Integrating safety and health practices into the day-to-day operations of running a business can be a challenge. Managing health and safety is more than just abiding by a checklist of OSHA regulations; it entails creating a culture of safety in the organization that is reinforced from both management and line workers. Management systems focus on the policies and processes of the organization that affect behavior. A management system can transform a work culture into one that excels in occupational health and safety.

A new five-year HICAHS project by Dr. David Douphrate, to be launched in fall 2016, will develop occupational health and safety management systems within dairy farms. As Douphrate explains, six safety management practices have shown to predict safety performance: 1) owner or manager commitment, 2) safety training, 3) workers’ involvement, 4) safety communication/feedback, 5) safety rules and procedures, 6) and safety promotion.

Front-line supervisors of dairy workers will be taught to identify critical safety behaviors among dairy workers and provide feedback on performance. Front-line supervisors are the link between workers and owners, and are key to implementation of organizational policies. These supervisors will also be taught leadership techniques to inspire and motivate employees while receiving guidance and mentorship from dairy owners. Through this combined bottom-up and top-down approach, a culture of safety will be integrated into all levels of the dairy organization.
HICAHS Administrative Core

Based on input from stakeholders and strategic planning HICAHS submitted a five-year grant renewal application to the National Institute for Occupational Safety and Health (NIOSH). Four new research projects were proposed, along with the HICAHS Pilot Program, Outreach Program, and Administrative Core. HICAHS Director Stephen Reynolds, in collaboration with consultant Bob McKnight, created a new vision statement for HICAHS, “To be the preeminent scientific authority, resource, and site for innovative strategies that improve the health and safety of agricultural and forestry workers and their families in the high plains intermountain region and beyond.” HICAHS has been funded for another 5 years (2016 – 2021).

Health and Safety Outreach: Progressive Dairyman, FReSH, YouTube

HICAHS engages in outreach by sharing health and safety knowledge and research finding at conferences, sharing resources, and developing partnerships that advance health and safety. Many of our resources are now provided online to improve dissemination and accessibility.

Emma St. Aubin, a graduate student in the MPH program focusing on health communication, wrote seven HICAHS newsletters. The newsletters are distributed by email and the distribution list includes 213 recipients. Over the year, the newsletters were opened 1,827 times with an average open rate of 30.7% across all stories.

- **Do YOU have a plan for your pets when disaster strikes?** (May 2016)
- **SAY What? New Ag Resources!** (March 2016)
- **HICAHS Collaborations Provide Avenues for Partnership** (February 2016)
- **A FReSH Look at Ag Research** (December 2015)
- **Do you know how to handle pesticides this winter?** (November 2015)
- **Make Your Tractor Safer With ROPS!** (October 2015)
• Do you know ATV safety rules in your state? (September 2015)

In collaboration with the Farm and Ranch eXtension Safety and Health (FReSH) Community of Practice Ms. St. Aubin prepared two reports for the FReSH website

• Website takes ‘FReSH’ look at agricultural safety and health
• SAY What? A New Source of Agriculture Safety Information for Youth

David Douphrate, in collaboration with HICAHS staff, continues to write a monthly column on health and safety issues in the Progressive Dairyman, one of the leading publications on the dairy industry. There have been over 1,000 views of these articles since 2014, these can be found on the HICAHS website at [http://csu-cvmbs.colostate.edu/academics/erhs/agricultural-health-and-safety/Pages/progressive-dairyman.aspx](http://csu-cvmbs.colostate.edu/academics/erhs/agricultural-health-and-safety/Pages/progressive-dairyman.aspx)

Allison Cassidy continues to be actively involved in the ECO Group, a collaborative group comprised of evaluators, coordinators, and outreach personnel from all 10 U.S. Agricultural Safety and Health Centers nationwide. In collaboration with Jennifer Watson from the Southeast Center for Agricultural Health and Injury Prevention, she has created a social media kit for the 2015 National Farm Safety and Health Week and 2016 National Ag Day. The social media kits contained suggested Twitter and Facebook messages for promoting agricultural health and safety. Many of the links directed to the U.S. Agricultural Safety and Health YouTube channel, resulting in large spikes in viewership (3-5 times average). Results were presented at the 2016 International Society for Agricultural Safety and Health Conference.

In addition, Ms. Cassidy was invited by Jac Nickoloff, Department Head for Environmental and Have a question about agricultural health and safety? Ask an expert at [www.extension.org/farm_safety_and_health](http://www.extension.org/farm_safety_and_health)
Radiological Health Sciences at Colorado State University, to lead strategic planning for department communications. The newly-formed communications team will be developing a newsletter and intranet to help facilitate communications within the department.

**Computer-based ROPS design program**

As reported in previous annual reports, engineer Paul Ayers at the University of Tennessee, has completed the design and testing of a Computer-based ROPS Design Program (CRDP). In the event of a tractor roll-over, a roll-over protective structure (ROPS) protects the driver from getting crushed underneath the weight of the tractor. The CRDP underwent additional simulated stress testing this year in a process called Finite Element Analysis (FEA). FEA using more appropriate element size and resolution was shown to predict the ROPS performance deflections within 20 percent. This information was shared in a conference call with ROPS manufacturers at John Deere, AGCO and CNH. Due to changes in the ROPS standards, the CRDP was also modified to include the option for designing foldable ROPS. Foldable ROPS are used in orchards where low-hanging branches can prevent other tractors from moving through the orchard. The modified CRDP is still under evaluation and has limited release to selected ROPS manufacturers for additional testing.

**HICAHS Dairy Industry Activities**

**Antimicrobial Assessment**

The HICAHS study titled “Exploring Shed Antimicrobial Exposures within High Plains Livestock Operations” aims to explore whether and how medicines used in agriculture persist in fecal material shed by farm animals. Paul Gunderson (Dakota Precision Agriculture Center – North Dakota) and Sanjay Shukla (Marshfield Clinic Research Foundation – Wisconsin) are testing samples of fresh manure, manure from on-farm storage facilities, and field soil for the presence of antimicrobial metabolites. The researchers are developing an understanding of which antimicrobial and bacterial exposures agricultural workers may experience as a result of performing tasks that involve handling of manure. This project’s ultimate aim is to (1) provide agricultural producers with information about veterinary medicine persistence within their agricultural environments and their effect on microbiomes which can modulate the immune system of farm animals and their handlers, and (2) identify methods to prevent agricultural worksite exposures or lessen exposure to mutational products that may introduce workers to resistant organisms.

To date, fourteen farms from New York State to North Dakota have participated in the study. This project benefits from substantial cooperation provided by owners/managers of agricultural enterprises. While visiting these farms project staff have provided recommendations to farm owners on workplace safety and health.
Health and Safety Training for Dairies

Dr. Douphrate’s research and outreach efforts in the dairy industry has enabled him to be recognized among dairy producers as a trusted authority to address worker health and safety issues on dairy farms.

Dr. David Douphrate has been providing OSHA compliance training to dairy producers nationwide since 2009. Recent dairy worker fatalities in New Mexico, Utah, Washington and Idaho has raised concern among dairy producers in the Western states. He has provided training to producers in New Mexico, Colorado, Idaho, Nebraska, Iowa, Kansas and North and South Dakota.

Additionally, Dr. Douphrate recently received a third year of OSHA funding to deliver safety training content to dairy workers using innovative and interactive mobile-learning technologies. The funding for this project is provided by OSHA Susan Harwood training funding mechanism. Safety training using mobile devices (iPads) enables an efficient mechanism to deliver safety training content to dairy workers without disruption of farming activities. To date, project personnel have delivered safety training content to over 1,400 dairy workers in New Mexico, Texas, Colorado, Kansas and New York. Plans are in place to deliver training to additional workers in New Mexico, Texas, Washington and Idaho.
Dr. Robert Hagevoort and Dr. Douphrate have been asked to serve as keynote presenters for the Washington State Dairy Federation Conference in November of 2016. Dr. Douphrate has also presented to WA State Labor and Industry (state OSHA) compliance officers on dairy safety issues in 2016.

Dr. Hagevoort and Douphrate have also presented to Idaho Dairyman Association members in both Boise and Twin Falls, Idaho. Idaho will have an agriculture focused OSHA Local Emphasis Program announced this fall. The Idaho OSHA Area Director emailed Dave soliciting assistance in educating Idaho producers, and Dr. Douphrate will be providing his expertise and assistance.

**Worker Health, Safety and Performance in Milking Parlors**

The HICAHS project "Exposure Assessment and Intervention Analysis in Large-Herd Dairy Parlors" is addressing the health and safety of large-herd dairy workers through assessment and comparison of physical workloads (motion, posture, muscle forces), and their effect on worker performance. In partnership with dairy equipment manufacturers and dairy producers, researchers are evaluating targeted parlor design and milking tools for their effectiveness at reducing physical loads and enhancing worker performance.

The results will be used to determine an optimum parlor milking pit height and develop recommendations for dairy producers to address parlor design, milking tools and worker performance and productivity.

This innovative and novel work is the first to quantify and compare full-shift and task-specific physical exposures in large-herd parlors in the United States. This is being accomplished using direct measurement technology and clinically-relevant exposure metrics. This will also be the first study to use direct-measure motion capture technology in these challenging work environments of milking parlors. Researchers have begun publishing study findings. Two manuscripts have been published, a third is under review, and a fourth is in development.

**Learn about safety issues for manure pits, ATVs, chemical hazards in the dairy industry through our monthly Progressive Dairyman column.**

[www.hicahs.colostate.edu/progressive-dairyman.html](http://www.hicahs.colostate.edu/progressive-dairyman.html)
Improving our understanding of bioaerosols and respiratory health

Building on our collaboration with the dairy industry over the past decade, the current project “Bioaerosol Exposures and Models of Human Response in Dairies” aims to more fully characterize the contents of aerosols on dairies, and to develop better models to predict respiratory health risks using human lung cells. Our goal is to use this information to further reduce dairy worker exposures. Last year we presented some of the initial human lung cell study results showing potential for inflammation in upper and lower respiratory cells. (Hawley 2015) Here we summarize preliminary results from field studies on four dairies.

Area Exposure Results – High Volume Sampler

To measure a wide range of particle sizes and to collect sufficient dust for cell studies and other analyses we used a novel Hi Volume sampler (HiVol) in 3 dairy parlors over four seasons. This is the first study to characterize the bacteria in larger sized aerosols. Bacterial DNA was extracted from HiVol samples and bacteria were identified based on 16S genes according to the Earth Microbiome Project (EMP) protocols (www.earthmicrobiome.org).

The bacteria found in these samples are typical of a variety of sources (Figure 1a), but not unexpectedly are mainly (more than 75%) from bovine feces. Other noteworthy sources include birds, water, soil, and humans. The impactor was positioned near the operator pit where milker activity was high. The impactor was also near parlor bathrooms and human fecal bacteria were also found in these aerosols. Previous studies in other environments have suggested that substantial aerosols of potentially infectious agents occurs when toilets are flushed.

The types of bacteria found were similar across dairies, which included rotary, parallel, and herringbone configurations; Figure 1b). Gram-positive bacteria predominated including Staphylococcus, Corynebacterium, and Streptococcus. Dairy cattle are principal reservoirs of Staphylococcus aureus, which is an opportunistic pathogen for humans that can rapidly evolve towards an antibiotic-resistant phenotype.

The bacteria genera by source are presented in Figure 1c. Bacteria found in mammalian gut microbiome were present (e.g., Acinetobacter) including unclassified genera associated with Ruminococcaceae, Lachnospiraceae, and Enterobacteriaceae. While these bacteria are common in human and animal feces, aerobic and anaerobic groups with pathogenic species were also identified. For example, Staphylococcus was one of the most abundant genera. Pseudomonas are opportunistic pathogens widely linked to hospital acquired infections in vulnerable individuals. Pseudomonas aeruginosa is the most recognized species with demonstrated resistance to drugs. Bacteroides, commensal gut bacteria, were also present in bioaerosols; most likely derived from human feces and animal mucus.
Worker Sampling - Pulmonary Function and Exposure Results

Four dairies (with 5 different milking parlors) participated in measurements of workers exposure and lung function during four seasons. Twenty-three workers, almost all in milking parlors, participated. Lung function was measured before and after the workshift, and the percent change in cross-shift lung function was determined. Each worker wore a sampling device that collected the inhalable-sized aerosol they experienced during their work shift (typically 8 – 10 hours). The Geometric Mean (a kind of average) of inhalable dust mass concentration ranged from 0.34 mg/m$^3$ to 0.60 mg/m$^3$ across all four seasons at all dairies. Geometric Standard Deviations (a measure of variability) were 1.7 to 2.7. In agreement with results from other studies of modern dairies, almost all of these measurements are much lower than suggested occupational exposure guidelines of 2.4 mg/m$^3$. While further analysis of other markers of Gram positive and Gram negative bacteria are still underway, results for endotoxin exposure also appear to be very low.

The average change across the workshift in Forced Vital Capacity (FVC - volume of lung) and Forced Expiratory Volume in 1 second (FEV1 – flow rate) were -1.13% and -0.71% across all workers and days of the study. These means are both mildly decreased over the workshift – again consistent with other recent studies of modern dairies. There was significant variability among individuals shown by the large standard deviations in FVC (5.7) and FEV1 (6.2). Further, the range of cross-shift changes in FVC and FEV1 were quite large. Eight individuals had cross-shift reductions greater than 5% in FVC and/or FEV1. Eight had increases greater than 5%. We are evaluating this data to determine if there is an association between exposure and lung function changes, and whether other factors may play a role.
Impact

The relatively low exposure to dust and endotoxins, plus a mild reduction in cross shift lung function appear to be typical of modern dairies and represent an improvement from traditional dairies.

These results suggest that particles containing airborne bacteria may impact or deposit along the entire respiratory tract. In addition to inflammatory reactions, infections in the nasal passage and gut are possible. The results of this study will help researchers and dairy producers to better understand and further prevent respiratory effects. We are building on this work in a related project to identify and evaluate cost effective interventions to further reduce bioaerosol exposures on dairies.

Enhancing safety training on dairies

HICAHS is developing a dairy safety training program designed with regard to the cultural traits of the Spanish speaking dairy worker population on U.S. dairy farms. This year Dr. Noa Roman-Muñiz, lead investigator on the project, interviewed 61 Colorado dairy employees to validate themes that should be addressed in the creation of effective training interventions. (See box below.)

Given the lack of basic knowledge about zoonotic diseases and the limited communication between workers and health care providers, a training program aimed at increasing awareness and promoting best preventive practices is being developed.

This bilingual training program’s key messages are that (1) Protecting ourselves from zoonotic diseases is easy to do, and (2) By protecting ourselves, we are protecting our families, co-workers and the animals that we work with.

The effectiveness of this training program in increasing awareness among dairy workers will be assessed with pre and post training surveys.

Community-Initiated Grants Program:
2015 Highlights

The Development of "Dairy Tool Box Talks"
Community Partner: South Dakota State University Dairy Extension

This program provided dairy farm workers with a basic understanding of the modern operations of a dairy including basic animal care, safe animal handling practices, cow comfort, and personal safety practices needed for working on the farm. A “One-Health” model that emphasized both cow and worker health was implemented.

Dairy Tool Box Talks were conducted at three South Dakota dairy farms from June 22 through August 31, 2015. Each dairy was provided weekly sessions (nine sessions total) lasting 30 minutes each. The sessions were scheduled according to employee work shifts.
This program included the following topics:

1. Basic cow knowledge
2. Cow housing
3. Animal health: cow signals, zoonotic disorders
4. Mastitis and somatic cell count
5. Milking routine
6. Safe hands-on cow handling
7. Cultural differences within the workplace
8. Animal welfare and risks of animal organization
9. Dairy’s success-team interactions
10. Final session: assessment and certificate

Seventy-five people representing primarily milking parlor workers participated. At the end of the program, the investigators conducted an evaluation with participants and feedback sessions with owners, managers and herdsmen of the dairies involved.

The employees indicated it was an informative program with dynamic sessions, as well as a desire in continuing the learning process with topics not covered such as farm management, A.I. and maternity.

Comments from the owners, managers and herdsmen were that the program was a good learning experience and that some changes in employee behavior were noticed with cow moving (more patience and consistency), working relations were improved, and employees exhibited more awareness on hygiene issues.

ATV Training
Community Partner: Montana State University Extension

Significant progress has been made in the number of people trained in ATV safety. Montana Agricultural Extension agents have trained over 100 agricultural producers using the ATV Safety Institute’s (ASI) 5-hour hand-on Rider Course training program. HICAHS has supported the ASI certification for 11 Agricultural Extension Agents. This past summer MT Agricultural Extension Agent Ken Nelson held two ATV safety-training sessions on the Fort Belknap Indian Reservation for nearly 40 Native Americans. The Native Americans use ATVs for work activities and recreation. Another ATV project has led to the development of an online interactive ATV safety training soon to be offered through the Mountain & Plains Education and Research Center (MAP ERC). This collaborative project will be accessible to the millions of ATV users across the U.S. with a focus in agricultural operations.

Chainsaw Safety Videos
Community Partner: Montana State University Forestry Extension

- Video 1-Personal Safety with Chainsaw Use
- Video 2-How to Fell and Buck a Tree Safely
Two chainsaw safety videos were developed and produced for small landowners that cut and sell timber to sawmills. Each video (15 minutes in length) was filmed on-site in the forests of Montana using professional loggers to demonstrate safe chainsaw practices for felling and cutting of trees. Feedback from the target audience (loggers), OSHA consultants, and two Certified Safety Professionals was collected and incorporated into the videos.

**Safety Messages for Large Logging Contractors**

*Community Partner: Montana Logging Association (MLA)*

This community-initiated project primarily focused on developing and installing safety signage with the Montana Logging Association. The Montana Logging Association (MLA) consists of 400 businesses and 1,300 member workers that harvest lumber to meet the nation’s commercial manufacturing and construction needs. Loggers face unusually high risk for work-related injury and death. The BLS reports that loggers experience the highest fatal work injury rate among all civilian occupations at at 110/100,000 full-time equivalent workers.

The first set of signage consisted of medical evacuation signs for ensuring that helicopter landing sites are predetermined and easily identified. The signs were distributed to MLA member contractors for use on logging sites; they will be reused and relocated when logging contractors move job locations. These signs supplement the OSHA-required evacuation plans for each logging job.

The second set of signage were used to alert logging workers to situations involving and requiring attention related to lock out/tag out, use of personal protective equipment, and pinch points. The signs have magnetic backings so that they can be easily attached to field equipment when needed.

The magnetic signs will be given to logging contractors so that employees and/or people approaching equipment in the field can have an onsite safety reminder of the hazards related to each piece of logging equipment.

Additionally, the MLA used funds from this program to purchase two noise dosimeters to assess operators’ noise exposure to feller bunchers, skidders, processor/delimiters, log loaders, log trucks, dozers, excavators, graders, and line machines. The dosimeters are used by the MLA “safety rangers” to demonstrate to logging companies the need for hearing protection for noise that exceeds OSHA permissible levels.

**Pilot Program**

HICAHS awarded four new pilot proposals during the 2016 fiscal year. These proposals address a broad array of relevant agricultural health and safety topics: farm injury surveillance, bioaerosols, zoonotic diseases, and determinants of health.

Postdoctoral fellow Kimberly Anderson from the Department of Engineering at Colorado State University was awarded $24,000 for her pilot, “The application of a novel sensor for spatially and
temporally resolved monitoring.” The project will evaluate the use of a novel, online bioaerosol monitor, the Wideband Integrated Bioaerosol Sensor (WIBS), against a conventional filter-based measurement technique. The WIBS has been used by atmospheric scientists to measure particulates but has not been evaluated for use in occupational bioaerosol exposure environments. The WIBS can measure temporal and spatial data, which is an improvement over filter-based methods. Dr. Anderson has collaborated with HICAHS researchers Drs. Reynolds and Schaeffer over the past several years and her study may provide HICAHS researchers with another tool for bioaerosol analysis.

Veterinarian Jairo Palomares Velosa, a PhD student in the Department of Clinical Sciences at Colorado State University, was awarded $24,000 for his pilot, “Socio-ecological model for exposure to zoonotic diseases among dairy farm workers.” A survey will be administered to dairy workers to measure the social and ecological barriers to the prevention of zoonotic diseases. There are a number of zoonotic pathogens that can cause gastrointestinal illness if preventive measures are not undertaken, such as handwashing. Social and ecological issues, such as workers’ attitudes, beliefs, access to knowledge, etc. affect whether the worker changes his or her behavior to prevent zoonotic disease transmission. These factors will be measured and correlated to the presence of three zoonotic pathogens (Salmonella spp., Campylobacter jejuni, and Cryptosporidium parvum) on the clothes, shoes, and gloves of the worker.

Anita Peña, an economist and Associate Professor at Colorado State University, will be analyzing data from the Agricultural Workers Survey (NAWS) in her pilot study titled, “Occupational Health and Safety of U.S. Farmworkers in the High Plains and Beyond.” The project was awarded $16,000 to evaluate the (1) determinants of reported health conditions and exposures to health risk and (2) economic effects on individual productivity and earnings outcomes in the population of U.S. farmworkers both nationally and in the High Plains area specifically.

Travis Sondgerath, a Ph.D. student in the Department of Environmental Health and Radiological Sciences at Colorado State University, was awarded $10,000 for his proposal titled, “A Feasibility Study of Enrolling Colorado, Wyoming, and New Mexico Farm-Families in a Prospective Farm Injury Cohort.” A paper-based survey will be mailed to 200 family farms in Colorado, Wyoming, and New Mexico to collect descriptive information such as farm type, demographic and health information of the person completing the survey, frequency of farm activities (e.g. operating a tractor), among others. This information will be used to inform sample size and power calculations that would be necessary in future grant proposals for the formation of a cohort of farm families.

The results from a 2014 pilot study by veterinarian Craig McConnel were published in the Journal of Food Protection in a paper titled, “Antimicrobial resistance profiles in Escherichia coli O157 isolates from Northern Colorado Dairies.” Analysis of seventy-five Escherichia coli O157 isolates from three Colorado dairies showed a low prevalence (8%) of antimicrobial resistance.
Evaluation Program

Purpose

The purpose of the Evaluation Project is to ensure accountability and to assess the impact of Center Projects and Programs in Public Health Region VIII; and where appropriate nationally and internationally.

HICAHS Needs Assessment

The HICAHS Evaluation Team presented the specific results of the Regional and National Needs Assessment completed in 2014-2015 to HICAHS staff and the Advisory Board in order to assist with project selection for submission for the 2016-2021 funding cycle.

The recommendations included the development of training and education materials/procedures, continued respiratory health research, and the request from respondents to work collaboratively with agricultural stakeholders to solve health and safety issues.

Community Capacity Building for Disaster Planning for Pets & Service Animals

The manual developed for this project “Creating a Community Animal Disaster Plan” has been completed (L. Quijano, lead author). This is a project that Vicky Buchan and Louise Quijano have been working on with Frank Garry, DVM (PI) and Ragan Adams DVM from CSU Extension and other collaborators over the last three years. The toolkit includes step-by-step instructions for building a community response plan for pets in the case of an emergency. A series of webinars accompany the kit.

View the kit here: http://extension.colostate.edu/disaster-web-sites/community-animal-disaster-planning-toolkit/
The collaborators which included the Colorado State University School of Veterinary Medicine, Cooperative Extension, and the HICAHS evaluation team were awarded a third year of funding by USDA to produce and evaluate a video of Extension personnel implementing the newly-developed “Pet and Service Animal Annex” to their emergency plan to accompany the manual.

**Research to Practice**

The instruments developed by the evaluation team to measure progress of the transmission of public health interventions from research to practice continued to be utilized to assess the utility of r2p for HICAHS projects across CORES. Over the five-year cycle, stakeholder perceptions were collected on a yearly basis with feedback provided to the PIs and the Center Advisory Team. As projects neared completion, r2p scores increased, with translation and education projects receiving the highest scores averaged on a 10-point scale, indicating belief that the project was either closer or ready for constituency use.

**Participation in the ECO group**
The NIOSH Agricultural Center *ECO group* which holds a conference call every other month, has been a useful way to learn from and collaborate with the other Ag Centers. HICAHS Evaluation and Outreach staff are active participants in the *ECO group*. The group has shared evaluation approaches, developed promotional materials, and worked together to publicize resources. This year the ECO group created a logo to represent the coalition of all ten NIOSH-funded U.S. Agricultural Safety and Health Centers. Although individual Centers have developed logos (HICAHS has its own logo), this is the first time that there has been a logo to represent the entire group. This past year the ECO group developed a joint statement related to the anticipated next funding cycle. In particular, evaluation personnel have encouraged NIOSH to work towards some standardization of the data they collect on the overall AgFF initiative.

*Front Cover Image Credit: Fotolia*

**References**


The reports contents are solely the responsible of the High Plains Intermountain Center for Agricultural Health and Safety and do not necessarily represent the views of the National Institute for Occupational Safety and Health. Report date: October 16, 2015
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