Isis database,
- **1,406** active files were inventoried and entered into the Master Log of Active Records,
- **3,130** by-hand mail dispatched from the Council via Bearer,
- **1,882** external mails were received in the Registry for dispatched to relevant departments,
- Both editions of the biannual newsletter called '*RecInfo'* newsletter were disseminated to staff, and
- **27** requests for information were facilitated by the Registry in keeping with the Access to Information Act.

Management Information Systems

The Management Information Service (MIS) team provides the following services:

- Management of Computer & Server Systems,
- Provision & Maintenances of Software Systems,
- Website Design & Maintenance,
- Management of IT Equipment,
- Safety & Security of Computer Network, and
- Provision of Graphical Designs and Artwork.

In addition to providing ICT services to the Council, major activities during the period included:

- Expansion of the WIFI network to include public access, separate from the internal network,
- Cleaning, patching and restoration of twelve (12) website platforms,
- Upgrading of the HR, Purchasing, Property and MIS Help Desk systems,
- Upgrade in all meeting rooms to wireless functionality,
- The procurement and installation of nine (9) new computers, and repair of twenty (20) computers,
- Procurement of a new firewall system to strengthen network security,
- Commenced the phasing out multiple security platforms in favour of a single solution,
- Carried out trunking in designated areas to address the exposure of network cables, and
- Procured several cameras which were installed at strategic point to increase security.

MARKETING & CORPORATE COMMUNICATIONS

Mrs. Carolyn Rose-Miller, Manager

OVERVIEW

The financial year 2018/2019 was one in which the Marketing & Corporate Communications Division focused on the application of Science, Technology and Innovation to support agriculture, MSME's and food research and development.

The period under review saw us implementing strategies to promote the Councils' products and services, to facilitate business development along the value chain, technology transfer for commercialization, and employment creation through entrepreneurship.

We interfaced with over 600 clients by means of clarification meetings, that led to sales of formulations and product development services. We forged and improved on strategic alliances within both the private and public sectors. Various activities were specifically designed i.e. forums, workshops and exhibitions, to create greater social and economic, whilst increasing awareness of our products to our targeted market.

Exhibitions and Public Events

During the period under review, the Council was represented at approximately 25 exhibitions island wide. We collaborated with numerous entities and stakeholders to highlight the importance of Science Technology and Innovation to our economy. The "SRC in the Community" events, our very own roving exhibitions, were well received and allowed for greater interaction with the public. Some of our major activities are highlighted below:

1. **Denbigh Agricultural Show.** The annual event was held August 5-7, 2018 at the Denbigh Agricultural Show Grounds. We showcased our food, analytical and wastewater management services, and two vegetable drinks that received rave reviews. We also provided the opportunity for some of our clients to showcase their products. Over 100 business leads were garnered.

2. **JN Foundation Water Tech Fest for World Water Day.** We participated in the World Water Day Exhibition on March 22, 2019. Our wastewater management services were highlighted, and in particular our testing services for raw, potable and waste water. Approximately 30 persons were engaged by the SRC technical and marketing team.

3. **Jamaican Cultural Development Commission Culinary Competition.** This event was held August 2, 2018, at the Jamaica Pegasus Hotel. Over 30 exhibits were on display, and nearly 300 attendees engaged. We showcased our capability in food manufacturing and packaging, and offered technical support as our sectional prize to one of the competition winners.

4. **Total Jamaica Starter Upper.** This international symposium designed specifically for budding entrepreneurs, was organized by Total Jamaica Ltd. The function was held February 20, 2019 at which SRC's products were on display for over 50 participants.

5. **Ministry of Health Business Fair.** Under the theme of "Small Bag Juice Manufacturing Reasoning and Mini Expo", we highlighted our service capabilities of providing products which are sugar-free and low sugar. This was in response to the Ministry of Health's stance on sugary products, and the impending ban of these products in schools.

6. **Williamsfield Farmers Festival and Gospel Show.** The event was held November 23, 2018 at the Williams Park in Manchester, and hosted by Social Development Commission. Over 200 persons were sensitized on the value-added products that could be generated from their farm produce.

7. **Accompong Economic Workshop.** We participated in this workshop on September 25, 2018. Our focus was commercializing the products being manufactured at the cottage industry level. Also we investigate how we can assist the community in standardizing their folklore/tradition remedies.

8. **Packaged Presentations.** Direct presentations were developed and delivered to Heart Trust for Trainee Entrepreneur Programme, Jones Town Baptist Church and Dela Vega City Empowerment Group. The roles and functions of the SRC were highlighted and knowledge transferred on the rudiments of Entrepreneurship/business planning.

9. **The Dermatology Conference.** This was held March 31, 2019. Over 60 participants were sensitized on SRC services related to product development. Eighteen business leads were garnered.

Direct & Target Presentations

During the reporting period, we also designed and implemented events for specific target audiences. These are listed below:

1. **Interactive Workshop 2019**: an interactive workshop was held, with the goal to promote the products of the Council to existing and new markets within the agro-processing sector. This initiative was done in conjunction the Bureau of Standards and the Company's Office. Over 30 participants were sensitized to the various products and services of the Council.

2. **Portmore Town Hall Forum**: Held under the theme "Be Your Own Boss" a forum was held at the centrally located Portmore Holiness Christian Church. Over 50 participants were sensitized to SRC capabilities with the food and natural care services.

3. **Commercialization Readiness Forum**: This forum was specially designed promote our services towards export readiness. Over 30 persons in Manchester, were trained in Good Manufacturing Practices (GMP) and the procedures for FDA filing.

4. **The SRC Experience**: This inaugural event saw representatives from the Ministry of Science & Technology, as well as the Ministry of Finance & Planning, seeing firsthand the operations of the Council. Twenty-one (21) participants were engaged in making soaps, sausages and plantation chips, as well as participating in a tour of the Tissue Culture lab and greenhouses.

5. **Executive Director's Round Table Talk**: Over 18 public and private sector entities were in represented. The focus group discussed how the Council can better serve, and engage agencies, while strengthening existing relationships to effectively contribute to national development. Feedback from this session was incorporated into the Council's strategic planning documents.

6. **SRC in the Community**: specially designed to reach less traversed communities and towns, to sensitize residents of the Council's products and services. We promoted our products and services in the parishes of St. Elizabeth and Portland for the period under review.

Training Workshops and Tours

During the period under review, the MCCD promoted the following workshops which were hosted at the Council:

- **Food Additives Workshop**: hosted June 27, 2018. This targeted food manufacturers, and medium, small and micro enterprises in agro-processing,
- **Lotion & Body Cream Workshop:** hosted October 25, 2018. This workshop targeted individuals interested in developing personal care products,

- **Meat processing Workshop**: hosted November 27-29, 2018. Targeted to meat producing entities and small and medium meat shop operators,
- **Mushroom Workshop**: hosted December 6, 2018, with 17 participants, and
- **Body Washing Workshop:** hosted February 28, 2019 with 11 participants wanting to enter the personal care industry or to broaden their knowledge base.

Twelve (12) tours were coordinated for the period, with eleven (11) educational institutions and 1 private sector entity. The institutions included two (2) universities, five (5) secondary schools and four (4) primary schools. The areas toured included our Pilot Plant, Tissue Culture laboratory, wastewater facilities, and the Analytical Services Department.

Internal Staff Presentations

Presentations were organized for staff members, to keep us abreast of various trends and developments. The following topics were explored:

- *The Nutraceutical Industry: Potential beyond the herbs*, presented by Dr. Charah Watson,
- *The Impact of oxidative stress on the Manifestation of Type 2 Diabetes Mellitus* presented by Ms. Chantal Golding,
- *Nutraceuticals: from Natural Plant to Manufacturing Plant* presented by Ms. Shawntae Rodney,
- *Moringa: the underutilized Superfood* presented by Dr. Shadae Foster,
- *Genetically Engineered Crops and Food Security* presented by Dr. Melaine Randle, and
- *Utilizing Lower Temperature in Food Processing* presented by Ms. Mylinda Dosumnu.

Communication Activities

For the review period, communication activities were focused on enlightening the public on the products and services of the Council in support of technology transfer and commercialization. Social media along with traditional methods were utilized in getting our promotional messages across.

We coordinated and developed radio advertisements highlighting Council activities, including the launch of Energy for Young Minds Programme, National Science & Technology Fair, the launch of Science & Technology Month, and the National Innovation Awards.

During the period SRC's Instagram page was created, with the following results:

- A total of 216 posts were made,
- 2,575 likes were received on posts made,
- 46,383 persons were reached for the period,
- 65,523 impressions were created, and
- 1,122 followers at the end of the reporting period.

Customer Feedback Survey

The Annual Customer Satisfaction Survey was conducted the end of October 2018, for the various units across the Council. A total of 137 persons were polled. Of the persons polled, we found that:

- 96% would recommend SRC's services to others,
- 78% said the turn-around time was good,
- 92% said the SRC was responsive, and
- 64% said we were reasonably priced.

A new customer database was created to capture client requests, as the previously implemented E-Tracking System no longer worked. For the period April 2018 to March 2019, a total of 240 clients were added to the database.

PROJECT & QUALITY MANAGEMENT

Mrs. C. Marcia Henry, Manager

OVERVIEW

The Project and Quality Management Office has oversight for administrative procedures and documents utilized to maintain and improve internal processes. There was particular focus on fulfilling the following strategic objectives:

- Strategic Objective 2: Customer Needs and demands are satisfied through the development of new products, and
- Strategic Objective 5: The SRC has a dynamic, innovative, responsive, efficient and effective team.

During the reporting period, several proposals were written and submitted for funding, while routine monitoring of ongoing projects ensured compliance with customer and donor requirements.

A summary of the major activities is presented in the bullets below:

- Trained 13 staff members of PRD, PDD, MCCD and FAD in project development. Topics covered included stakeholder, problem and objectives analysis and development of a logical framework matrix,
- A proposal titled "Supporting National Economic Growth - SRC Growth Proposal" was drafted following a meeting with the Economic Growth Council (EGC) at Jamaica House. The proposal was submitted to the EGC by the Executive Director,
- For the IAEA Mutation Breeding project, we prepared and delivered presentations on the project at the Public Investment Management Secretariat (PIMSEC) and the PIOJ. We also presented on the project status (progress and challenges), to the Project Steering committee at the PIOJ,
- Prepared for and held sensitisation session for management and other project-related team members on current project management principles and practices and a proposed project management system (PMS) for the Council. This was followed by a similar session for project-related team members from PDD and PRD,

- Coordinated annual QMS audits held in April 2018 and March 2019; including briefing and debriefing of auditors, review of audit checklists, chairing of opening and closing meetings and review of audit reports, NCAR and PAR/OFI forms,
- Reviewed corrective action plan to address non-conformances raised in the concluded HACCP precertification audit of the food pilot plant. Subsequently attended HACCP team meetings, and
- Participate in on-line consultation on the draft CARICOM standard for packaged coconut water, prepared by consultant Dr Andre Gordon for CARDI. The meeting was held in Trinidad on Friday November 30, 2018. SRC's participation allowed for the test methods used by the ASD to be included in the standard.

PEER REVIEWED PUBLICATIONS

During the 2018/19 financial year, we produced six (6) articles for publications as outlined below:

1. Randle M., Riley C., Williams L., Watson C. **A Systematic Review of the Traditional and Medicinal Uses of *Petiveria alliacea* L. in the Treatment of Chronic Diseases**. J Plant Sci. Res. 2018; 5(1): 179. **Published**
2. Bailey-Shaw, Y., Rodney, S., Golding, C., Foster, S., Randle, M., Watson, C. (2019). **The Potential Application of *Moringa oleifera* Leaves in Functional Herbal Beverages: A Review of its Nutritional, Medicinal and Toxicity Profiles**. *Journal of Herbs, Spices & Medicinal Plants*
3. Foster, S., Randle, M., Riley, C., Watson, C. **Effects of Processing Techniques on Phytochemical Content and Nutritional Composition of *Entada gigas* Seeds: Indigenous and Medicinal Uses**

Additionally, three articles are under internal review for publication:

1. Randle, M., Tennant, P., Watson, C. **Review of Diseases Affecting Crops of Economic Importance in Jamaica: Methods for Improved Detection**

2. Foster, S. Randle, M., Watson, C. **Monograph: Turmeric (*Curcuma longa*)**

3. Rodney, S., Randle, M., Watson, C. **Monograph: Jamaica Yellow Ginger**

INTERNAL AUDIT

Mrs. Paula Spence, Internal Auditor

OVERVIEW

During fiscal year 2018/2019 the Internal Audit Department continued to undertake financial, operational and compliance audits, with a view to determining the strength of the system of internal controls implemented by the Scientific Research Council, as well as to solicit improvement where necessary. Audits were done in all Divisions of the Council, the weaknesses identified, and recommendations for corrective actions made. The Internal Auditor conducted follow up audits to ascertain whether corrective actions were being taken by auditees in accordance with recommendations made. The areas audited included:

- The Payroll,
- Disbursement of Funds and,
- Receivables.

Twenty-one (21) recommendations were made, and of this amount, two were not yet implemented, while five were by their nature, work in progress. The implementation of the recommendations resulted in a more robust system of internal control, improvement of the Council's Corporate Governance, and a greater recognition of the need to conform to policies and procedures.

As the Scientific Research Council works towards its corporate goals, the Internal Audit Department will continue to undertake the challenge of assisting with identifying the areas of non-conformity in the system with a view to enhancing the achievement of its objectives. During the year ahead the Internal Audit Department will continue its mission to elicit improved performance in the audited business areas with the aim of portraying the Council as an entity that complies with required organizational practices.

FINANCE & ACCOUNTING

Mrs. Keneisha Irving

OVERVIEW

The Division has responsibility for managing the financial resources of the Council and ensuring compliance with the requirements of The Financial Administration and Audit Act, The Public Bodies Management and Accountability Act and other regulatory bodies.

The Council ended the fiscal year 2018/2019 with a net surplus of J$46.7million compared to that of the prior year which showed a surplus of J$10.7 million. This increase in surplus was primarily attributed to an increase in subvention income. There were marginal increases in major expenditure while other expenses were contained. The Council continues to earn revenue from approved project related activities. Income from projects was J$2.5 million compared to J$6.1 million in the previous year due to a reduction in the number of on-going projects.

The Council's net asset position remains positive. This is due primarily to increased cash and cash equivalents, being funds received for specific project expenditure. Capital expenditure increased compared to previous year. Investment was made in scientific equipment required to support the Council's strategic direction and one fleet vehicle was procured.

The financial statements were audited by Crowe Howarth Jamaica in accordance with International Financial Reporting Standards (IFRS).

Despite fiscal constraints, the main objectives were achieved through effective cash flow management, team work and budgetary support received from our parent ministry, Ministry of Science, Energy and Technology. Support was also received from the Ministry of Finance.

The Finance and Procurement Committees and Internal Audit provided adequate oversight for the Division's operations and ensured that guidelines set by Ministry of Finance and other regulatory bodies were upheld.

FORECASTS & PROJECTIONS FOR APRIL 2019 TO MARCH 2020

Figures represented in $J '000's

	APR.	MAY.	JUN.	JUL.	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
Information Services	**240**	**231**	**859**	**588**	**72**	**172**	**72**	**172**	**542**	**130**	**785**	**130**
Product Research	**2,939**	**2,965**	**5,586**	**3,335**	**3,274**	**2,905**	**3,394**	**3,391**	**3,135**	**3,148**	**3,950**	**3,458**
- Analytical Services	2,749	2,749	2,749	2,749	2,749	2,749	2,749	2,749	2,749	2,749	2,749	2,749
- Food Product	152	148	632	253	112	123	558	226	345	257	238	456
- Natural Products	20	56	69	21	165	21	69	160	28	45	7	160
- Biotechnology	18	12	2,136	312	248	12	18	256	13	97	956	93
Process Development	**984**	**1,221**	**1,640**	**1,016**	**1,237**	**1,584**	**1,892**	**3,824**	**5,760**	**856**	**1,221**	**9,421**
- Pilot Plant	789	865	982	692	756	1,052	958	3,256	4,852	598	745	1,056
- Wastewater Mgmt.	195	356	658	324	481	532	934	568	908	258	476	8,365
TOTALS	**4,163**	**4,417**	**8,085**	**4,939**	**4,583**	**4,661**	**5,358**	**7,387**	**9,437**	**4,134**	**5,956**	**13,009**

DIRECTORS COMPENSATION

Position of Director 2018/19	Fees ($)	Motor Vehicle Upkeep/Travelling or Value of Assigned Motor Vehicle ($)	Honoraria ($)	All Other Compensation including Non-Cash Benefits as applicable ($)	Total ($)
Chairman, Errol Morrison	195,000				195,000
Board Member, Henry Lowe	45,000				45,000
Board Member, Lilyclaire Bellamy	63,000				63,000
Board Member, Natwaine Gardner	90,000				90,000
Board Member, Melissa Sanderson	63,000				63,000
Board Member, Lisa Myers-Morgan	45,000				45,000
Board Member, Eleanor Jones	63,000				63,000
Board Member, Michelle Parkins	36,000				36,000
Finance Sub-Committee Member Nicole Brown	6,000				6,000
Total	**606,000**				**606,000**

SENIOR EXECUTIVES COMPENSATION

Name and Position of Senior Executive	Year	Salary ($)	Gratuity or Performance Incentive ($)	Pension or Other Retirement Benefits ($)	Travelling Allowance or Value of Assignment of Motor Vehicle ($)	Other Allowances ($)	Non-Cash Benefits ($)	Total ($)
Executive Director Cliff Riley	2018/19	5,302,500.00	2,783,430.00		1,341,624.00			9,427,554.00
Manager, Finance & Accounting Keneisha Irving	2018/19	3,768,720.00	165,961.00		1,341,624.00			5,276,305.00
Manager, Human Resources & Admin Mervelyn Harvey-Doughorty	2018/19	4,165,404.00	2,137,339.00		1,341,624.00			7,644,367.00
Manager, Product Research Charah Watson	2018/19	4,165,404.00	2,518,159.00		1,341,624.00			8,025,187.00
Manager, Process Development Julia Brown* / Jodi Dunn	2018/19	4,165,404.00	174,098.00		1,341,624.00			5,681,126.00
Manager, Information Services Kerry-Ann Curtis	2018/19	3,636,504.00	50,000.00		1,341,624.00			5,028,128.00
Manager, Marketing & Corporate Communications Carolyn Rose-Miller	2018/19	4,165,404.00	2,286,982.00		1,341,624.00			7,794,010.00
TOTALS		**29,369,340.00**	**10,115,969.00**		**9,391,368.00**			**48,876,677.00**

N.B. Julia Brown resigned during the period under review, and was succeeded by Jodi Dunn*

Smart decisions.

Lasting value.

Scientific Research Council
Financial Statements
for the year ended
31st March 2019

SCIENTIFIC RESEARCH COUNCIL

FINANCIAL STATEMENTS

YEAR ENDED 31ST MARCH 2019

SCIENTIFIC RESEARCH COUNCIL

FINANCIAL STATEMENTS

YEAR ENDED 31ST MARCH 2019

Crowe

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REPORT OF THE INDEPENDENT AUDITORS
TO THE MEMBERS OF
SCIENTIFIC RESEARCH COUNCIL

Opinion

We have audited the financial statements of the Scientific Research Council ("the Council"), which comprise the statement of financial position as at 31st March 2019, the statement of comprehensive income, statements of changes in equity and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the Council as at 31st March 2019, and of its financial performance and its cash flows for the year then ended in accordance with International Financial Reporting Standards (IFRSs) and the Scientific Research Council Act.

Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Council, in accordance with the International Ethics Standards Board for Accountants Code of Ethics for Professional Accountants (IESBA Code), and we have fulfilled our other ethical responsibilities in accordance with these requirements and the IESBA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

Management is responsible for the other information. The other information comprises the information included in the Annual Report, but does not include the financial statements and our auditor's report thereon. The Annual Report is expected to be made available to us after the date of issue of this auditor's report.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with IFRSs and the Scientific Research Council Act, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Crowe

REPORT OF THE INDEPENDENT AUDITORS
TO THE MEMBERS OF
SCIENTIFIC RESEARCH COUNCIL

Responsibilities of Management and Those Charged with Governance for the Financial Statements (Cont'd)

In preparing the financial statements, management is responsible for assessing the Council's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Council or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Council's financial reporting process.

Auditors' Responsibilities for the Audit of the Financial Statements:

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISA's will always detect a material misstatement when it exists.

Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs, we exercise professional judgement and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Council's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

Crowe

REPORT OF THE INDEPENDENT AUDITORS
TO THE MEMBERS OF
SCIENTIFIC RESEARCH COUNCIL

Auditors' Responsibilities for the Audit of the Financial Statements (Cont'd):

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Council's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Council to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on additional requirements of the Scientific Research Council Act

We have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purposes of our audit. In our opinion, proper accounting records have been maintained, so far as appears from our examination of those records, and the financial statements, which are in agreement therewith, give the information required by the Scientific Research Council Act in the manner required.

The engagement partner on the audit resulting in this independent auditors' report is Mr Dawkins Brown.

Crowe Horwath Jamaica

Crowe Horwath Jamaica

December 17, 2019

SCIENTIFIC RESEARCH COUNCIL
STATEMENT OF FINANCIAL POSITION
AS AT 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

	Notes	2019 $	2018 $
ASSETS			
Non-Current Assets			
Property, Plant and Equipment	4	84,999,118	52,895,562
Long Term Receivables	5	2,483,551	2,014,334
		87,482,669	54,909,896
Current Assets			
Inventories	6	-	176,459
Trade and Other Receivables	7	10,382,474	4,861,746
Withholding Tax Recoverable		239,204	85,354
Current Portion of Long Term Receivables	5	693,327	305,128
Short Term Investments	8	70,348,922	54,549,238
Cash and Cash Equivalents	9	152,198,517	180,085,646
		233,862,444	240,063,571
Total Assets		**321,345,113**	**294,973,467**
EQUITY AND LIABILITIES			
Capital and Reserves			
Capital Reserve	10	1,544,303	1,853,163
Accumulated Surplus		216,474,852	169,689,934
		218,019,155	171,543,097
Current Liabilities			
Trade and Other Payables	11	76,127,812	60,432,491
Unexpended Funds	12	27,198,146	62,997,879
		103,325,958	123,430,370
Total Equity and Liabilities		**321,345,113**	**294,973,467**

The accompanying notes form an integral part of the financial statements.

APPROVED FOR ISSUE BY THE BOARD ON December 17, 2019 **AND SIGNED ON ITS BEHALF BY:**

Professor Errol Morrison
Chairman

Dr. Cliff Riley
Executive Director

SCIENTIFIC RESEARCH COUNCIL
STATEMENT OF COMPREHENSIVE INCOME
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

	Notes	2019 $	2018 $
Revenue	13	532,448,915	459,972,975
Operating and Administrative Expenses		484,911,692	454,738,558
Operating Surplus		47,537,223	5,234,417
Net Income on Project Activities	14	2,501,998	6,076,751
Other Income	15	5,208,958	6,003,833
Surplus before depreciation		55,248,179	17,315,001
Depreciation	4	8,772,121	6,902,193
Net Surplus for the year before transfer		46,476,058	10,412,808
Transfer from capital reserve an amount equivalent to depreciation charge on donated assets	10	308,860	308,860
Total Comprehensive Income for the year		46,784,918	10,721,668

The accompanying notes form an integral part of the financial statements.

SCIENTIFIC RESEARCH COUNCIL
STATEMENT OF CHANGES IN EQUITY
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

	Capital Reserve	Accumulated Surplus	Total
	$	*$*	*$*
	(See Note 10)		
Balance at 31st March 2017	**2,162,023**	**158,968,266**	**161,130,289**
Transfer to income	(308,860)	-	(308,860)
Total Comprehensive Income for the year	-	10,721,668	10,721,668
Balance at 31st March 2018	**1,853,163**	**169,689,934**	**171,543,097**
Transfer to income	(308,860)	-	(308,860)
Total Comprehensive Income for the year	-	46,784,918	46,784,918
Balance at 31st March 2019	1,544,303	216,474,852	218,019,155

The accompanying notes form an integral part of the financial statements.

SCIENTIFIC RESEARCH COUNCIL
STATEMENT OF CASH FLOWS
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

	2019	**2018**
	$	**$**
CASH FLOWS FROM OPERATING ACTIVITIES		
Surplus for the year	46,784,918	10,721,668
Adjustments to reconcile net Surplus for the year to net cash (Used in)/Provided by Operating Activities:		
Interest Income	(1,441,292)	(3,820,012)
Movement in ECL/(2018: Bad Debt Expense)	490,599	1,472,409
Release from Capital Reserve - Depreciation on Donated Property, Plant and Equipment	(308,860)	(308,860)
Depreciation on acquired Property, Plant & Equipment	8,772,121	6,902,193
	54,297,486	14,967,398
Decrease/(Increase) in Current Assets:		
Inventories	176,459	(37,200)
Trade and Other Receivables	(6,011,327)	(3,236,352)
Withholding Tax Recoverable	(153,850)	392,383
(Decrease)/Increase in Current Liabilities:		
Trade and Other Payables	15,695,321	21,962,451
Net cash provided by Operating Activities	64,004,089	34,048,680
Cash flows from Investing Activities:		
Acquisition of Property, Plant and Equipment	(40,875,677)	(28,229,439)
Long Term Receivables	(857,416)	(888,509)
Interest Received	1,441,292	3,820,012
Short-Term Investments	(15,799,684)	6,065,460
Unexpended Funds	(35,799,733)	8,804,716
Net Cash Used in Investing Activities	(91,891,218)	(10,427,760)
Net (Decrease)/Increase in Cash and Cash Equivalents	(27,887,129)	23,620,920
Cash and Cash Equivalents at the beginning of Year	180,085,646	156,464,726
Cash and Cash Equivalents at end of Year	**152,198,517**	**180,085,646**

The accompanying notes form an integral part of the financial statements.

1. Identification

Scientific Research Council is a statutory body, established under the Scientific Research Council Act to foster and co-ordinate scientific research and promotes the application of such research to support the growth and development of the agro-industrial sector in Jamaica. It is wholly owned by the Government of Jamaica and is an agency within the Ministry of Science Energy and Technology.

The registered office of the Council is located at Hope Gardens, Kingston.

2. Adoption of Standards, Interpretations and Amendments.

The International Accounting Standards Board (IASB) issued certain new standards and interpretations as well as amendments to existing standards, which became effective during the year under review. The Council's management has assessed the relevance of the following new standards, interpretations and amendments that were in effect and has applied in these financial statements, those standards which are considered relevant to its operations:

(a) Standards and interpretations in respect of published standards which are in effect:

IFRS 9: Financial Instruments (Effective January 1, 2018)

A finalised version of IFRS 9 which contains accounting requirements for financial instruments, replacing IAS 39 Financial Instruments: Recognition and Measurement. The standard contains requirements in the following areas:

Classification and measurement: Financial assets are classified by reference to the business model within which they are held and their contractual cash flow characteristics. The 2014 version of IFRS 9 introduces a 'fair value through other comprehensive income' category for certain debt instruments. Hence, financial assets are to be classified into three measurement categories: those measured at amortised cost, those to be measured subsequently at fair value through other profit and loss (FVPL) and those to be measured subsequently at fair value through other comprehensive income (FVOCI). Financial liabilities are classified in a similar manner to under IAS 39, however there are differences in the requirements applying to the measurement of an entity's own credit risk.

Impairment: The 2014 version of IFRS 9 introduces an 'expected credit loss' model for the measurement of the impairment of financial assets, so it is no longer necessary for a credit event to have occurred before a credit loss is recognised

Hedge accounting: Introduces a new hedge accounting model that is designed to be more closely aligned with how entities undertake risk management activities when hedging financial and non-financial risk exposures

Derecognition: The requirements for the derecognition of financial assets and liabilities are carried forward from IAS 39.

The adoption of this standard had no material impact on the Council's financial statements.

2. Adoption of Standards, Interpretations and Amendments (cont'd):

(a) Standards and interpretations in respect of published standards which are in effect (Cont'd):

IFRS 15: Revenue from Contracts with Customers (IAS 18 will be superseded by IFRS 15 Revenue from Contracts with Customers.) (Effective January 1, 2018)

IFRS 15 provides a single, principles based five-step model to be applied to all contracts with customers.

The five steps in the model are as follows:
-Identify the contract with the customer
-Identify the performance obligations in the contract
-Determine the transaction price
-Allocate the transaction price to the performance obligations in the contracts
-Recognise revenue when (or as) the entity satisfies a performance obligation.

Guidance is provided on topics such as the point in which revenue is recognised, accounting for variable consideration, costs of fulfilling and obtaining a contract and various related matters. New disclosures about revenue are also introduced.

The adoption of this standard had no material impact on the Council's financial statements.

Clarifications to IFRS 15 : Revenue from Contracts with Customers (Effective January 2018)

Amends IFRS 15 Revenue from Contracts with Customers to clarify three aspects of the standard (identifying performance obligations, principal versus agent considerations, and licensing) and to provide some transition relief for modified contracts and completed contracts.

IFRIC 22 - Foreign Currency Transactions and Advance Consideration (Effective January 2018)

The interpretation addresses foreign currency transactions or parts of transactions where:

- there is consideration that is denominated or priced in a foreign currency;
- the entity recognises a prepayment asset or a deferred income liability in respect of that consideration, in advance of the recognition of the related asset, expense or income; and
- the prepayment asset or deferred income liability is non-monetary.

The Interpretations Committee came to the following conclusion:

- The date of the transaction, for the purpose of determining the exchange rate, is the date of initial recognition of the non-monetary prepayment asset or deferred income liability.
- If there are multiple payments or receipts in advance, a date of transaction is established for each payment or receipt.

These affected the financial statements for accounting periods beginning on or after the first day of the months stated. The adoption of these Standards and amendments had no material impact on the Council's financial statements.

2. Adoption of Standards, Interpretations and Amendments (cont'd):

(b) Standards and interpretations in respect of published standards that are not in effect:

Certain new, revised and amended standards and interpretations have been issued which are not yet effective for the current year and which the Council has not early-adopted. The Council has assessed the relevance of all the new standards, amendments and interpretations with respect to the Council's operations and has determined that the following are likely to have an effect on the Council's financial statements:

IFRS 16 - Leases (Effective January 2019)

IFRS 16 specifies how an IFRS reporter will recognise, measure, present and disclose leases. The standard provides a single lessee accounting model, requiring lessees to recognise assets and liabilities for all leases unless the lease term is 12 months or less or the underlying asset has a low value. Lessors continue to classify leases as operating or finance, with IFRS 16's approach to lessor accounting substantially unchanged from its predecessor, IAS 17.

Amendments to IFRS 9: Prepayment Features with Negative Compensation (Effective January 2019)

Amends the existing requirements in IFRS 9 regarding termination rights in order to allow measurement at amortised cost (or, depending on the business model, at fair value through other comprehensive income) even in the case of negative compensation payments.

Amendments to IAS 19: Plan Amendment, Curtailment or Settlement (Effective January 2019)

The amendments in Plan Amendment, Curtailment or Settlement (Amendments to IAS 19) are:

- If a plan amendment, curtailment or settlement occurs, it is now mandatory that the current service cost and the net interest for the period after the remeasurement are determined using the assumptions used for the remeasurement.

- In addition, amendments have been included to clarify the effect of a plan amendment, curtailment or settlement on the requirements regarding the asset ceiling.

2. Adoption of Standards, Interpretations and Amendments (cont'd):

(b) Standards and interpretations in respect of published standards that are not in effect (cont'd):

Definition of a Business (Amendments to IFRS 3) (Effective January 2020)

The amendments in Definition of a Business (Amendments to IFRS 3) are changes to Appendix A, Defined terms, the application guidance, and the illustrative examples of IFRS 3 only. They:

- clarify that to be considered a business, an acquired set of activities and assets must include, at a minimum, an input and a substantive process that together significantly contribute to the ability to create outputs;

- narrow the definitions of a business and of outputs by focusing on goods and services provided to customers and by removing the reference to an ability to reduce costs;

- add guidance and illustrative examples to help entities assess whether a substantive process has been acquired;

- remove the assessment of whether market participants are capable of replacing any missing inputs or processes and continuing to produce outputs; and

- add an optional concentration test that permits a simplified assessment of whether an acquired set of activities and assets is not a business.

Definition of Material (Amendments to IAS 1 and IAS 8) (Effect January 2020)

The amendments in Definition of Material (Amendments to IAS 1 and IAS 8) clarify the definition of 'material' and align the definition used in the Conceptual Framework and the standards.

These affect financial statements for accounting periods beginning on or after the first day of the month stated. The Council is assessing the impact these amendments will have on its 2020 and 2021 financial statements

3. Statement of Compliance, Basis of Preparation and Significant Accounting Policies

(a) Statement of Compliance and Basis of Preparation -

These financial statements are prepared in accordance with International Financial Reporting Standards (IFRS) and interpretations issued by the International Financial Reporting Committee of the IASB and comply in all material respects with the provisions of the Scientific Research Council Act. They have been prepared under the historical cost convention and are expressed in Jamaican Dollars.

(b) Property, Plant and Equipment -

Property, plant and equipment are stated at historical cost less depreciation less any impairment Depreciation of property, plant and equipment is provided on the straight-line basis calculated at annual rates estimated to write off the cost of each asset over the term of its useful life. The rates of depreciation in use are as follows:-

Buildings and Access Roadway	2 1/2%
Scientific Equipment	10% & 20%
Office Equipment	10% & 20%
Property and Workshop Equipment	10%
Motor Vehicles	20%

Property, plant and equipment are periodically reviewed for impairment. Where the carrying amount of an asset is greater than its estimated recoverable amount, it is written down to the recoverable amount.

Gains and losses on disposal of property, plant and equipment are determined by reference to their carrying amount and are taken into account in determining operating surplus or deficit.

Freehold land is not depreciated.

Donated Assets

Where an asset is funded by an external donor (including the Government of Jamaica) with no loan attached, the amount is credited to the Capital Reserve. An amount equivalent to the annual depreciation charge on the relevant property, plant and equipment is transferred from the capital reserve to comprehensive income.

(c) Impairment of Assets -

Property, plant and equipment and other long-lived assets are reviewed for impairment losses whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the carrying amount of the asset exceeds its recoverable amount, which is the higher of an asset's selling price or value in use. For the purpose of assessing impairment, assets are grouped at the lowest level for which there are separately identifiable cash flows.

3. Statement of Compliance, Basis of Preparation and Significant Accounting Policies (Cont'd):

(d) Inventories -
Inventories are valued at the lower of cost and net realisable value.

(e) Trade and Other Receivables -
Trade and Other Receivables are measured at original amounts less an Expected Credit Loss (ECL)/(2018:provisions made for bad debts). The Council has adopted the "simplified approach" whereby lifetime expected losses are recognised without the need to identify significant increases in credit risk. Subsequent recoveries of amounts previously written off are credited to the surplus or deficit.

(f) Provisions and Expected Credit Loss Allowance -

General

Provisions are recognised when there is a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate of the obligation can be made. Where the Council expects a provision to be reimbursed, for example under an insurance contract, the reimbursement is recognised as a separate asset but only when the reimbursement is virtually certain.

IFRS 9- Expected Credit Loss (ECL)
IFRS 9 sets out requirements for recognizing and measuring financial assets, financial liabilities and some contracts to buy or sell non-financial items. This standard replaces IAS 39 "Financial Instruments: Recognition and measurement". IFRS 9 bring fundamental changes to the accounting of financial assets and to certain aspects of the accounting for financial liabilities.

As a result of the adoption of IFRS 9, the Council has adopted consequential amendments to IFRS 7 "Financial Instruments Disclosure", which are applied to disclosures about the financial year 2019, but have not been applied to the comparative information.

The Expected Credit Loss (ECL) represents the amount the Council is likely to lose in the event of a default.

(g) Short-Term Investments -
Short-term investments are measured at fair value by reference to quoted market prices when available. If quoted market prices are not available, then fair values are estimated on the basis of pricing models or other recognised valuation techniques.

Prior to January 1, 2018, Investments were classified as available for sale. The Council determines the appropriate classification of investments at the time of purchase and re-evaluates such designation on a periodic basis.

From January 1, 2018, the Council has applied IFRS 9 and classified its Financial assets at Fair value through profit and loss (FVTPL).

Significant judgement is applied in establishing the criteria for determining whether credit risk of the financial assets has increased significantly since initial recognition, determining the methodology for incorporating forward-looking information into the measurement of expected credit losses (ECL) on investments and selection and approval of models used to measure ECL.

All purchases and sales of investments securities are recognised at settlement date.

3. Statement of Compliance, Basis of Preparation and Significant Accounting Policies (Cont'd):

(h) Cash and Cash Equivalents -
For the purpose of the statement of cash flows, cash and cash equivalents comprise cash on hand, foreign and local savings accounts and current accounts held at banks.

(i) Capital Grants -
Where property, plant and equipment are received as gifts from, or acquired out of funds granted by the Government of Jamaica, the amount of the grant, determined by the cash received or, in the case of gifts in kind, the fair value of the asset received, is credited to capital reserve. An amount equivalent to the depreciation charge on the property, plant and equipment for the financial year is transferred from the capital reserve each year.

Where retention of a government grant is dependent on the Council satisfying certain criteria, it is initially recognised as a liability. When the criteria for retention have been satisfied, the unexpected balance is released to the statement of comprehensive income or netted against the asset purchased.

(j) Unexpended Funds -
The Council undertakes construction of waste water systems and other projects on behalf of customers for which advances are received. Advances are initially recognized as liabilities and reduced to the extent that revenue is recognized on the contracts. Revenue and costs associated with these projects are recognized in the income statement in accordance with IFRS as describe in note 3 (k). The amount in unexpended funds represents the balance remaining on deposits received for such projects.

(k) Revenue Recognition -
Revenue comprises the fair value of the consideration received or receivable for the sale of goods and services in the ordinary course of the Council's activities. Revenue is recognized as follows:

i) *Government Grants*
Government subventions to support the Council's operating budget are recognised when there is reasonable assurance that the grant will be received and the Council will comply the condition associated with the grant. Grants that compensate the Council for expenses incurred are recognized in the surplus or deficit as other income on a systematic basis in the same periods in which the expenses are recognised.

ii) *Construction Contracts*
Where the amounts of a construction contract can be estimated reliably, contract revenue and contract expenses are recognized in proportion to the stage of completion of the contract. Any expected loss on the contract is recognized immediately in surplus or deficit.

When the income from construction contract cannot be estimated reliably, revenue is recognized only to the extent of contract costs incurred that are likely to be recoverable.

iii) *Interest Income*
Interest income is accrued on the principal outstanding on fixed deposits.

3. Statement of Compliance, Basis of Preparation and Significant Accounting Policies (Cont'd):

(k) Revenue Recognition (Cont'd)-

iv) *Other Income*
Revenue from other income is recognised when the significant risks and rewards of ownership have been transferred to the buyer and the Council is reasonably certain that economic benefit will be received.

(l) Employee Benefits -

Employee benefits are all forms of consideration given by the Council in exchange for service rendered by employees. These includes short-term benefits such as salaries, incentives, NIS Contributions, vacation leave and post -employment benefits such as pensions.

Short-term employee benefits are recognized as a liability, net of payments made, and expensed. The expected cost of vacation leave that accumulates is recognized when the employee becomes entitled to leave.

The Council's contributions to cost of funding benefits under the scheme established to provide retirement pensions (note 19) are charged against income as they fall due.

(m) Actuarial Valuation -

In accordance with the Trust Deed, Actuarial Valuations of the Plan are to be done as prescribed by the Pensions (Superannuation Funds and Retirement Schemes) Act 2004. The Trustees have determined that such valuations are to be done at regular intervals provided that no longer than three (3) years elapse between each valuation. The last Actuarial Valuation was done as at 31st March 2018 and the report revealed a surplus of $365,485,000 being the excess of accumulated assets over the value of the past service liabilities of the plan. The next valuation is due no later than 31st March 2021.

(n) Foreign Currency Transactions -

During the period, transactions in foreign currencies are converted into Jamaican dollars at the rates of exchange ruling on the dates of those transactions. Assets and liabilities denominated in foreign currencies are translated at the rates of exchange ruling at the reporting date. Gains or losses arising from fluctuation in the exchange rates are reflected in the Statement of Comprehensive Income.

(o) Use of Estimates and Judgements -

The preparation of financial statements in accordance with International Financial Reporting Standards (IFRS) requires directors and management to make estimates and assumptions that affect the amount reported in the financial statements and acCounciling notes. These estimates are based on historical experience and directors and management's best knowledge of current events and actions and are reviewed on an ongoing basis. Actual results could differ from those estimates.

(p) Trade and other payables -

Trade and other payables are measured at amortised cost.

3. Statement of Compliance, Basis of Preparation and Significant Accounting Policies (Cont'd):

(q) Related Party Balances and Transactions -

A related party is a person or entity that is related to the entity that is preparing its financial statements (referred to in IAS 24, Related Party Disclosures as the "reporting entity").

(a) A person or a close member of that person's family is related to the reporting entity if, that person:

(i) has control or joint control over the reporting entity;

(ii) has significant influence over the reporting entity; or

(iii) is a member of the key management personnel of the reporting entity or of a parent of the reporting entity.

(b) An entity is related to the reporting entity if any of the following conditions applies:

(i) The entity and the reporting entity are members of the same group (which means that each parent, subsidiary and fellow subsidiary is related to the others).

(ii) One entity is an associate or joint venture of the other entity (or an associate or joint venture of a member of a group of which the other entity is a member).

(iii) Both entities are joint ventures of the same third party.

(iv) One entity is a joint venture of a third entity and the other entity is an associate of the third entity.

(v) The entity is a post-employment benefit plan for the benefit of employees of either the reporting entity or an entity related to the reporting entity. If the reporting entity is itself such a plan, the sponsoring employers are also related to the reporting entity.

(vi) The entity is controlled, or jointly controlled by a person identified in (a).

(vii) A person identified in (a) (i) has significant influence over the entity or is a member of the key management personnel of the entity (or of a parent of the entity).

(viii) The entity, or any member of a group of which it is a part, provides key management personnel services to the reporting entity or to the parent of the reporting entity.

(r) Comparative Information -

Where necessary, comparative figures have been re-classified to conform to changes in presentation in the current year. In particular, comparatives have been adjusted to take into account the requirements of IFRS except as a result of the adoption of IFRS 9 where consequential amendments to IFRS 7 "Financial Instruments Disclosure", which are applied to disclosures about the financial year 2019, but have not been applied to the comparative information.

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

4. Property, Plant and Equipment

	Building & Roadway	*Office Equipment Printing & Workshop*	*Scientific Equipment*	*Motor Vehicles*	*Total*
	$	*$*	*$*	*$*	*$*
Cost or Valuation:					
31st March 2017	25,753,817	65,006,432	105,763,654	9,393,940	205,917,843
Additions	-	4,311,895	23,917,544	-	28,229,439
Disposals	-	(3,620,580)	(1,338,094)	-	(4,958,674)
31st March 2018	25,753,817	65,697,747	128,343,104	9,393,940	229,188,608
Additions	-	8,039,101	27,036,576	5,800,000	40,875,677
Disposals	-	(2,441,044)	(5,791,362)	-	(8,232,406)
31st March 2019	25,753,817	71,295,804	149,588,318	15,193,940	261,831,879
Accumulated Depreciation:					
31st March 2017	15,580,065	57,064,037	92,311,485	9,393,940	174,349,527
Charge for the year	637,397	2,554,634	3,710,162	-	6,902,193
Depreciation released on Disposal	-	(3,620,580)	(1,338,094)	-	(4,958,674)
31st March 2018	16,217,462	55,998,091	94,683,553	9,393,940	176,293,046
Charge for the year	637,397	1,993,662	6,141,062	-	8,772,121
Depreciation released on Disposal	-	(2,441,044)	(5,791,362)	-	(8,232,406)
31st March 2019	16,854,859	55,550,709	95,033,253	9,393,940	176,832,761
Net Book Value					
31st March 2019	**8,898,958**	**15,745,095**	**54,555,065**	**5,800,000**	**84,999,118**
31st March 2018	9,536,355	9,699,656	33,659,551	-	52,895,562
31st March 2017	10,173,752	7,942,395	13,452,169	-	31,568,316

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

5. Long Term Receivables

	2019 $	2018 $
Loan to Employees	3,176,878	2,319,462
Less: Current Portion	(693,327)	(305,128)
	2,483,551	2,014,334

6. Inventories

	2019 $	2018 $
Processed Meats	-	176,459

7. Trade and Other Receivables

	2019 $	2018 $
Trade Receivables	14,164,624	8,219,712
Expected Credit Loss/(2018: Provision for Bad Debt)	(4,467,949)	(3,977,350)
	9,696,675	4,242,362
Other Receivables	685,799	619,384
	10,382,474	4,861,746

8. Short-Term Investments

	2019 $	2018 $
Foreign Currency (USD)	4,391,719	4,348,578
Jamaican Dollar	65,957,203	50,200,660
	70,348,922	54,549,238

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

9. Cash and Cash Equivalents

	2019	2018
	$	$
Current Accounts		
Jamaican Dollar	8,595,647	14,699,469
US Dollar	7,345,524	26,989,693
Project Accounts		
Jamaican Dollar	134,948,463	120,162,442
US Dollar	1,257,971	18,146,397
Petty Cash		
Jamaican Dollar	49,646	86,379
US Dollar	1,266	1,266
	152,198,517	180,085,646

10. Capital Reserve

	2019	2018
	$	$
Balance brought forward	1,853,163	2,162,023
Depreciation Charges	(308,860)	(308,860)
Balance carried forward	1,544,303	1,853,163

The balance on the reserve represents the receipt of donated asset in the 2015 financial year of $3,088,603 less annual depreciation charges.

11. Trade and Other Payables

	2019	2018
	$	$
Trade Payables	24,451,940	8,809,576
Vacation Leave Accrued	31,064,571	28,758,636
Other Payables	20,611,301	22,864,279
	76,127,812	60,432,491

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

12. Unexpended Project Funds

	2019	2018
	$	$
Wastewater Management Projects	16,597,746	14,499,012
Other Projects	10,600,400	48,498,867
	27,198,146	**62,997,879**

13. Revenue

	2019	2018
	$	$
Government Subvention	475,362,720	399,345,468
Applied Research and Technology Know-how	57,086,195	60,627,507
	532,448,915	**459,972,975**

These revenue balances represent Subvention from the Government of Jamaica for operational activities and from applied research and technology and products sold.

14. Net Income from Project Activities

	2019	2018
	$	$
Project Income	2,842,519	20,915,883
Project Cost	(340,521)	(14,839,132)
	2,501,998	**6,076,751**

15. Other Income

	2019	2018
	$	$
Interest Income	1,441,292	3,820,012
Gain on Foreign Exchange	-	60,384
Miscellaneous	3,767,666	2,123,437
	5,208,958	6,003,833

(expressed in Jamaican Dollars unless otherwise indicated)

16. Taxation

The Council is exempt from income tax, stamp duty and taxation under the Transfer Tax Act, by virtue of Section 3 (J) of the Scientific Research Council Act.

17. Pension

The Council operates a defined contributory pension scheme for all permanent employees, administered by Employee Benefits Administrator Limited, a subsidiary of the Sagicor Group Jamaica. The pension commences upon confirmation of permanency.

The benefits are based on accumulated employer and employee contributions, together with interest thereon, and, accordingly, the scheme imposes no further funding obligation on the Council.

The scheme is subject to triannual valuation and the most recent valuation, as of 31st March 2018 revealed a surplus of $365.5 million.

The Council's contribution for the year amounted to $14,797,532 (2018: $14,233,915).

18. Related Party Balances

A related party transaction is a transfer of resources, services or obligations between related parties, regardless of whether a price is charged.

The Council has the following income and expenses incurred in transactions with related parties (other agencies under common control by the Government of Jamaica), in the ordinary course of business:

(a) Included in the Statement of Comprehensive Income are the following related party;

	2019 $	2018 $
Subvention - Government of Jamaica	475,362,720	399,345,468
Key Management Personnel - Salaries & Other Related Costs	48,876,677	46,821,323
Directors' Fees - Board Members	606,000	473,250

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

18. Related Party Balances

(b) Related Party Balances

(i) Included in receivables are balances arising in the normal course of business with related parties as follows:

	2019 $	2018 $
Housing Agency of Jamaica	487,570	428,161
Development Bank Of Jamaica	28,326	28,326
Ministry of Education	386,551	386,551
Tourism Product Development Co. Ltd	770,745	770,745
Bureau of Standards	25,670	7,846
Ministry of Health Waste Management Unit	182,533	182,533
Rural Water Supply	56,990	46,788
Water Resources Authority	440,830	249,970
	2,379,215	2,100,920

(ii) Included in Payables are balances arising in the normal course of business with related parties as follows:

	2019 $	2018 $
Bureau of Standards	20,388	80,434
	20,388	80,434

19. Staff Costs

	2019 $	2018 $
Salaries & Wages	211,222,005	210,343,147
Allowance and Other Benefits	75,531,339	63,119,155
Gratuity	6,854,699	8,323,493
	293,608,043	281,785,795
Pension	14,797,532	14,233,915
Employer's Statutory Costs	10,431,843	10,087,585
	318,837,418	306,107,295

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management

A financial instrument is a contract that gives rise to both a financial asset of one enterprise and a financial liability of another enterprise. For the purpose of the financial statements, financial assets have been determined to include cash and cash equivalents, short term investments and trade and other receivables. Financial liabilities have been determined to include trade and other payables and projects and contracts.

The activities of the Council expose it to certain financial risks which require evaluation, acceptance and management. Operational risks are an inevitable consequence of being in business. The Board of Directors aims to achieve an appropriate balance between risk and return and thereby minimising any potential adverse effects on the Council's financial performance.

The main types of risks to which the Council is exposed are credit risk, liquidity risk, market risk and operational risk. Market risk is further broken down into interest rate risk and currency risk The management policies of the Council are designed to identify and analyse these risks, to set up appropriate controls, and to monitor the risks by means of up-to-date information.

(a) Credit risk

The Council is exposed to credit risk, which is the risk that its customers and counter-parties to its financial instruments will cause a financial loss for the Council by failing to discharge their contractual obligations. Management however carefully manages its exposure to credit risk in order to minimise losses. The accounts department ensures that amounts billed are collected on a timely basis and where amounts are considered doubtful or uncollectible, the necessary provisions or write off are done after careful review and approval by the Board of Directors.

Credit Review Process

The Council has established a credit quality review process and has credit policies and procedures which require regular analysis of the ability of counter-parties to meet their payment obligations.

Maximum Exposure to Credit Risk

	2019	**2018**
	$	**$**
Long-Term Receivables	2,483,551	2,014,334
Current Portion of Long Term Receivables	693,327	305,128
	3,176,878	2,319,462
Trade Receivables	14,164,624	8,219,712
Short-Term Investments	70,348,922	54,549,238
Cash and Cash Equivalents	152,198,517	180,085,646
	239,888,941	245,174,058

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(a) Credit risk (Cont'd)

(i) Trade Receivables

Trade receivable balances are not considered high risk. Revenue in respect of its primary operations are settled by cash. For transactions done on a credit basis, management closely monitors its customers to minimise the level of bad debts. The Council has established a credit quality review process and has credit policies and procedures which require regular analysis of the ability of debtors to meet their obligations.

As at 31st March 2019, trade receivables of $4,991,058 (2018: $3,386,490) were past due but not impaired. These relate to customers for whom there is no recent history of default.

Movement on the expected credit loss/(2018: provision for impairment) of trade receivables are as follows:

	2019	2018
	$	$
Balance at the beginning of the year	3,977,350	3,982,032
Provided for/(Written off) during the year	490,599	(4,682)
Balance at end of the year	4,467,949	3,977,350

In determining the recoverability of a receivable, the Council considers any change in the credit quality of the receivable from the date credit was initially granted up to the reporting date. The Board believes that at the statement of financial position date there is no further credit loss required.

Concentration of Risk - Trade Receivables

The following summarises the Council's exposure for trade receivables at their carrying amounts as categorised by customer sector:

	2019	2018
	$	$
Government entities	569,084	569,084
Other	13,595,540	7,650,628
	14,164,624	8,219,712
Less expected credit loss/(2018: provision for impairment)	(4,467,949)	(3,977,350)
	9,696,675	4,242,362

(ii) Short-Term Investments and Cash and Cash Equivalents

Short-Term Investments and Cash and cash equivalents comprise current and savings accounts, and deposits held with financial institutions. The Council limits its exposure to credit risk by placing its cash and cash equivalents with counter-parties that have high credit quality. Accordingly, management does not expect any counter-party to fail to meet its obligations.

There has been no change in the Council's exposure to credit risk or the manner in which it measures and manages the risk.

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(b) Liquidity risk

Liquidity risk is the risk that an enterprise will encounter difficulty in raising funds to meet commitments associated with financial liabilities when they fall due and to replace funds when they are withdrawn. The consequence may be the failure to meet obligations to creditors and also to complete projects.

The income generated by the Council represents only 11.53% (2018: 14.115%) of total income. If the Council was totally dependent on internally generated income, it would have faced liquidity risk in that regard. The Council however, is funded mainly by Government Subvention which is pre-determined in the fiscal budget. Total income is usually sufficient to cover expenses. At 31st March 2019, the Council's current assets exceeded its current liabilities by $130,536,486 (2018: $116,633,201).

Liquidity management process

The Council's liquidity management process, as carried out within the Council and monitored by the Accounts Department, includes:

(i) Monitoring future cash flows and liquidity on a daily basis. This incorporates an assessment of expected cash flows in relation to payment obligations.

(ii) Monitoring Statement of Financial Position Liquidity ratios against internal requirements. The most important of these is to maintain limits on the ratio of net liquid assets to customer liabilities.

There has been no change in the Council's liquidity risk or the manner in which it measures and manages the risk.

SCIENTIFIC RESEARCH COUNCIL
NOTES TO THE FINANCIAL STATEMENTS - (CONT'D)
YEAR ENDED 31ST MARCH 2019
(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(b) Liquidity risk (Cont'd)

The following are the contractual maturities of financial assets and liabilities including interest payments as at:

31st March 2019

	Carrying Amount and Contractual Cash Flow	0 - 6 months	6 - 12 months	No specific maturities
	$	$	$	$
Current Assets				
Trade and Other Receivables				
Trade	9,696,675	9,696,675	-	-
Other	685,799	-	569,824	115,975
Taxation Recoverable	239,204	-	-	239,204
Current Portion of Long Term Receivable	693,327	346,664	346,664	-
Short-Term Investments	70,348,922	70,348,922	-	-
Cash and Cash Equivalents	152,198,517	-	-	152,198,517
	233,862,444	80,392,261	916,488	152,553,696
Current Liabilities				
Trade and Other Payables				
Trade	24,451,940	24,451,940	-	-
Accruals/Other Payables	51,675,872	20,611,301	-	31,064,571
Unexpended Funds	27,198,146	-	-	27,198,146
	103,325,958	45,063,241	-	58,262,717
Net Current Assets	**130,536,486**	**35,329,020**	**916,488**	**94,290,979**

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(b) Liquidity risk (Cont'd)

The following are the contractual maturities of financial assets and liabilities including interest payments as at:

31st March 2018

	Carrying Amount and Contractual Cash Flow	0 - 6 months	6 - 12 months	No specific maturities
	$	$	$	$
Trade and Other Receivables				
Trade	4,242,362	4,242,362	-	-
Other	619,384	-	503,409	115,975
Taxation Recoverable	85,354	-	-	85,354
Current Portion of Long Term Receivable	305,128	152,564	152,564	-
Short-Term Investments	54,549,238	54,549,238	-	-
Cash and Cash Equivalents	180,085,646	-	-	180,085,646
	239,887,112	58,944,164	655,973	180,286,975
Trade and Other Payables				
Trade	8,809,576	8,809,576	-	-
Accruals/other payables	51,622,915	22,864,279	-	28,758,636
Unexpended Funds	62,997,879	-	-	62,997,879
	123,430,370	31,673,855	-	91,756,515
Net Current Assets	116,456,742	27,270,309	655,973	88,530,460

(c) Market Risk

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate as a result of changes in market prices. This arises mainly from changes in interest rates, foreign currency rates and equity prices. The Council's operations are impacted by changes in interest rates and foreign currency movements, but not by changes in equity prices. The effect of these changes however, are not considered significant. The objective of market risk management is to monitor and control market risk exposures within acceptable parameters, while optimising the return on investments. Market risk exposures are measured using sensitivity analyses.

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(c) Market Risk (cont'd)

(i) Interest rate risk

Interest rate risk arises when the value of a financial instrument fluctuates during a specified period due to changes in the market interest rates.

The Council is exposed to interest rate risk in respect of its cash on deposit and foreign currency savings account. The Council manages this risk by maintaining net earning assets and procuring the most advantageous interest rates.

Financial Assets

The interest rates on fixed deposits are based on contractual arrangements and are therefore not affected by short term fluctuations in the market interest rates. The interest rates paid on savings accounts will fluctuate from time to time but are usually reflective of market conditions.

At the reporting date, the interest rate profile of the Council's interest-bearing financial instruments were:

	Interest Rate	**2019**	**Interest Rate**	**2018**
	%	**$**	**%**	**$**
J$ Bank balances				
Short term investment	2.1 - 3.0	27,687,704	4 - 3.20	13,062,704
Fixed Deposit	2 - 5.65	37,900,196	5.65	36,768,653
US$ Bank balances				
Savings Accounts	0.1	8,603,495	0.1	45,121,541
Fixed Deposit	0.95	4,391,719	0.95	4,348,578
		78,583,114		99,301,476

Financial Liability

The Council has no interest-bearing liabilities and therefore is not exposed to interest rate risk in this regard.

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(c) Market Risk (cont'd)

(i) Interest rate risk (cont'd)

Interest rate sensitivity analysis

There have been insignificant movements in the interest rates over the last reporting date. A one percent (1%) (2018: one percent (1%) for Jamaican interest-bearing financial assets and a one percent (1%) (2018: one percent (1%) for US $ interest-bearing financial assets movement in interest rate at the reporting date would have increased/(reduced) the reported (deficit)/surplus and accumulated fund by the amounts shown below:

	2019	**2018**
	$	**$**
Increase in interest rates		
J$ Bank balances (1% (2018: 1%))		
Short term investment	276,877	130,627
Fixed Deposit	379,002	367,687
US$ Bank balances (0.5% (2018: 0.05%))		
Savings Accounts	43,017	451,215
Fixed Deposit	21,959	43,486
Increase in surplus/deficit and accumulated fund	720,855	993,015

	2019	**2018**
	$	**$**
Decrease in interest rates		
J$ Bank balances (1% (2018: 1%)		
Short term investment	(276,877)	(130,627)
Fixed Deposit	(379,002)	(367,687)
US$ Bank balances (0.5% (2018:0.5%)		
Savings Accounts	(43,017)	(451,215)
Fixed Deposit	(21,959)	(21,743)
Decrease in surplus/deficit and accumulated fund	(720,855)	(971,272)

Between April 2018 and March 2019, the interest rate on Bank of Jamaica 3 - 6 months commercial bank deposits rates increased by 131 basis points from 3.88% to 2.57%. The rate movement subsequent to the year end is expected to be insignificant as there has been some amount of stabilizing of the rates.

This analysis assumes that all other variables, in particular exchange rates, remain constant.

(ii) Foreign currency risk

Foreign currency risk is the risk that the market value of, or the cash flows from financial instruments will vary because of exchange rate fluctuations. The Council is exposed to foreign currency risk due to fluctuations in exchange rates on transactions and balances that are denominated in currencies other than the Jamaican dollar. A foreign currency bank account is maintained at a level which partially meets foreign currency obligations. During the period 1st April 2018 to 31st March 2019, the Council was a net expender of foreign currency.

(expressed in Jamaican Dollars unless otherwise indicated)

20. Financial Instruments & Financial Instruments Risk Management (cont'd)

(c) Market Risk (cont'd)

(ii) Foreign currency risk (cont'd)

The Council's foreign currency asset at the reporting date is as follows:

	2019 US$	2018 US$
Cash and Cash Equivalents	68,038	358,276
Short term deposits	34,725	33,575
	102,763	391,851

Sensitivity analysis

Exchange rates in terms of Jamaican Dollars which is the Council's reporting currency, were as follows:

	US$
30th June 2019	131.07
31st March 2019	126.47
31st March 2018	125.98

Over the period April 2018 to March 2019 there was a 0.4% appreciation of the Jamaican dollar against the US dollar. Between March 2019 and June 2019 there has been a 4% depreciation of the Jamaican dollar against the US dollar.

The appreciation/depreciation of the Jamaican dollar to the extent shown against the United States dollar would have reduced/increased income and equity by the amounts shown below.

	Movement %	2019 J$	Movement %	2018 J$
United States dollar	6	779,789	4	1,974,692
United States dollar	-4	(519,859)	-2	(987,346)

The analysis is computed on the same basis for 2018 and assumes that all other variables, in particular, interest rates, remain constant.

20. Financial Instruments & Financial Instruments Risk Management (cont'd):

(d) Operational risk:

Operational risk is the risk of direct or indirect loss arising from a wide variety of causes associated with the Council's processes, personnel, technology and infrastructure, and from external factors other than financial risks such as those arising from legal and regulatory requirements and generally accepted standards of corporate behaviour.

The Council's objective is to manage operational risk so as to balance the avoidance of financial losses and damage to its reputation with overall cost effectiveness and to avoid control procedures that restrict initiative and creativity.

The primary responsibility for the development and implementation of controls to identify operational risk is assigned to Senior Management. This responsibility is supported by overall standards for the management of operational risk in the following areas:

- Requirements for the periodic assessment of operational risks faced, and the adequacy of controls and procedures to address the risks identified.
- Requirements for the appropriate segregation of duties, including the independent authorisation of transactions.
- Requirements for the reconciliation and monitoring of transactions.
- Compliance with regulatory and other legal requirements.
- Documentations of controls and procedures.
- Requirements for the reporting of operational losses and proposed remedial action.

20. Financial Instruments & Financial Instruments Risk Management (cont'd):

(d) Operational risk (Cont'd):

- Development of contingency plans.
- Training and professional development.
- Ethical and business standards.
- Risk mitigation, including insurance where this is effective.

Compliance with the Council's policies is supported by a programme of periodic reviews undertaken by Internal Audit. The results of Internal audit reviews are discussed with senior management.

(e) Fair value:

Fair value is the amount for which an asset could be exchanged, or a liability settled between knowledgeable willing parties who are under no compulsion to act, in an arm's length transaction. Market price is used to determine fair value where an active market exists as it is the best evidence of the fair value of a financial instrument.

The carrying value of each class of financial instrument approximates to their fair value.

The amounts included in the financial statements for trade and other receivables, cash and cash equivalents, trade and other payables reflect their approximate fair values because of the short-term maturity of these instruments.

(f) Capital Management:

The main objectives of the Board when managing capital are to safeguard the ability of the Council to continue as a going concern and to ensure that there are adequate revenue reserves. The Board of Directors monitor and maintain an appropriate balance between revenue and expenditure to ensure that the subvention received is used only for intended purposes and that adequate levels of liquidity is maintained. There is also close monitoring of the projects undertaken by the Council to ensure that are no cost overruns, or that such overruns are kept to a minimum.

There were no changes to the Council's approach to capital management during the year.

The Council's capital comprises:

	2019	**2018**
	$	**$**
Capital Reserve	1,544,303	1,853,163
Accumulated Surplus	216,474,852	169,689,934
	218,019,155	171,543,097

SCIENTIFIC RESEARCH COUNCIL
SUPPLEMENTARY INFORMATION TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31ST MARCH 2019
(Expressed in Jamaican Dollars unless otherwise indicated)

INDEX

Crowe

Statement 1

REPORT OF THE INDEPENDENT AUDITORS
TO THE DIRECTORS OF
SCIENTIFIC RESEARCH COUNCIL
ON SUPPLEMENTARY INFORMATION

The supplementary information presented on statement 2 has been taken from the accounting records of the company and has been subjected to review procedures applied in our examination of the financial records of the company for the year ended 31st March 2019.

In our opinion, the said information is fairly presented in all material respects in relation to the financial statements taken as a whole, although it is not necessary for a fair presentation of the state of affairs of the company at 31st March 2019 and of the results of its operations, its changes in equity and cash flows for the year then ended.

Crowe Horwath Jamaica

Crowe Horwath Jamaica

December 17, 2019

SCIENTIFIC RESEARCH COUNCIL
SCHEDULE OF ADMINISTRATIVE AN GENERAL EXPENSES
FOR THE YEAR ENDED 31ST MARCH 2019
(Expressed in Jamaican Dollars unless otherwise indicated)

	2019 $	2018 $
Salaries, Wages & Related Expenses (note 19)	318,837,418	306,107,295
Travelling and Subsistence	23,723,149	20,293,385
Food & Drink	9,623,953	6,388,717
Electricity, Water and Telephone	17,473,707	20,355,404
Other operating supplies material	33,691,562	22,743,364
Purchase of Raw materials	1,728,969	1,639,100
Rental Expense	355,500	530,352
Repairs and Maintenance	32,383,543	32,660,434
Advertising & Promotion	4,430,035	3,038,790
Contributions and Subscriptions	211,000	237,313
Consultancy	8,632,443	8,183,839
Directors' Fees	606,000	473,250
Seminars and Workshops	5,119,845	3,450,114
Auditors' Remuneration - Current	977,000	977,000
Other Taxes & Fees	314,626	542,266
Insurance	6,586,906	5,262,694
Security	7,722,230	6,604,112
Cooking Fuel	22,521	165,231
Bad Debt Charge	490,599	1,472,409
Bank Charges	1,228,914	644,733
Loss on Foreign Exchange	5,350	-
GCT Expenses	10,746,422	12,968,756
	484,911,692	454,738,558