

HERC/IGEM Project

First Annual Progress Report

Project Title:	Sustaining the Competitiveness of the Food Industry in Southern Idaho: Integrated Water, Energy and Waste Management
Principal Investigator:	Dr. Karen Humes
Institution:	University of Idaho (lead) with subcontracts to Boise State University and Idaho State University
Grant Number:	IGEM19-001
Award Amount:	\$700,000
Fiscal Period:	July 1, 2018 – June 30, 2019
Progress Report Submitted to SBOE:	June 30, 2019
Reporting Period:	July 1, 2018 – June 30, 2019

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1) Summary of project accomplishments for first year reporting period and Plans for Yr 2:

The accomplishments and plans for the four primary tasks identified in the original proposal are summarized here (Tasks A-D). A summary of accomplishments for the overall project management and coordinated stakeholder engagement activities are also summarized below, listed as Task E.

The team would like to stress that our partnerships with producers, processors, municipal treatment personnel and water management entities (private and public) are fundamental to all of our tasks and our project as a whole. Our Yr 1 activities have been influenced and enhanced by interactions with our Stakeholder Advisory Board (described in more detail under Task E below) and interactions with other stakeholders as well.

Task A) Recovery of energy, nutrients, water and bioproducts from waste streams: bench to place-based pilot projects

Team: Erik Coats (UI, environmental engineering/molecular biology; emphasis on resource recovery from waste streams); Armando McDonald (UI, biomass conversion and bioproducts); Kevin Feris (BSU, algae-based resource recovery and microbial ecology))

Team background and overall goals:

This team collaborated for 10+ years and has the required multidisciplinary experience to integrate biological, chemical, physical and thermal approaches to the recovery of energy, bioproducts and nutrients from multiple waste streams. The team is leveraging investments made by the INL, CAES, HERC, and the IGEM incubation fund. Over the last 10 years our efforts have resulted in multiple extramurally funded awards, student training opportunities, scientific publications and a pending patent. We have worked across bench and pilot scales. Recent support from SBOE HERC allowed us to build a pilot scale system to convert dairy waste to value added products (biogas, bio-plastic, algal biomass); previous HERC funding supported construction of two pilot systems at UI by Dr. Coats—one located at the Moscow WWTP, designed for municipal wastewater and one mobile system (24 ft. trailer) designed for dairy manure resource recovery. We are engaged in testing, validating, and extending these systems to evaluate opportunities to recover high-value products (bioplastics, algae, biofuels) from industrial/municipal wastewater while achieving treatment. Research is focused on further understanding/optimizing our integrated system to maximize utility across input streams and demonstrate “real-world” applicability. Research objectives will further technology interrogations and advance wastewater as an economic resource. Ultimately, research will advance solutions that can be applied in Idaho agricultural and food processing sectors; producing economic value from waste will enhance Idaho-based industries by diversifying product portfolios.

Accomplishments this reporting period:

- i. Bench scale process improvements and system modeling for assessing commercial scale feasibility of the integrated system being evaluated in Task A (i.e., bioplastics, biochar, algal biomass and bio-products) :

a) Characterization of waste streams from a variety of producers and processors in the Twin Falls area (e.g., dairies, yogurt, cheese, and potato processors);

- Obtained and conducted preliminary analysis on agro-industrial wastes available in the Twin Falls area. Further investigations are ongoing.

Entity	Flow (mgd)	BOD (mg/L)	TSS (mg/L)	FOG (mg/L)
AmeriPride	0.13	178.28	70.36	110.53
Chobani	0.80	144.97	164.22	24.16
City of Kimberly	0.30	302.56	285.07	24.59
Clif Bar	0.01	659.22	444.06	23.86
Eagle Eye	0.01	143.01	410.35	2.78
Glanbia	0.51	601.50	244.21	89.27
Independent Meat	0.11	84.34	91.58	17.33
KapStone	0.01	401.69	196.97	3.15
Lamb Weston	1.76	2305.13	510.47	93.24
Total	3.65	1267.98	349.38	69.34

b) Assessment of optimal process sequences (biological, chemical, physical, thermal) to recover energy, bioproducts (biofuels; bioplastics) and nutrients from mixed waste.

- Bench-scale bioreactor operations are set up and underway. Performance assessment is ongoing. One current focus is analysis of process “success” vs. “failure.” Stable operations of any resource recovery system at full scale demands intrinsic knowledge on what constitutes stable operation, and how unstable, or “failed,” operations might be recovered. Investigations are being conducted using macro- and molecular-level methods.
- Phosphorus recovery from wastewater is best achieved through a process known as enhanced biological phosphorus removal, EBPR. Bench-scale EBPR operations are ongoing, with a focus on ascertaining the effects of key process operational criteria on maximal P recovery. Results will ultimately inform pilot and full scale operations.
- Another current focus is on achieving stable nitritation in an activated sludge wastewater treatment system achieving carbon, ammonia-N, nitrite-N, nitrate-N, and phosphorus removal. Nitritation is a biological process whereby ammonia-N is oxidized only to nitrite. Process success will result in significant energy savings in wastewater treatment.
- Two of Coats’ undergraduate students are investigating the production of bioplastics (polyhydroxybutyrate-co-valerate, PHBV) on fermented dairy manure. Results will inform operations of our pilot scale system for 2019.
- Algal cultivars are established and being maintained for routine experimental deployment. On-going experiments are focused on cultivation at both bench and pilot scales employing wastewaters from multiple sources (e.g. currently dairy and municipal provided by the Coats lab) to maximize nutrient capture and algal biomass production. Bench scale experiments are identifying which strains produce optimal levels of biomass under various cultivation conditions. Optimal bench scale conditions will then be scaled up to pilot scales to evaluate algae production at these large scales and to provide algae biomass for HTL processing by

- the McDonald lab. Nutrients captured from the HTL processing of algal biomass will then be tested in a secondary stage algae production system for high value commodity production in year 2 of the project. Based on these initial wastewater characterization and viability experiments we will determine the most opportunity mechanism for algal cultivation in our integrated system and initiate cultivation tests with individual or consortia of algal strains selected based on their ability to grow in the selected wastewater streams and based on their growth rates, yields, biomass characteristics, and economic potential.
- ii. Pilot scale assessments: Conduct pilot scale evaluations from mixed waste streams; implement/evaluate treatment resource recovery processes.
- Have hired a team of undergraduate students and started training in the laboratory, with a focus on operations and analysis of biological resource recovery systems that are part of the targeted pilot-scale systems. The undergraduate team, combined with 2-3 graduate students, will operate the UI scale model systems in 2019.
 - Conducting hypothetical re-configuration of the Twin Falls wastewater treatment plant to integrate proximate waste streams and achieve resource recovery. Analyses are being conducted using SUMO process modeling software by Dynamita. Results will be used to inform 2019 scale model operations.
 - The initial pilot scale greenhouse systems have been constructed at the Boise State research greenhouse and are being tested for suitability for cultivation of multiple strains. New system configurations are being developed and tested that should facilitate the production of high value algal biomass (e.g. PUFA rich algal biomass). For example, we are developing the capability to rapidly decrease culture temperatures on large volume scales. Rapid decreases in culture temperature can induce PUFA synthesis in a variety of the algal strains we are working with. This is a new capability for our systems and we are currently configuring and testing the systems to ensure temperatures can be reliably controlled at the large cultivation volumes we will employ. As noted above the outcome of these pilot scale assessments and modeling will inform decisions about which types of algal cultivation systems to couple with the AD/PHA aspects of our integrated system and which algal cultivars/species to employ in our bench and pilot-scale tests. We will continue to operate the pilot scale algal cultivation systems through 2019 in collaboration with the Coats and McDonald labs at UI.
- iii. Produce prototype products (bioplastic mulch film, biochar, biofuel) for evaluation.
- Ordered laboratory blown-film extruder system for preparing bioplastic films and installed/commissioned it in May 2019.
 - Hired 1 graduate student that started spring semester 2019 to characterize the bioplastic generated and prepare and evaluate the bioplastic films.
 - Ongoing experiments in the Feris lab will begin to produce suitable quantities of algal biomass this summer for use in HTL experiments by the McDonald lab. Primary outputs of HTL processing of algal biomass will include biofuel (i.e. biooil), biochar, and aqueous phase nutrients. The aqueous phase will be recycled to the algal cultivation system to enhance algal biomass production.

Task A - Goals for Year 2:

i: Bench scale

- In year 2 nutrients captured from the HTL processing of algal biomass will then be tested in a secondary stage algae production system for high value commodity production. Based on these initial wastewater characterization and viability experiments we will determine the most opportunity mechanism for algal cultivation in our integrated system and initiate cultivation tests with individual or consortia of algal strains selected based on their ability to grow in the selected wastewater streams and based on their growth rates, yields, biomass characteristics, and economic potential.
- Advance new knowledge on operational criteria to discern between process “failure” and “success” for enhanced biological phosphorus removal.
- Advance new knowledge on achieving shortcut nitrogen removal in biological wastewater treatment.
- Finalize a metabolic model for producing biodegradable plastics from fermenter dairy manure.

ii: Pilot scale:

- We will continue to operate the pilot scale algal cultivation systems through 2019 in collaboration with the Coats and McDonald labs at UI.
- Produce quantities of bioplastic material from Coats’ pilot scale system for McDonald’s ongoing polymer characterization work.
- Translate/assess operational criteria from Coats’ bench scale reactors to his pilot scale systems.

iii: Producing prototype products:

- Ongoing experiments in the Feris lab will begin to produce suitable quantities of algal biomass in year 2 for use in HTL experiments by the McDonald lab. Primary outputs of HTL processing of algal biomass will include biofuel (i.e. biooil), biochar, and aqueous phase nutrients. The aqueous phase will be recycled to the algal cultivation system to enhance algal biomass production.

Important note on continued stakeholder partnership development in Yr2:

- In response to an invitation from the Idaho Dairywomen’s Association Dr. Feris and Coats will attend a conference with regional Dairywomen in Salt Lake City, July 31, 2019.
 - The goal of this meeting will be to introduce the larger Dairy production community to this project and build relationships to explore deployment opportunities for the technology developed as part of the work done here.

Task B) Decision-support tools for industry and community leaders to quantify and visualize trade-offs among water, energy, land use and municipal growth

Team: Jae Ryu, UI, systems dynamics modeling, water resources; Karen Humes (UI, water/energy nexus, geospatial analysis

Overall Goals:

The goal of this task is to integrate energy components into an updated version of a pre-existing system dynamics model for water supply, use and flows in the region of the Eastern Snake Plain Aquifer. The model which will serve as a decision-support tool for stakeholders (including the food producers, food processors, irrigation districts, water and energy providers and municipal communities/citizens). The tool will quantify and provide users with visuals on the linkages between water, energy, land use and municipal growth, to be used for planning and decision-making by businesses, utilities, state agencies and communities.

Accomplishments this period:

- Began the process of upgrading the existing Stella system dynamics model from an older version to the new Stella Architect, which has more features and is more user friendly.
- Completed a literature review of recent published research related to water resources and system dynamics modeling in preparation for completing the tasks.
- Reviewed the data that was included in the original version of the existing model and identified data needs in order to make the model more current and representative of climate changes and drought that have occurred during the past ten years. Examples of these data include: precipitation, groundwater pumping, spring discharges, evapotranspiration, etc.
- Further evaluated the existing model to determine how to implement conservation scenarios given the existing data types available
- Initiated collaborations with IDWR on their newest ESPAM (Eastern Snake Plain Aquifer Model) model version and updated data needs
- Evaluated feedback from IDWR and Surface Water Users Association representatives at our Stakeholder Advisory meeting as to how the model could be more useful for them
- Explored data sources and availability for information on energy use in irrigation
- Initiated collaborations with irrigation specialists in order to begin developing module that would describe energy use in irrigation based on key variables such as crop type, irrigation system, water source, etc.
- Initiated collaborations with IDWR and Idaho Power on their knowledge, expertise and data on energy use in irrigation, to assist in quantifying relationships between climate, crop types, irrigation systems, water use and energy use. Currently evaluating spatial patterns in energy use for irrigation in the ESPA and what controls them
- Undertook plans for integrating energy components into the updated Stella Architect model.

Plans for Yr 2:

- We plan to incorporate new features that are available in Stella Architect into the system dynamics model and user interface.
- We plan to perform a quality analysis of the most recent data available from IDWR and complete the integration process to bring the model up to date.
- We will continue exploring management options to incorporate into the model, such as water conservation, managed recharge, etc.

- We will be developing system evaluation criteria associated with new data inputs and potential uses for the expanded and update model, such as system reliability, vulnerability, resilience, etc.
- We will complete our analysis of available data on energy use in irrigation
- We will complete the development of a module for the system dynamics model that quantifies energy use in irrigation for two meteorological scenarios (average and above average demand in a growing season) and number of acres with other key variable combinations (eg., crop type, irrigation source/type)
- We will begin incorporating supply side scenarios to quantify the linkages between water, energy and land use and address the uncertainty of the water/energy nexus in the Eastern Snake Plain Aquifer.
- We will continue to seek input from our Stakeholder Advisory Board and other water and energy providers, managers and community leaders on how to make the tool/model most useful to them.

Task C) Technical innovations/sensing systems to reduce water/energy/nutrient use in targeted production systems:

Primary team members: Donna Delparte, (ISU, drone and satellite-based sensing systems) and partners among growers and crop consultants.

Accomplishments this period:

Progress in the following task area has been made through the subcontract award to Idaho State University and included:

- **Goal 1 – Decision Support Systems**
 - Decision support online tool prototype for sustainable agriculture decisions making: <http://geoviz.rdc.isu.edu/ProGro/index.html>
 - Working with stakeholders to provide remote sensing data/tools to aid decision making that is relevant to their business decision making and operations
 - Stakeholders are excited about the potential of the tool to improve ROI
- **Goal 2 - Pilot projects to use drone-based, other field-based and satellite sensors to reduce water/nutrient/energy use in production of targeted crops**
 - Conducted remote sensing analysis to forecast yield for potato growers based on a growing season of high resolution satellite imagery (in process of being submitted for publication to *Remote Sensing* by Masters student)
 - Acquired thermal camera for UAS for 2019 growing season irrigation to assess efficiency and support water reduction efforts. Camera and drone tested and ready to deploy with stakeholder growers.
 - Hyperspectral camera acquired for use with 2019 growing season spectral data collection.

- PhD student conducted experiment to determine essential spectral signatures required to detect individual sick plants in a growers field that leverages machine learning – thus offering the opportunity to reduce inputs for control and mitigation of disease.

Plans for next reporting period:

For the next reporting period, the team will focus on the continued development and testing of UAS platform and sensor combinations for data collection in the latter half of 2019 growing season and first part of the 2020 season, again in partnership with growers and crop consultants. We will also continue to refine our interactive on-line decision support tool that uses operationally available satellite data to provide rapid decision-making information to reduce water and nutrient loads.

Task D) Engaging the present and future workforce in the adoption of new technologies

Team members for training (primary): Karen Humes, Erik Coats, Kevin Feris, and partners at CSI, UI Idaho Falls and professional organizations such as Food Northwest, *Primary team member for drone outreach activities:* Jae Ryu (Idaho Drone League (I-Drone), Founder).

Overall goals:

The overall goals in this task are two-fold: 1) to provide direct support to our stakeholders in the near-term by identifying workforce development needs that universities could plan and implement, together with partners at community colleges and professional organizations (resourced primarily in Yrs 2 and 3) and 2) contribute to longer-term workforce needs by holding outreach events designed to engage the future workforce in STEM activities that will serve the food industry in Idaho in the future, such as drone operations and the analysis of data from sensors onboard drones.

Accomplishments this period:

- Goal 1: Current/near-term workforce development needs (note, this goal was budgeted for more activity in Yrs 2 and 3 than in Yr 1)
 - Held initial discussions with Stakeholder Advisory Board (SAB) in May 2018 on near-term needs and identified several pathways that the university could begin implementing, such as specialized tracks at the BS/MS level that provided students with cross-training in Food Processing and Water/Energy Management
 - After Idaho DEQ heard about our project from some of our SAB members, they reached out to us for discussions about how to help conduct workforce training in food processing, to help industries comply with recent EPA requirements for greater emphasis on pollution prevention.
 -
- Goal 2:
 - Hosted a hands-on education program known as “Idaho Drone League(iDrone)” to promote STEM pipelines in the Treasure Valley and skills important to the Idaho food industry in the future. It was held at Idaho Water Center for June 6-7, 2019, with about 30 students participating.

Plans for next reporting period:

- Develop courses and/or workshops for delivery at CSI and/or other partner institutions
- Continue to engage with our Stakeholder Advisory Board and professional organizations such as Food Northwest to identify and implement professional development needs in food, water, energy and waste and how the universities can catalyze and facilitate these.
- Continue to engage with other stakeholders such as the IDEQ on needs and opportunities in professional development on pollution control and management.
- Outreach to Treasure Valley and Magic Valley 7th–12th Grade and CSI students to engage them with new technologies, providing exposure to/encouragement toward STEM careers
- Implement I-Drone outreach events in Moscow, Boise and Pocatello (possibly add Twin Falls if funds permit).

Task E) Project Management/Stakeholder Engagement

Accomplishments this period:

- Stakeholder Advisory Board (SAB) formed and first in-person meeting held on May 3 at the UI Water Center in Boise. Members include:
 - Dan Axness, Engineering Project Leader, Idaho Power
 - Jeff Bohlscheid, Senior Principal Scientist, J.R. Simplot Company
 - Shawn Moffitt, Regional Business Manager, Jacobs Engineering (contractor for City of Twin Falls and Chobani water treatment plants)
 - Bob Naerebout, Government Affairs and former Exec Director, Idaho Dairyman’s Association
 - Ben Nydegger, Biosolids Program Manager, City of Boise
 - Brian Olmstead, President, Surface Water Appropriators and General Manager, Twin Falls Canal Company
 - Sean Vincent, Hydrology Section Manager, Idaho Dept of Water Resources
 - Pam Barrow, Sustainability Director, Food Northwest
- The primary goal of this initial meeting of our SAB was to enhance existing relationships, build new ones, and importantly to build a sense of collaboration and shared vision with regard to the specific nature of the experiments we perform and the outputs and products we target. In this effort we were successful.
 - Our SAB was very excited and supportive about the details of our proposed project.
 - A primary component of the SAB feedback for the Task A team was to focus on demonstration of commercialize-able product production.
 - We also had a deep conversation regarding the complexities of bringing new systems to market in complex regulatory environments. All of the stakeholders were strongly supportive of the proposed integrated goals of waste treatment and commodity production and pledged to help seek opportunities for the project team to introduce our proposed systems to key commercial partners and operators in the region.

- Member of the SAB also provided input as to how our Task B activities could be made most useful to entities such as IDWR and water users’ group
- As noted under Task D above, members of the SAB also provided some initial thoughts on workforce development needs.
- More stakeholder outreach: developed 2-page project brochure intended provide concise explanation of project goals, make clear the genuine desire to better understand stakeholder needs and “value proposition” to stakeholders for their engagement with our project. (copy attached as Appendix B). The brochure was used to invite advisory board members (Yr1) and to be used in Yr 2 to engage with other stakeholders. It is provided as an Appendix to this report.
- Monthly Team meetings established, seven held via videoconference (in addition to separate coordination by multiple Co-Is under individual tasks) and in-person team meeting at the Stakeholder Advisory Board Meeting in Boise on May 3, 2019.

Plans for next reporting period:

- Hold quarterly video-conferences with our Stakeholder Advisory Board (board members unanimously agreed to this at the May meeting)
- Continue to build on existing relationships with Twin Falls wastewater treatment facility, Food Northwest, Chobani, Amalgamated Sugar, J.R. Simplot, Idaho Dairymen’s Association, and Glanbia, and expand to new partners throughout this project
- Continue to hold monthly team meetings to monitor progress and facilitate coordination of all project tasks and stakeholder engagement activities.

2. Summary of budget expenditures for Yr 1 (July 1, 2018 – June 30, 2019)

As required by the terms of the award, the University of Idaho, as the main contractor on the award, requested permission in advance for any shifts in spending among budget categories from the original plan in the proposal, including expenditures at the UI as well as our collaborators/subcontractors at Boise State University and Idaho State University.

	<u>Original Proposal</u>	<u>Rebudget Approved</u>	<u>Rebudget Approved</u>	<u>Rebudget Approved</u>	<u>Unspent by 6/30</u>
	<u>Budget - Yr 1</u>	<u>March 2019</u>	<u>May 1, 2019</u>	<u>June 17, 2019</u>	<u>Returned 6/20</u>
Salaries	\$170,419	\$184,738	\$193,739	\$193,739	\$ 7,663.67
Fringe Benefits	\$24,859	\$28,772	\$31,157	\$31,157	\$ 718.08
Irregular Help	\$40,000	\$42,934	\$42,934	\$42,934	\$ -
Travel	\$30,000	\$28,293	\$28,293	\$24,300	\$ 541.38
OE	\$48,000	\$56,288	\$61,302	\$62,339	\$ -
Participant Support	\$5,333	\$0			\$ -
<\$5K Capital	\$11,000	\$12,100	\$12,152	\$15,245	\$ -
>\$5K Capital	\$33,984	\$40,000	\$59,848	\$59,848	\$ -
Trustee/Benefits	\$55,115	\$25,585	\$25,585	\$25,448	\$ -
Subcontracts	\$281,290	\$281,290	\$244,990	\$244,990	\$ 3,093.85
Total Award:	\$700,000	\$700,000	\$700,000	\$700,000	\$ 12,016.98

As also required by the terms of the award, we reported and returned to the SBOE funds that were not spent or expected to be spent by the end of the spending authority on June 30. The columns in the table above show the original budgets, approved rebudget requests and unspent funds returned to the SBOE on June 20. The last column was estimated as precisely as possible, given that some personnel expenses in the last pay period of FY 19, such as the wages of the many hourly student employees on this project, could only be based on the plan in place on June 17, as opposed to the actual hours worked and reported, which we are required to pay by federal law.

Several of our requests for rebudgeting over Year 1 arose over some start-up issues, such as delays in hiring graduate students after learning of our grant award in late July 2018 and delays in getting the subcontracts set up at BSU and ISU. The main categories on which we spent less than originally budgeted were:

- Travel – due to efficiencies in combining our team meeting and SAB meeting
- Tuition and Fees – two of our graduate students received scholarships
- BSU subcontract – At the request of our BSU Co-I (working primarily on Task A), some of the BSU funds for students and student fees were shifted to the UI and expended for Task A by Dr. Coats (team lead on Task A).

The savings from these reductions were primarily expended in this way:

- Additional equipment and OE for Task A
- Additional OE for the outreach activities in Task C
- Additional salary for staff and students

Section 6 at the end of this report provides detailed lists of expenditures for each institution. After final processing of all FY19 purchasing card and personnel expenses at all three institutions, a final financial report will be sent to SBOE.

3. Demonstration of economic development/impact

- Patents, copyrights, Plant Variety Protection Certificates received or pending

Although not a direct outgrowth of the funding received on this grant beginning in July 2018, there was a patent filed by ISU in our reporting period on behalf of Co-I Donna Delparte and her collaborator on work of a similar nature to that being done by Dr. Delparte in this grant. The previous work on which the patent was based involved the detection of infected plants in potato fields; the work in this grant will be of similar methodology (detecting plant stress with the use of high spatial and spectral resolution sensors on drones and satellites), but the focus in this investigation is slightly different (the detection of nutrient and moisture stress with remotely sensed imagery). The patent is included here as an example of the likely future outcome of Dr. Delparte's work on this grant and her success in working with stakeholders to develop useful products and methodologies.

Patent filed on Nov 30, 2018 entitled: "Method and system for detecting and managing infected plants"
Donna Delparte, L. Michael Griffel, Idaho State University. Cross reference - U.S. Provisional Patent Application No. 62/597,636 (ISU-001 PROV)

- Private sector engagement

Because every aspect of our work involves considerable private sector engagement, we have noted those engagements in each of our five tasks described in Section 1, particularly under **Task E: Project Management/Stakeholder Engagement**.

- Jobs created

Programmer/Decision Support Analyst hired on Dec 16, 2018 (starting date) at Idaho State University

4. Numbers of faculty and student participation

Through June 30, the numbers of faculty, students and other researchers participating are as follows:

Faculty:	6 (4 UI, 1 BSU, 1 ISU)
Graduate Students:	10 (7 UI, 3 ISU)
Undergrad Students:	10 (9 UI; 1 BSU)
Research Scientists:	5 (2 UI, 1 ISU, 2 BSU, all partially supported by this grant)

5. Description of future plans for project continuation or expansion

- The team is coordinating closely with the newly forming CAES entity (led by the UI but including other CAES partners) referred to as the Food Processing Innovation and Education Center (FPIEC). The vision for the center is for it to be a mechanism for collaboration between universities and private industry to develop next-generation technology and education programs for the Pacific Northwest food processing industry, with private industry eventually contributing to research driven by their needs. The collaborations between Idaho institutions, Idaho food processors and Idaho communities that are being supported by this IGEM grant, and the beneficial results it will produce, should provide excellent examples to encourage more stakeholders to become involved in partnerships through the FPIEC in the future. Likewise, the FPIEC provides a mechanism to continue and expand upon the work begun in this IGEM.
- PI Karen Humes has recently been invited by the Director of CAES to be a Focus Area Lead in the Energy-Water Nexus arena. Being a CAES Focus Area lead provides some access to CAES resources, including program development funds, to build a team of CAES researchers in pursuit of establishing CAES as a global leader in research, education, and innovation related to the energy-water nexus. Team members of this project are looking forward to leveraging our current work to pursue future opportunities. The coupling of food, water and energy is exceptionally strong in southern Idaho, from both a national and international standpoint, making a compelling case for other funding sources. Our integrated approach to water, energy and waste is also unique among teams studying the food-energy-water nexus.
- Team members are also actively writing grants to other agencies for related work, such as the NSF, USDA and NASA.

- The UI members of the team are also part of an ad-hoc working group organized by the VPRED at the UI to network with other land grant institutions in the Northwest (i.e., Washington State University and Oregon State University) to be mindful of collaborative opportunities for research funding in the arena of sustainable food production and processing and food/energy/water nexus, particularly from the USDA, DOE and NSF. Some of the largest grants awarded at the University of Idaho have been through this type of regional collaborations. This is one of many reasons that we highly value and are working to continue to build our partnership with Food Northwest, which represents processors in all three states.

6. Expenditure report

Expenditure reports are provided below for all three institutions individually. Please note that payroll costs and purchasing card purchases from the last two weeks of FY19 are not included in these reports.

A. University of Idaho

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FWRITEM                                University of Idaho
                                         Itemized Expenditures by Grant Code
                                         From 01-JUL-2018 To 28-JUN-2019

Grant: SG2836 -                          28-Jun-2019 04:20 PM
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Salaries
E4106 Staff
    Brinkman, Cynthia                      16743.52
        936.96 hours
E4108 Summer Salary
    Coats, Erik                            20397.20
        280.00 hours
    Humes, Karen                           12698.80
        176.00 hours
    McDonald, Armando                       7672.50
        110.00 hours
    Ryu, Jae                                16920.12
        290.60 hours
E4109 IA/GA Salary
    Abbasi, Maryam                          9213.80
        460.00 hours
    Alfaro Salmeron, Glenda                 4080.00
        240.00 hours
    Asghar, Sehrish                         1801.00
        100.00 hours
    Crozes, Alexandre                       8250.00
        440.00 hours
    Mellin, Jason                           33422.40
        920.00 hours
    Thompson, Emily                          22000.00
        880.00 hours
    Walters, Riveraine                      9123.20
        200.00 hours
E4175 Overtime - Covered by FLSA

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Brinkman, Cynthia		104.99	
11.75 hours			

		\$ 162427.53	
Temporary/Irregular Help			
E4110 Temporary Employee			
Dillon, Katherine		99.00	
8.25 hours			
E4135 Temporary Student			
Alfaro Salmeron, Glenda		1061.50	
97.00 hours			
Brouillard, Nicolas		3334.50	
278.00 hours			
Crites, Willow		2169.75	
201.50 hours			
Dolph, Kirsten		4344.50	
406.00 hours			
Gibson, Joseph		2794.00	
254.00 hours			
Guho, Nicholas		7778.40	
280.00 hours			
McCormack, Roslyn		63.25	
5.75 hours			
Rice, Heather		1508.47	
60.33 hours			
Shaber, Jonathon		2230.25	
202.75 hours			
Smoot, Lindsey		4692.89	
429.25 hours			
Tompkins, Nicole		8068.50	
624.50 hours			
Watabe, Shion		1163.25	
107.75 hours			

		\$ 39308.26	
Fringe Benefits			
E4280 Faculty CFR Benefit Expense		15287.51	
E4281 Staff CFR Benefit Expense		5576.85	
E4282 Student CFR Fringe Expense		4829.80	
E4283 Temporary CFR Benefit Expense		8.61	

		\$ 25702.77	
Travel			
E5360 Personal Vehicle - In-State			
07-SEP-18	I2024562	Ryu, Jae H.	367.01
16-NOV-18	I2038986	Coats, Erik Robert.	332.77
16-NOV-18	I2038986	Coats, Erik Robert.	21.00
11-JAN-19	I2048754	Ryu, Jae H.	917.52
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	3.00
09-APR-19	J1240277	V00349140 Ryu, Jae H.	3.00
09-APR-19	J1240277	V00349140 Ryu, Jae H.	11.50
15-APR-19	I2065559	Ryu, Jae H.	5.03
31-MAY-19	I2075087	Coats, Erik Robert.	10.00
05-JUN-19	ZT130789	Parking 05022019	10.00
E5365 Personal Vehicle - Out-of-State			
09-NOV-18	I2037420	Coats, Erik Robert.	25.00
24-JAN-19	I2050850	Coats, Erik Robert.	20.00
15-APR-19	I2065557	Ryu, Jae H.	5.03
15-APR-19	I2065560	Ryu, Jae H.	5.03

16-APR-19	I2065720	Ryu, Jae H.	1.80
24-APR-19	I2067862	Ryu, Jae H.	5.03
04-JUN-19	I2075924	Coats, Erik Robert.	20.00
E5367 Rental Vehicles - In-State			
25-SEP-18	J1218430	V00349140 Ryu, Jae H.	28.05
25-SEP-18	J1218430	V00349140 Ryu, Jae H.	337.90
04-OCT-18	I2030060	Ryu, Jae H.	67.02
08-OCT-18	J1219824	V00733798 Humes, Karen S.	149.76
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	45.30
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	18.00
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	49.06
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	97.02
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	43.73
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	26.03
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	19.56
09-APR-19	J1240277	V00349140 Ryu, Jae H.	17.35
09-APR-19	J1240277	V00349140 Ryu, Jae H.	45.30
10-JUN-19	ZT190904	Car Rental Fuel 05112019	43.31
10-JUN-19	ZT190904	Car Rental Fuel 05182019	27.68
10-JUN-19	I2077579	Ryu, Jae H.	259.52
E5368 Rental Vehicles - Out-of-State			
16-APR-19	I2065720	Ryu, Jae H.	43.59
16-APR-19	I2065720	Ryu, Jae H.	29.30
16-APR-19	I2065720	Ryu, Jae H.	274.95
16-APR-19	I2065720	Ryu, Jae H.	26.84
16-APR-19	I2065720	Ryu, Jae H.	24.00
E5380 Airfare - In-State			
18-SEP-18	I2027040	Humes, Karen S..	521.11
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	11.50
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	63.48
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	58.70
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	122.46
22-APR-19	I2067430	Humes, Karen S..	611.50
29-APR-19	I2068891	Coats, Erik Robert.	611.50
05-JUN-19	ZT130789	Airfare 04072019	595.20
E5381 Airfare - Out-of-State			
02-NOV-18	I2035887	Coats, Erik Robert.	485.60
30-JAN-19	I2052075	Humes, Karen S..	578.00
30-JAN-19	I2052075	Humes, Karen S..	215.00
26-FEB-19	I2056281	Humes, Karen S..	530.43
12-MAR-19	J1236705	V00096579 Coats, Erik R.	481.70
12-MAR-19	J1236705	V00096579 Coats, Erik R.	481.70
14-MAR-19	I2059894	Coats, Erik Robert.	378.00
27-MAR-19	J1238216	V00586185 Thompson, Emily	456.20
15-APR-19	I2065557	Ryu, Jae H.	111.90
15-APR-19	I2065560	Ryu, Jae H.	311.10
24-APR-19	I2067862	Ryu, Jae H.	204.62
04-JUN-19	I2075924	Coats, Erik Robert.	378.00
10-JUN-19	J1246371	JRM/ CT fr CEE to GPSA for GAS	-481.70
10-JUN-19	J1246371	JRM/ CT from CEE to GPSA for SA	-481.70
E5391 Ground Transportation - In-State			
14-JAN-19	J1230378	V00349140 Ryu, Jae H.	14.81
31-MAY-19	I2075087	Coats, Erik Robert.	14.12
31-MAY-19	I2075087	Coats, Erik Robert.	14.79
E5392 Ground Transportation-Out-of-State			
09-NOV-18	I2037420	Coats, Erik Robert.	205.12
24-JAN-19	I2050850	Coats, Erik Robert.	31.06
30-JAN-19	I2052075	Humes, Karen S..	5.00
30-JAN-19	I2052075	Humes, Karen S..	5.00
30-JAN-19	I2052075	Humes, Karen S..	5.00
09-APR-19	J1240276	V00349140 Ryu, Jae H.	50.43
09-APR-19	J1240276	V00349140 Ryu, Jae H.	32.05

09-APR-19	J1240284	V00349140 Ryu, Jae H.	20.66
09-APR-19	J1240284	V00349140 Ryu, Jae H.	22.33
09-APR-19	J1240284	V00349140 Ryu, Jae H.	14.49
18-APR-19	J1241640	V00586185 Thompson, Emily	5.00
18-APR-19	J1241640	V00586185 Thompson, Emily	16.03
18-APR-19	J1241640	V00586185 Thompson, Emily	48.54
18-APR-19	J1241640	V00586185 Thompson, Emily	20.00
18-APR-19	J1241640	V00586185 Thompson, Emily	20.00
18-APR-19	I2066622	Humes, Karen S..	15.00
18-APR-19	I2066622	Humes, Karen S..	20.00
04-JUN-19	I2075924	Coats, Erik Robert.	16.44
04-JUN-19	I2075924	Coats, Erik Robert.	11.57
04-JUN-19	I2075924	Coats, Erik Robert.	29.23
E5396 Lodging & Per Diem ? In State			
07-SEP-18	I2024562	Ryu, Jae H.	81.00
18-SEP-18	I2027040	Humes, Karen S..	90.00
18-SEP-18	I2027040	Humes, Karen S..	447.00
03-OCT-18	J1219330	V00096579 Coats, Erik R.	756.60
04-OCT-18	I2030060	Ryu, Jae H.	126.00
16-NOV-18	I2038986	Coats, Erik Robert.	56.25
11-JAN-19	I2048754	Ryu, Jae H.	45.00
11-JAN-19	I2048754	Ryu, Jae H.	135.00
15-APR-19	I2065559	Ryu, Jae H.	45.00
29-APR-19	I2068891	Coats, Erik Robert.	221.61
28-MAY-19	I2074443	Humes, Karen S..	33.00
28-MAY-19	I2074443	Humes, Karen S..	184.19
28-MAY-19	I2074443	Humes, Karen S..	26.00
31-MAY-19	I2075087	Coats, Erik Robert.	26.00
31-MAY-19	I2075087	Coats, Erik Robert.	42.00
05-JUN-19	ZT130789	Hotel - Lodging 05042019	230.52
05-JUN-19	I2076316	McDonald, Armando Gabriel.	42.00
05-JUN-19	I2076316	McDonald, Armando Gabriel.	49.00
E5397 Lodging & Per Diem ? Out of State			
06-SEP-18	J1216134	MC, from 820928 to 820922	840.52
13-SEP-18	J1217141	V00096579 Coats, Erik R.	1260.78
24-SEP-18	F0148395	GRT227262-Civil Envmntl Engin	-453.96
27-SEP-18	F0148659	GRT227263 Civil & Environ ENGR	-783.35
03-OCT-18	J1219329	V00096579 Coats, Erik R.	1175.02
09-NOV-18	I2037420	Coats, Erik Robert.	255.00
24-JAN-19	I2050850	Coats, Erik Robert.	118.25
24-JAN-19	I2050850	Coats, Erik Robert.	548.55
30-JAN-19	I2052075	Humes, Karen S..	686.79
30-JAN-19	I2052075	Humes, Karen S..	206.25
09-APR-19	J1240284	V00349140 Ryu, Jae H.	106.13
09-APR-19	J1240284	V00349140 Ryu, Jae H.	344.35
15-APR-19	I2065557	Ryu, Jae H.	102.00
15-APR-19	I2065560	Ryu, Jae H.	109.65
15-APR-19	I2065560	Ryu, Jae H.	138.20
16-APR-19	I2065720	Ryu, Jae H.	165.00
16-APR-19	I2065720	Ryu, Jae H.	377.11
18-APR-19	J1241640	V00586185 Thompson, Emily	363.00
18-APR-19	J1241640	V00586185 Thompson, Emily	1422.46
18-APR-19	I2066622	Humes, Karen S..	385.00
24-APR-19	I2067862	Ryu, Jae H.	285.60
04-JUN-19	I2075924	Coats, Erik Robert.	43.00
04-JUN-19	I2075924	Coats, Erik Robert.	554.40
04-JUN-19	I2075924	Coats, Erik Robert.	33.00
E5399 Other Employee Travel			
26-OCT-18	I2034588	Mellin, Jason James.	102.00
09-NOV-18	I2037420	Coats, Erik Robert.	24.00
29-MAY-19	I2074624	Asghar, Sehrish	112.75
29-MAY-19	I2074625	Alfaro Salmeron, Glenda Maribel.	112.75

 \$ 21587.38

Operating Expenses

E5005 Freight			
01-APR-19	I2062494	City North American	40.00
14-MAY-19	I2071925	City North American	40.00
10-JUN-19	ZT139131	Postage / Courier / Freight 0503201	15.38
10-JUN-19	ZT139131	Postage / Courier / Freight 0510201	18.60
E5023 Express Mail			
15-JAN-19	Z0845028	1214 FEDEX 784411193765 MEMPHIS TN	205.75
12-FEB-19	Z0845758	0118 FEDEX 31453276 800-4633339 TN	6.80
12-FEB-19	Z0845758	0125 FEDEX 31537347 800-4633339 TN	20.19
26-MAR-19	Z0847592	0309 FEDEX 32060258 800-4633339 TN	7.80
E5025 Printing & Binding			
09-APR-19	J1240129	FP#12601 UI Drone Smmr Cmp-SWS;bc	206.25
09-APR-19	I2064249	Ryu, Jae H.	85.08
26-MAY-19	J1245781	FP#12947 Fd Ind Grnt Flyr-GEOG;bc	285.00
26-MAY-19	J1245781	FP#12947 Fd Ind Grnt Flyr-GEOG;bc	41.00
11-JUN-19	J1247277	FP#13999 Lg Food Ind Pstr-GEOG;bc	40.00
11-JUN-19	J1247277	FP#13999 Lg Food Ind Pstr-GEOG;bc	52.50
E5045 Photocopy Service			
03-DEC-18	J1225771	DS; UIB copier charges Nov 2018	162.54
02-JAN-19	J1228773	DS; copier charge Dec 2018	0.06
30-JAN-19	Z0845258	0112 FEDEXOFFICE 00051193 MOSCOW	43.04
30-JAN-19	Z0845258	0112 FEDEXOFFICE 00051193 MOSCOW	2.48
01-FEB-19	J1232586	DS; UIB copier charges Jan 2019	0.19
01-MAR-19	J1235545	DS; UIB copier charge Feb 2019	0.96
18-APR-19	I2066622	Humes, Karen S..	25.00
01-MAY-19	J1243391	DS; UIB copier charges April 2019	13.10
03-JUN-19	J1246430	DS; UIB copier charges May 2019	0.12
E5049 Journal Publication Costs			
09-APR-19	I2064249	Ryu, Jae H.	712.50
E5060 Subscriptions			
29-OCT-18	I2034722	Ryu, Jae H.	129.00
E5070 Conference/Registration Fees			
12-SEP-18	Z0839536	0826 PACIFIC NORTHWEST CLEAN W 208-	530.00
25-SEP-18	Z0840303	0905 ACT*UNIV OF IDAHO 877-551-5560	135.00
25-SEP-18	Z0840303	0905 ASSN OF AMER GEOGRAPHERS 202-2	165.00
08-OCT-18	J1219824	V00733798 Humes, Karen S.	250.00
09-OCT-18	Z0840975	0924 WEF EVENT 703-684-2400 VA	725.00
31-OCT-18	J1222316	NR, CT to correct budget	179.00
12-FEB-19	Z0845753	0123 EB PATHWAY TOOLS INTR 801-413-	342.74
26-FEB-19	Z0846523	0211 EB PATHWAY TOOLS INTR 80141372	-342.74
26-FEB-19	I2056281	Humes, Karen S..	360.00
12-MAR-19	Z0847044	0226 AMERICAN ASSOC OF GEOGRAP 202-	35.00
27-MAR-19	J1238222	V00096579 Coats, Erik R.	467.00
11-APR-19	J1240548	T340615 FAADroneZone	5.00
18-APR-19	J1241794	TNum 347651	330.00
23-APR-19	J1242337	TNum 347652- ASUE AEESP	330.00
24-APR-19	I2067862	Ryu, Jae H.	660.00
12-JUN-19	ZT156906	Memberships / Subscriptions / Regis	-35.00
E5080 Licensing/Certificates			
09-APR-19	I2064249	Ryu, Jae H.	150.00
E5152 All Other Services			
25-SEP-18	Z0840189	0910 MISTER CAR WASH #502 BOISE ID	7.00
E5199 Other Professional Service			
10-SEP-18	BKCK0818	\$47.20-Smoot 820922	47.20
07-MAR-19	BKCK0219	\$47.20-Rice 877924	47.20
12-JUN-19	BKCK0519	\$47.20-Deyo 820922	47.20
E5299 Other Administrative Services			
26-MAR-19	Z0847590	0305 DHL EXPRESS USA INC 800-722-00	261.20

12-APR-19	J1240750	MC, from E5299 to E5724	-261.20
E5310 Technology - Services			
11-SEP-18	J1216650	ec; August18 Net Services	80.00
04-OCT-18	J1219448	ec; September18 Net Services	60.00
18-DEC-18	Z0844107	1204 DELL SALES & SERVICE 866-393-9	61.50
12-FEB-19	Z0846123	0121 GOOGLE *GOOGLE STORAGE 855-836	19.99
E5320 Software/Applications - Individual			
09-APR-19	J1240098	MC, from E5528 to E5320	58.09
E5340 Software/Applications - Enterprise			
09-APR-19	I2064249	Ryu, Jae H.	210.94
E5345 Testing/Grading/Inspecting			
28-AUG-18	Z0839291	0816 PAYPAL *BOISEAREARA 402-935-77	92.91
E5350 Other Technical Services			
12-SEP-18	Z0839536	0817 OETC 503-6250501 OR	149.02
E5410 Office and Administrative Supplies			
12-SEP-18	Z0839536	0822 VANDAL STORES MOSCOW MOSCOW ID	86.94
29-MAY-19	ZT101546	Supplies 04112019	134.50
E5430 Consumable Water			
31-MAY-19	I2074969	Culligan Water Conditioning	29.95
E5465 Gasoline			
25-SEP-18	Z0840189	0906 SHELL OIL 57444639603 GARDEN C	80.58
25-SEP-18	Z0840189	0907 EXXONMOBIL 47851928 IDAHO F	40.88
25-SEP-18	Z0840189	0907 PILOT_00350 MOUNTAIN HOME ID	71.77
25-SEP-18	Z0840189	0907 PILOT_00350 MOUNTAIN HOME ID	19.10
11-APR-19	J1240548	T337421 Chevron	15.38
11-APR-19	J1240548	T342806 Hammer Stores	19.98
29-MAY-19	ZT135212	University Vehicle Expenses 0508201	14.34
E5528 Resale - Computer Software			
04-DEC-18	Z0843209	1113 OETC 503-6250501 OR	58.09
09-APR-19	J1240098	MC, from E5528 to E5320	-58.09
E5560 Technology - Supplies			
12-SEP-18	Z0839536	0817 CDW GOVT #NTW9785 800-808-4239	39.31
12-FEB-19	Z0845758	0131 CDW GOVT #QWZ0644 800-808-4239	24.02
29-MAY-19	ZT101546	Supplies 05102019	36.99
E5630 R&M Sup - Machinery & Equipment			
29-MAY-19	ZT101546	Supplies 04062019	1175.00
E5650 R&M Sup - Other			
04-DEC-18	Z0843545	1115 PAYPAL *PGNINTERNAT 402-935-77	6.08
04-DEC-18	Z0843545	1119 PAYPAL *ZORO.COM 402-935-7733	5.48
E5670 Food			
15-MAY-19	I2072626	Humes, Karen S..	31.80
15-MAY-19	I2072626	Humes, Karen S..	318.31
E5720 Educational Supplies			
09-OCT-18	Z0840866	0914 THE HOME DEPOT #1806 BOISE ID	32.94
18-DEC-18	Z0844337	1124 AMZN MKTP US*M03012NW1 AMZN.CO	149.95
18-DEC-18	Z0844337	1202 AMAZON WEB SERVICES AWS.AMAZON	1.64
18-DEC-18	Z0844337	1203 AMZN MKTP US*M02PW3BH1 AM AMZN	29.83
18-DEC-18	Z0844337	1206 AMZN MKTP US*M08P72690 AMZN.CO	13.76
18-DEC-18	J1227469	ef/CT E5720 to E7865	-193.54
18-DEC-18	J1227471	ef/CT 826769 to 826816	-1.64
12-FEB-19	Z0846123	0119 EMLID CENTRAL	243.54
12-FEB-19	Z0846123	0121 AMZN MKTP US*MB2RC9E62 AMZN.CO	261.94
12-FEB-19	Z0846123	0121 AMZN MKTP US*MB85C90A2 AMZN.CO	44.12
12-FEB-19	Z0846123	0123 AMZN MKTP US*MB1TU4HT1 AMZN.CO	237.99
E5724 Research Supplies			
24-AUG-18	I2021934	Coats, Erik Robert.	1669.70
24-AUG-18	I2021943	Coats, Erik Robert.	1174.50
24-AUG-18	I2021946	Coats, Erik Robert.	838.78
24-AUG-18	I2021980	Coats, Erik Robert.	742.00
24-AUG-18	I2021995	Coats, Erik Robert.	549.21
28-AUG-18	Z0839116	0810 QIAGEN INC 800-426-8157 MD	594.22
28-AUG-18	Z0839291	0812 AMZN MKTP US AMZN.COM/BILL WA	9.73

28-AUG-18	Z0839291	0812 AMZN MKTP US AMZN.COM/BILL WA	62.70
28-AUG-18	Z0839291	0813 AMAZON.COM AMZN.COM/BILL WA	72.70
28-AUG-18	Z0839291	0813 AMAZON.COM AMZN.COM/BILL WA	5.28
28-AUG-18	Z0839291	0813 AMZN MKTP US AMZN.COM/BILL WA	113.20
28-AUG-18	Z0839291	0813 GRAINGER 877-2022594 IL	33.98
28-AUG-18	Z0839291	0814 AMAZON.COM AMZN.COM/BILL WA	5.28
28-AUG-18	Z0839291	0814 AMZN MKTP US AMZN.COM/BILL WA	14.63
28-AUG-18	Z0839291	0815 AMZN MKTP US AMZN.COM/BILL WA	14.84
28-AUG-18	Z0839291	0816 AMZN MKTP US AMZN.COM/BILL WA	99.98
28-AUG-18	Z0839291	0816 AMZN MKTP US AMZN.COM/BILL WA	170.76
28-AUG-18	Z0839413	0804 TFS*FISHERSCI ECOM HUS 800-766	37.62
28-AUG-18	Z0839413	0807 TFS*FISHERSCI ECOM HUS 800-766	12.54
28-AUG-18	Z0839413	0808 PAYPAL *FUZHOUHUIJU 402-935-77	285.00
28-AUG-18	Z0839413	0810 SP * FILTROUS HTTPSFILTROUS CA	253.25
28-AUG-18	Z0839413	0813 PAYPAL *COL INT GRP 402-935-77	483.34
28-AUG-18	Z0839413	0814 FILABOT 802-505-6772 VT	84.77
28-AUG-18	Z0839413	0814 TFS*FISHERSCI ECOM HUS 800-766	224.51
28-AUG-18	Z0839413	0815 TFS*FISHERSCI ECOM HUS 800-766	228.20
28-AUG-18	Z0839413	0815 TFS*FISHERSCI ECOM HUS 800-766	54.96
28-AUG-18	Z0839413	0815 TFS*FISHERSCI ECOM HUS 800-766	101.90
28-AUG-18	Z0839413	0816 DRI*WAVEMETRICS IGOR PRO ELEME	275.00
28-AUG-18	Z0839413	0816 TECHNICAL GLASS PRODUCTS 440-6	174.40
28-AUG-18	I2022816	Coats, Erik Robert.	292.70
28-AUG-18	I2022831	Coats, Erik Robert.	192.91
29-AUG-18	I2023038	Coats, Erik Robert.	160.06
30-AUG-18	I2023162	Coats, Erik Robert.	62.15
30-AUG-18	I2023260	Coats, Erik Robert.	61.89
30-AUG-18	I2023268	Coats, Erik Robert.	215.64
06-SEP-18	J1216079	TNUM 324543 Walmart	14.42
07-SEP-18	I2024658	Ryu, Jae H.	465.99
12-SEP-18	Z0839996	0817 PAYPAL *CHENGUOQING 402-935-77	28.99
12-SEP-18	Z0839996	0818 TFS*FISHERSCI ECOM HUS 800-766	75.24
12-SEP-18	Z0839996	0820 PAYPAL *NEXTDAYAUTO 402-935-77	25.00
12-SEP-18	Z0839996	0822 PAYPAL *9265823 402-935-7733 C	17.00
12-SEP-18	Z0839996	0823 PAYPAL *JMEJAK 402-935-7733 CA	15.00
12-SEP-18	Z0839996	0823 PAYPAL *MAJINNA 402-935-7733 C	13.60
12-SEP-18	Z0839996	0823 TFS*FISHERSCI ECOM HUS 800-766	88.51
12-SEP-18	Z0839996	0825 TFS*FISHERSCI ECOM HUS 800-766	74.00
14-SEP-18	I2026110	Coats, Erik Robert.	426.81
19-SEP-18	I2027222	Ryu, Jae H.	147.12
19-SEP-18	I2027309	Coats, Erik Robert.	18.15
19-SEP-18	I2027325	Coats, Erik Robert.	60.22
25-SEP-18	Z0840195	0904 AMAZON.COM AMZN.COM/BILL WA	336.40
25-SEP-18	Z0840195	0906 AMZN MKTP US AMZN.COM/BILL WA	44.37
25-SEP-18	Z0840195	0908 THE HOME DEPOT 1806 BOISE ID	368.43
25-SEP-18	Z0840195	0909 THE HOME DEPOT #1806 BOISE ID	-3.15
25-SEP-18	Z0840195	0909 THE HOME DEPOT #1806 BOISE ID	3.75
25-SEP-18	Z0840355	0910 HACH COMPANY 9706631377 CO	61.57
25-SEP-18	Z0840613	0901 TFS*FISHERSCI ECOM HUS 800-766	63.17
25-SEP-18	Z0840613	0911 PAYPAL *DVBARGAINZ 402-935-773	299.00
02-OCT-18	I2029573	Ryu, Jae H.	115.82
02-OCT-18	I2029587	Coats, Erik Robert.	43.80
09-OCT-18	Z0840975	0919 QIAGEN INC 800-426-8157 MD	1173.35
09-OCT-18	Z0840975	0920 HACH COMPANY 9706631377 CO	2137.68
09-OCT-18	Z0840975	0927 AMZN MKTP US*MT96Y1XG0 AMZN.CO	15.99
09-OCT-18	Z0841185	0916 PAYPAL *9265823 4029357733 CA	-17.00
09-OCT-18	Z0841185	0917 PAYPAL *INDUSTRIALH 402-935-77	10.98
09-OCT-18	Z0841185	0918 PAYPAL *ALBERTFILTE 402-935-77	27.20
09-OCT-18	Z0841185	0921 PAYPAL *FRANKBACONM 402-935-77	761.00
23-OCT-18	Z0841490	1002 PALOUSE HABITAT FOR HUMAN MOSC	30.00
23-OCT-18	Z0841490	1004 AIREKASCIENTIFIC WAN CHAI	238.00
23-OCT-18	Z0841490	1005 GRAINGER 877-2022594 IL	149.20

23-OCT-18	Z0841490	1005 PAYPAL *ADVANCE OPS 402-935-77	125.00
23-OCT-18	Z0841490	1009 HACH COMPANY 9706631377 CO	572.62
23-OCT-18	Z0841490	1011 TFS*FISHERSCI ECOM HUS 800-766	292.70
23-OCT-18	Z0841490	1011 TFS*FISHERSCI ECOM HUS 800-766	151.40
23-OCT-18	Z0841862	1003 AMZN MKTP US*MT3JB0820 AMZN.CO	207.69
23-OCT-18	Z0841864	0928 PAYPAL *RQ SURPLUS 402-935-773	22.40
23-OCT-18	Z0841864	0930 PAYPAL *STRADEFAREA 402-935-77	14.08
23-OCT-18	Z0841864	1001 PAYPAL *MARCHOFFMAN 402-935-77	98.81
23-OCT-18	Z0841864	1008 PAYPAL *MS AND A 402-935-7733	11.10
23-OCT-18	Z0841864	1009 PAYPAL *MROSUPPLY 402-935-7733	12.90
23-OCT-18	Z0841864	1009 PAYPAL *SCOTTDCTEU 402-935-77	10.86
23-OCT-18	Z0841864	1011 PAYPAL *MOLLYJAMIE 402-935-773	15.49
02-NOV-18	I2035694	Coats, Erik Robert.	43.80
06-NOV-18	Z0842037	1011 TRI STATE OUTFITTERS MOSC MOSC	9.96
06-NOV-18	Z0842037	1013 TFS*FISHERSCI ECOM HUS 800-766	161.30
06-NOV-18	Z0842484	1014 PAYPAL *MORNINGHILL 402-935-77	81.40
06-NOV-18	Z0842484	1022 PAYPAL *SOLANOTRADE 402-935-77	133.94
08-NOV-18	J1223342	331082 PAYPAL *METALREMNAN 402-935-	17.75
08-NOV-18	J1223342	331083 PAYPAL *TUNDRASPECI 402-935-	20.30
20-NOV-18	Z0842648	1101 TFS*FISHERSCI ECOM HUS 800-766	420.33
04-DEC-18	Z0843350	1112 AMZN MKTP US AMZN.COM/BILL WA	-62.70
04-DEC-18	Z0843545	1112 PAYPAL *FRANKBACONM 402-935-77	479.70
04-DEC-18	I2041603	Coats, Erik Robert.	278.93
18-DEC-18	Z0844147	1203 HACH COMPANY 9706631377 CO	565.99
18-DEC-18	Z0844147	1206 TFS*FISHERSCI ECOM HUS 800-766	355.50
18-DEC-18	Z0844337	1123 AMZN MKTP US*M00LJ9FR2 AMZN.CO	172.28
18-DEC-18	J1227469	ef/CT E5724 to E7865	-172.28
04-JAN-19	I2046938	Coats, Erik Robert.	170.76
15-JAN-19	Z0844886	0102 AIREKASCIENTIFIC WAN CHAI	238.00
15-JAN-19	Z0844886	1213 TFS*FISHERSCI ECOM HUS 800-766	1023.46
15-JAN-19	Z0844886	1213 TFS*FISHERSCI ECOM HUS 800-766	98.75
15-JAN-19	Z0844886	1213 TRI STATE OUTFITTERS M MOSCOW	2.25
15-JAN-19	Z0844886	1227 PHENOMENEX INC 310-2120555 CA	543.18
15-JAN-19	Z0844886	1227 THE HOME DEPOT #1808 LEWISTON	-43.15
15-JAN-19	Z0844886	1227 THE HOME DEPOT #1808 LEWISTON	762.25
15-JAN-19	Z0845028	1219 MSP*HELIAN POLYMERS BELFELD	275.60
28-JAN-19	J1231897	TNum 338037 Sigma Aldrich	182.59
30-JAN-19	Z0845258	0112 FEDEXOFFICE 00051193 MOSCOW	14.99
30-JAN-19	Z0845473	0107 HACH COMPANY 9706631377 CO	1097.60
30-JAN-19	Z0845473	0107 TRI STATE OUTFITTERS M MOSCOW	22.45
30-JAN-19	Z0845473	0108 TFS*FISHERSCI ECOM HUS 800-766	89.66
30-JAN-19	Z0845473	0110 TFS*FISHERSCI ECOM HUS 800-766	1237.53
30-JAN-19	Z0845473	0111 TFS*FISHERSCI ECOM HUS 800-766	2091.09
30-JAN-19	Z0845473	0114 TRI STATE OUTFITTERS M MOSCOW	12.32
30-JAN-19	Z0845473	0115 TFS*FISHERSCI ECOM HUS 800-766	178.86
30-JAN-19	Z0845473	0116 TFS*FISHERSCI ECOM HUS 800-766	311.83
05-FEB-19	I2053076	Coats, Erik Robert.	43.80
07-FEB-19	I2053535	Humes, Karen S..	48.09
12-FEB-19	Z0845753	0116 MOSCOW BUILDING SUPPLY 208-822	34.99
12-FEB-19	Z0845753	0125 GOBLE SAMPSON ASSOCIAT 801-268	423.16
12-FEB-19	Z0846123	0122 AMZN MKTP US*MB1Y83BO1 AMZN.CO	13.98
12-FEB-19	Z0846157	0130 MSP*HELIAN POLYMERS BELFELD	577.83
04-MAR-19	I2057222	Coats, Erik Robert.	388.71
12-MAR-19	Z0847017	0215 AIREKASCIENTIFIC WAN CHAI	380.00
12-MAR-19	Z0847017	0222 HACH COMPANY 9706631377 CO	196.63
12-MAR-19	Z0847017	0228 VWR INTERNATIONAL INC 800-932-	854.66
12-MAR-19	Z0847189	0227 TFS*FISHERSCI ECOM HUS 800-766	32.38
26-MAR-19	Z0847590	0310 AMAZON.COM*MW36V2CNO AMZN.COM/	72.08
26-MAR-19	Z0847590	0313 VWR INTERNATIONAL INC 800-932-	407.65
09-APR-19	I2064249	Ryu, Jae H.	738.38
09-APR-19	I2064249	Ryu, Jae H.	6715.23
11-APR-19	I2064997	McDonald, Armando Gabriel.	29.50

12-APR-19	J1240750	MC, From E5299 to E5724	261.20
16-APR-19	Z0848187	0320 GRAINGER 877-2022594 IL	101.70
16-APR-19	Z0848187	0320 GRAINGER 877-2022594 IL	35.40
16-APR-19	Z0848187	0327 MOSCOW BUILDING SUPPLY 208-822	77.54
16-APR-19	Z0848187	0328 SPENCE HARDWARE & SUPPLY MOSCO	219.32
16-APR-19	Z0848187	0329 IN *APSCO LLC 425-8223335 WA	2348.91
16-APR-19	Z0848187	0402 MOSCOW BUILDING SUPPLY 208-822	32.25
16-APR-19	Z0848187	0402 MOSCOW BUILDING SUPPLY MOSCOW	-16.89
16-APR-19	Z0848187	0402 SPENCE HARDWARE & SUPPLY MOSCO	39.25
16-APR-19	Z0848187	0402 SPENCE HARDWARE & SUPPLY MOSCO	7.45
16-APR-19	Z0848187	0403 TFS*FISHERSCI ECOM HUS 800-766	417.60
16-APR-19	Z0848187	0403 TFS*FISHERSCI ECOM HUS 800-766	139.28
16-APR-19	Z0848187	0404 TFS*FISHERSCI ECOM HUS 800-766	45.37
16-APR-19	Z0848550	0401 PAYPAL *DUANYUANLIU 402-935-77	75.98
23-MAY-19	I2073995	Humes, Karen S..	18.98
29-MAY-19	ZT101546	Supplies 04062019	9.00
29-MAY-19	ZT101546	Supplies 04102019	52.16
29-MAY-19	ZT101546	Supplies 04112019	80.24
29-MAY-19	ZT101546	Supplies 04112019	544.62
29-MAY-19	ZT101546	Supplies 04172019	29.49
29-MAY-19	ZT101546	Supplies 04182019	8.42
29-MAY-19	ZT101546	Supplies 04222019	1941.25
29-MAY-19	ZT101546	Supplies 04242019	458.00
29-MAY-19	ZT101546	Supplies 04242019	261.20
29-MAY-19	ZT101546	Supplies 04272019	138.41
29-MAY-19	ZT101546	Supplies 04272019	8.96
29-MAY-19	ZT101546	Supplies 04282019	60.75
29-MAY-19	ZT101546	Supplies 04302019	78.31
29-MAY-19	ZT101546	Supplies 05012019	30.11
29-MAY-19	ZT101546	Supplies 05132019	61.57
29-MAY-19	ZT101546	Supplies 05142019	72.12
29-MAY-19	ZT101546	Supplies 05152019	46.24
29-MAY-19	I2074730	Coats, Erik Robert.	193.04
07-JUN-19	J1246937	From 820945 to 820922	185.84
10-JUN-19	ZT139131	Supplies 05032019	379.00
10-JUN-19	ZT139131	Supplies 05082019	872.00
10-JUN-19	ZT139131	Supplies 05102019	1240.00
13-JUN-19	J1247722	cfc: ct Glass Crucible Cover Lid	-358.07
13-JUN-19	J1247722	cfc: ct Glass Crucible Set	-1240.00
13-JUN-19	J1247722	cfc: ct Sample Pan & Pan Lid Kit	-872.00
18-JUN-19	J1248086	Credit correction frm CR	-261.20
18-JUN-19	J1248101	Credit correction frm CR	-261.20
26-JUN-19	ZT208153	Supplies 06052019	82.89
26-JUN-19	ZT208153	Supplies 06052019	473.10
E5725 Field Supplies			
28-AUG-18	Z0839291	0811 MY VINYL DIRECT 12089326803 ID	8.32
E5741 Med Lab & Tech Supplies			
04-SEP-18	U0129294	Chemstores/Alayat	12.51
14-SEP-18	U0129478	Chemstores/McDonald	29.14
24-SEP-18	U0129560	Chemstores/Asghar	2.26
25-SEP-18	U0129581	Chemstores/Asther	9.79
26-SEP-18	U0129593	Chemstores/Alayat	13.34
05-OCT-18	U0129714	Chemstores/Asghar	15.12
23-OCT-18	U0129878	Chemstores/Wang	4.36
06-NOV-18	Z0842484	1014 PAYPAL *LI YUN 402-935-7733 CA	8.64
06-NOV-18	Z0842484	1015 PAYPAL *HONGKONGYEE 402-935-77	15.76
08-NOV-18	J1223342	329408 PAYPAL *PHR INC 402-935-7733	176.00
04-DEC-18	Z0843545	1120 PAYPAL *GD5357117SH 402-935-77	24.88
15-JAN-19	U0130695	Chemstores/Tompkins	30.56
22-JAN-19	U0130817	Chemstores/Tompkins	26.30
04-APR-19	U0131586	Chemstores/Crozes	24.65
16-APR-19	Z0848550	0401 THERMAL SUPPORT 678-580-3822 G	988.00

10-MAY-19	I2071486	VWR Scientific Products Corp.	40.91
10-MAY-19	I2071488	VWR Scientific Products Corp.	228.13
15-MAY-19	ZT072743	Agriculture and Medical Supplies 04	598.00
21-MAY-19	U0132185	Chemstores/Mellin	40.94
05-JUN-19	I2076174	VWR Scientific Products Corp.	40.30
E5749 Other Specific Use Supplies			
20-NOV-18	Z0842725	1102 FS *WEBODM.ORG 877-3278914 CA	47.00
E5799 Other Insurance			
21-JUN-19	J1248565	BM/Camp insurance, serial 25503	4.00
E5920 Rent - Motor Vehicles			
18-SEP-18	J1217504	EA; Fleet vehicle rental 9/6-9/10	228.00
11-APR-19	J1240548	T319393 Enterprise Rent a Car	32.19

			\$ 61068.30

Subawards

ES001 Subaward 1 Expenses			
25-JAN-19	I2051158	Boise State University	14.94
18-JUN-19	I2079125	Boise State University	4162.44
ES002 Subaward 2 Expenses			
16-JAN-19	I2049686	Idaho State University	31479.14
12-FEB-19	I2054132	Idaho State University	7763.73
01-APR-19	I2062381	Idaho State University	6320.57
05-APR-19	I2063628	Idaho State University	6712.56
21-MAY-19	I2073405	Idaho State University	7236.08
14-JUN-19	I2078575	Idaho State University	108600.09

			\$ 172289.55

Small Equipment (<\$5K)

E7810 <5K Technology Equip - Office/Deptl			
30-JAN-19	Z0845641	0116 DMI* DELL K-12/GOVT 800-981-33	1125.50
13-JUN-19	J1247697	cfc: ct from 691752 to 691868	-1125.50
E7815 <5K Technology Equip - Enterprise			
27-AUG-18	I2022204	Ryu, Jae H.	2543.98
E7830 <5K Computer Equipment Other			
16-NOV-18	I2038975	Ryu, Jae H.	3372.68
E7855 <5K Research Text			
10-JUN-19	ZT139131	Non Capital Outlay or Less than 5k	1032.77
14-JUN-19	J1247764	cfc: Moisture Balance Analyzer	-1032.77
E7865 <5K Educational Other			
18-DEC-18	J1227469	ef/CT E5720 to E7865	193.54
18-DEC-18	J1227469	ef/CT E5724 to E7865	172.28
E7996 <5K Photographic Equipment			
07-SEP-18	I2024658	Ryu, Jae H.	2097.63
29-OCT-18	I2034722	Ryu, Jae H.	2120.00

			\$ 10500.11

Capital Equipment (>=\$5K)

E6850 >5K Medical/Surgery/Lab Equipment			
04-APR-19	I2063258	Hach Company	9847.75
18-APR-19	!0352060	Hach Company	0.00
29-MAY-19	I2074563	Thermo Electron North America LLC	10103.60
07-JUN-19	I2076950	Labtech Engineering Co. Ltd	29800.00
13-JUN-19	B1808179	Thermo Electron North America LLC	0.00

			\$ 49751.35

Tuition Remission and Training

E7140 Tuition and Fees - Grad Assistants			
13-AUG-18	J1213446	G1GB for 171-55579	744.00

13-AUG-18	J1213446	SHI1 for 171-55579	899.00
13-AUG-18	J1213446	T1GB for 171-55579	3932.00
10-OCT-18	J1220157	G1HD for 142-24168	415.00
10-OCT-18	J1220157	MPX1 for 142-24168	175.00
10-OCT-18	J1220157	T1HD for 142-24168	2185.00
07-JAN-19	J1229422	G2GB for 171-55579	744.00
07-JAN-19	J1229422	SHI2 for 171-55579	899.00
07-JAN-19	J1229422	T2GB for 171-55579	3932.00
09-JAN-19	J1229109	ARF2 for V00665494	40.00
09-JAN-19	J1229109	G2GB for V00665494	744.00
09-JAN-19	J1229109	SHI2 for V00665494	899.00
09-JAN-19	J1229109	T2GB for V00665494	3932.00
09-JAN-19	J1229109	VVSF for V00665494	100.00
14-JAN-19	J1230426	G2HA for 041-97395	83.00
14-JAN-19	J1230426	T2HA for 041-97395	437.00
22-MAR-19	J1237635	cfc: ct fees and insur	2168.00
13-MAY-19	J1244630	G3HB for 171-55579	83.00
13-MAY-19	J1244630	T3HB for 171-55579	437.00
23-MAY-19	J1245687	G3HA for 131-97623	83.00
23-MAY-19	J1245687	G3HA for 941-68901	83.00
23-MAY-19	J1245687	T3HA for 131-97623	437.00
23-MAY-19	J1245687	T3HA for 941-68901	437.00
24-MAY-19	J1243506	G3HB for V00665494	83.00
24-MAY-19	J1243506	T3HB for V00665494	437.00

			\$ 24408.00

		Total Expenses	\$ 567043.25

B. Boise State University Expenditure Report

Award: SG2836-SB-222840

Project Title: Sustaining the Competitiveness of the Food Industry in Southern Idaho

Principle Investigator: Kevin Ferris

Expenses Posted Through: 6/28/19

Salaries and Fringe by Pay Period End Date	Sum of Net Amount
2/9/2019	\$ 1,731.97
Employees - Temporary	1600
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.49
2/23/2019	\$ 1,731.97
Employees - Temporary	1600
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.49
3/9/2019	\$ 1,731.97
Employees - Temporary	1600
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.49
3/23/2019	\$ 1,941.03
Employees - Temporary	1600
Employer Retirement Contributi	173.44
Group Insurance - Life	25.23
Retirement Sick Leave	10.4
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.48
4/6/2019	\$ 4,245.81
Employees - Temporary	1600
Employer Retirement Contributi	173.44
Group Insurance - Medical & De	2330
Retirement Sick Leave	10.4
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.49
4/20/2019	\$ 1,966.27
Employees - Temporary	1600
Employer Retirement Contributi	173.44
Group Insurance - Life	50.46
Retirement Sick Leave	10.4
Social Security/Medicare	122.4
Unemployment Insurance	2.08
Worker'S Compensation	7.49
5/4/2019	\$ 6,666.87
Employees - Temporary	4800
Employer Retirement Contributi	173.44
Group Insurance - Medical & De	1165
Retirement Sick Leave	10.4
Social Security/Medicare	367.2
Unemployment Insurance	6.24
Worker'S Compensation	144.59
5/18/2019	\$ 3,708.83
Employees - Temporary	3200
Employer Retirement Contributi	173.44
Retirement Sick Leave	10.4
Social Security/Medicare	244.8
Unemployment Insurance	4.16
Worker'S Compensation	76.03
6/1/2019	\$ 4,564.46
Employees - Temporary	3941
Employer Retirement Contributi	173.44
Group Insurance - Life	25.23
Retirement Sick Leave	10.4
Social Security/Medicare	301.48
Unemployment Insurance	5.12
Worker'S Compensation	107.79
6/15/2019	\$ 5,553.79
Employees - Temporary	3980
Employer Retirement Contributi	173.44
Group Insurance - Medical & De	970.84
Retirement Sick Leave	10.4
Social Security/Medicare	304.47
Unemployment Insurance	5.18
Worker'S Compensation	109.46
Total Salaries	\$ 25,521.00
Total Fringe	\$ 8,321.97

Other Expenses by Account Description	Sum of Net Amount
Credit Card Fees	\$ 11.90
INTERNATIONAL TRANSACTION*International transaction fee for syringe filters***TXN00455180 INTERNATIONAL TRANSACTION*International transe	11.9
Employee Training - Servi	\$ (20.00)
CORR005096 - UT EX CULTURE COLLECTI*credit for canceled algae media***TXN00446441 CORR005096 - UT EX CULTURE COLLECTI*credit for can	0
UT EX CULTURE COLLECTI*credit for canceled algae media***TXN00446441 UT EX CULTURE COLLECTI*credit for canceled algae media***TXN0044644	-20
Express Mail/Messenger	\$ 11.41
FEDEX 32308220*waste water samples for research project***TXN00458943 FEDEX 32308220*waste water samples for research project***TXN00458	11.41
Medical & Laboratory Equip	\$ 2,454.66
CORR006063 TFS FISHERSCI ECOM HUS*For measuring algal biomass productivity***TXN00464325 CORR006063 TFS FISHERSCI ECOM HUS*For meas	2454.66
Medical & Laboratory Supp	\$ 6,647.42
AIREKASCIENTIFIC*algae culture analysis supplies (syringe filters)***TXN00455122 AIREKASCIENTIFIC*algae culture analysis supplies (syringe filters)~	1488
CORR006063 TFS FISHERSCI ECOM HUS*For measuring algal biomass productivity***TXN00464325 CORR006063 TFS FISHERSCI ECOM HUS*For meas	-2454.66
D&B SUPPLY CO STORE 12*algae culturing supplies***TXN00465357 D&B SUPPLY CO STORE 12*algae culturing supplies***TXN00465357	194.97
GROW GREEN MI*algae culturing supplies***TXN00460251 GROW GREEN MI*algae culturing supplies***TXN00460251	43.69
GROW GREEN MI*algae culturing supplies***TXN00462324 GROW GREEN MI*algae culturing supplies***TXN00462324	113.62
OFFICESUPPLY.COM*algae culturing supplies***TXN00462236 OFFICESUPPLY.COM*algae culturing supplies***TXN00462236	18.26
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446426 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446426	240.06
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00444426 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00444426	97.79
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445059 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445059	184.24
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445550 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445550	54.97
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445637 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445637	100.95
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445758 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00445758	52.29
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446496 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446496	85.51
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446945 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446945	19.12
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446958 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00446958	47.9
TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00447641 TFS FISHERSCI ECOM HUS*algae cultivation supplies***TXN00447641	36.88
TFS FISHERSCI ECOM HUS*algae culture supplies***TXN00450732 TFS FISHERSCI ECOM HUS*algae culture supplies***TXN00450732	200.7
TFS FISHERSCI ECOM HUS*algae culturing supplies***TXN00463007 TFS FISHERSCI ECOM HUS*algae culturing supplies***TXN00463007	235.96
TFS FISHERSCI ECOM HUS*algae culturing supplies***TXN00468858 TFS FISHERSCI ECOM HUS*algae culturing supplies***TXN00468858	985.18
TFS FISHERSCI ECOM HUS*filters for algae cultivation***TXN00471735 TFS FISHERSCI ECOM HUS*filters for algae cultivation***TXN00471735	55.31
TFS FISHERSCI ECOM HUS*For measuring algal biomass productivity***TXN00464325 TFS FISHERSCI ECOM HUS*For measuring algal biomass produc	2454.66
TFS FISHERSCI ECOM HUS*Vacuum pump***TXN00458908 TFS FISHERSCI ECOM HUS*Vacuum pump***TXN00458908	816.95
THRIFTWAY HOME CENTER*project bleach for disinfecting algal cultures***TXN00436152 THRIFTWAY HOME CENTER*project bleach for disinfecting	14.94
UT EX CULTURE COLLECTI*algae culture media***TXN00445825 UT EX CULTURE COLLECTI*algae culture media***TXN00445825	230
UT EX CULTURE COLLECTI*algae cultures***TXN00443283 UT EX CULTURE COLLECTI*algae cultures***TXN00443283	1025
UT EX CULTURE COLLECTI*Algae cultures***TXN00443441 UT EX CULTURE COLLECTI*Algae cultures***TXN00443441	150
UT EX CULTURE COLLECTI*credit for canceled media***TXN00446459 UT EX CULTURE COLLECTI*credit for canceled media***TXN00446459	-55
VWR INTERNATIONAL INC*algae cultivation supplies***TXN00446135 VWR INTERNATIONAL INC*algae cultivation supplies***TXN00446135	31.17
VWR INTERNATIONAL INC*algae cultivation supplies***TXN00446482 VWR INTERNATIONAL INC*algae cultivation supplies***TXN00446482	65.41
VWR INTERNATIONAL INC*filter for algae media prep***TXN00445001 VWR INTERNATIONAL INC*filter for algae media prep***TXN00445001	115.55
Other Professional Service	\$ 625.00
TRADEWIND CHILLERS*algae culturing supplies***TXN00469162 TRADEWIND CHILLERS*algae culturing supplies***TXN00469162	625
Other Supplies	\$ 145.28
SIGMA ALDRICH US*algae culturing supplies***TXN00470873 SIGMA ALDRICH US*algae culturing supplies***TXN00470873	145.28
Total Other Expenses	\$ 9,875.67
Total Direct Costs:	\$ 43,718.64

Idaho State UNIVERSITY

Office for Research
Grants & Contracts Accounting
Physical Address: Business & Technology Center, Stop 8046 • Pocatello, Idaho 83209-8046
Remittance Address: 921 South 8th Avenue, Stop 8219 • Pocatello, Idaho 83209-8219

Estimated Final INVOICE

For information regarding this invoice contact:
Lisa Wood
282-2777

Renee Jensen-Hasfurth
Financial Contact
University of Idaho
875 Perimeter Drive, MS 3021
Moscow, ID 83844

Date Prepared: 06/11/2019
Contract: SG2836-SB-222841
Purchase Order:
Invoice No.: RGE02R-06E
Reference invoice number on the
payment

PERIOD COVERED: 5/01/2019-06/30/2019

SUBAWARD	BUDGET	CURRENT EXPENSES	CUMULATIVE EXPENSES	(Over)/Under BUDGET
Salary	\$60,283.00	\$32,595.79	\$60,283.00	\$0.00
Fringe Benefits	\$15,946.00	7,935.88	\$14,153.17	1,792.83
Material and Supplies	\$12,676.00	2,336.35	\$12,676.00	0.00
Equipment	\$74,000.00	58,934.28	\$74,000.00	0.00
Travel	\$4,500.00	4,297.79	\$4,500.00	0.00
Student Tuition	\$0.00	0.00	\$0.00	0.00
Consultant Services	\$2,500.00	2,500.00	\$2,500.00	0.00
Totals	\$169,905.00	\$108,600.09	\$168,112.17	\$1,792.83

Cumulative Amount Received: \$59,512.08
Billed-Not Received*: 0.00
Current Expenses: \$108,600.09

Total Due This Period	\$108,600.09
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PLEASE NOTE

The Total Now Due represents the current billing amount and any prior billings that have not yet been received as of the invoice date. If you have already sent payment for an invoice listed as billed-not received, please remit the CURRENT expense amount rather than the cumulative total. THANK YOU!

Lisa Wood for Lori Johnson
Lori Johnson, Director, Sponsored Projects Accounting

Please make remittances payable to Idaho State University

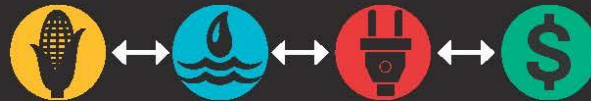
"I certify that the above bill is correct and just, that the amounts claimed represent fair charges against this subcontract."

Phone: (208) 282-3134 • Fax: (208) 282-4723 • www.isu.edu/research
ISU is an Equal Opportunity Employer

7. Commercialization revenue - None to report at this time

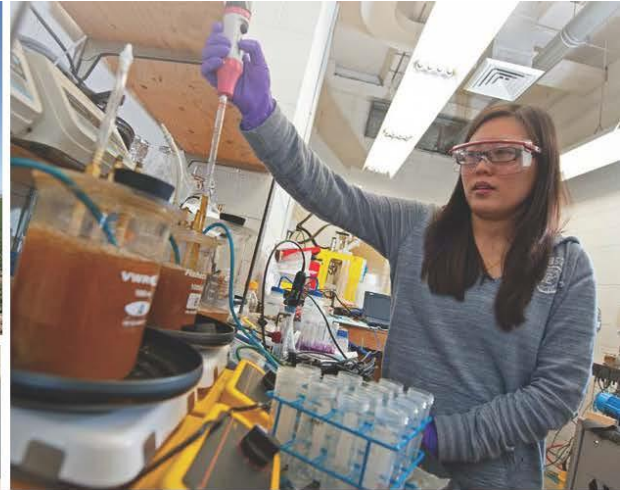
WATER, ENERGY, and WASTE Management

for FOOD PRODUCTION, PROCESSING, and RESOURCE RECOVERY



WHO we are: Consortium of scientists and engineers from University of Idaho, Boise State University, Idaho State University, and Center for Advanced Energy Studies



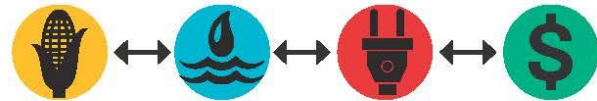


WHY ARE WE ASKING YOU TO ENGAGE WITH US?

- You are among the leaders in Idaho food production, processing, and associated services such as water and waste treatment
- To gain your perspective and input on issues, challenges, and pathways for your industry
- To better understand both single-user solutions and longer-term visions for applied research on regional solutions, including efficiencies to be gained through collaboration.
- To learn about workforce preparedness gaps and how we can help fill them

WHAT we are:

- Team conducting applied research funded by Idaho State Board of Education
- Research activities focused on creative solutions in water, energy, and waste management that enhance economic and environmental bottom line for Idaho agro-industry and rural communities.



TEAM EXPERTISE -

FOR DAIRIES AND FOOD PROCESSING:

- Wastewater treatment: operations, energy efficiency, nutrient recovery, and water recycling
- Minimizing management of waste products or any other outputs parasitic to the economic bottom line
- Assisting stakeholders to diversify economic portfolio via resource recovery and retrieval of other value-added products

TEAM EXPERTISE -

FOR CROP PRODUCTION:

- Tools for utilizing satellite and drone data for optimal application of nutrients and water

TEAM EXPERTISE -

FOR ALL STAKEHOLDERS, INCLUDING STATE AND COUNTY/MUNICIPAL PLANNING:

- Quantifying the interconnection of water, energy, and waste streams in southeastern Idaho region
- Useful for planning and identifying synergies/partnerships among stakeholders in the future

For more information, please contact Project Director Karen Humes, khumes@uidaho.edu or 208-885-6506.