

Reflections on Culture, Work Planning, and Metrics at SNL

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Executive Summary

The NNSA/SNL detail provided an NNSA safety professional a rare opportunity to immerse in the SNL documents, corporate guidance, local management and some processes as if I was an SNL employee. My detail was to identify opportunities for strengthening safety culture, especially as it relates to implementing engineered safety; seek site wide safety culture improvement opportunities; and to identify safety metric opportunities. To this regard, I was given wide latitude in studying and investigating how SNL functions, good access to many SNL websites. In an introductory letter from Division 4000's Catherine Green, she expressed the desire for all of SNL to openly share with me, thus making my collection of ideas about SNL more meaningful. I was able to talk with and learn from so many different SNL organizations and people including governance to custodial service; researchers, operation and safety; and, with all grades of employees especially mid-level center or organization managers. The ESH Coordinators were personally valuable in helping me see the big picture and understand some of the challenges. My hat is off to all those who volunteered to collaborate with me. One intent of this detail was to gain experience and knowledge so I could better perform my NNSA roles with greater awareness and understanding of SNL challenges and safety conditions. Without a doubt you at SNL have made this a reality. I appreciate the opportunity.

The following report is a collection of thoughts on the SNL culture, work planning and control/engineered safety processes, and about metrics. The details are intended to be implementable and are not those typical of culture surveys or external assessments as I tried to look at the SNL with a balanced perspective as a former national laboratory safety professional as well as a current NNSA safety person. This report captures observations and offers ideas for ESH and SNL consideration and these thoughts have contributed to my learning as well. For clarity, I consider excellence to be the integration of safety, security, quality, project management in achieving operational missions. Although some observations are specific to these roles, most apply broadly to all and to their integration. Security within SNL also includes emergency management. These are in no manner fully researched and thus will have knowledge gaps. Each comment is meant to provoke discussion and consideration as to applicability in defining and building systems, including safety systems, that will increase worker engagement and understanding of their roles in achieving safer working conditions.

Major topics in the report are correlated to Five Elements of Building an Organizational Culture¹ that I consider a clear model for culture change: Train It; Define It; Live It; Measure It; Reward It. These elements are not a linear thought model, rather these present concepts of culture change that require inputs, controls, and system responses from each element to help lead a culture change. In any case, consider the comments in this report as inputs to your model for increasing efficiency, excellence, and safety.

¹ Five Elements of Building an Organizational Culture, by Ari Weintraub [www.zingtrain.com]

Train It major observations include that SNL, with its matrixed division model, involves quite a few training management models and tools. While TEDS is the core tool for SNL required training management, divisions create and manage training in-house. While great for many functions, this could be counterproductive when trying to implement a consistent set of safety behaviors expectations for ISMS, engineered safety, and work planning and control. Another opportunity is for adding some structure to ESH coordinator professional and functional skill development, such as a qualification program, so coordinators are able to collaborate more effectively in operational process and systems safety. A similar competence assurance process for other functions could add to the existing SNL competency program. The local training offered by Center 4100 is sound and most people I talked with feel it is worthwhile. Talent Management and Organizational Effectiveness office develops leadership which could improve by teaming with Division 4000 so safety and safeguards and security are merged as crucial parts of a leader's skill set. There are also opportunities to reinforce project management, quality assurance, operations, and safety fundamentals and concepts are part of a more holistic view on safety.

Define It captures many observations related to clearly defining what SNL considers safe behaviors. These become part of processes and systems directly affecting the national interest. Once behaviors and attitudes are clearly identified and understood, these flow into training, which sets tone for living the behaviors as well as defining measures. The layered and largely unclear confluence of ISMS, WP&C, Engineered Safety, especially given the variation by Division, suggest that considerable resources be used to define a SNL corporate core set of principles, methods and processes. SNL currently has a multi-discipline team working this SNL Strategic Milestone. The SNL could consider more clarity in why and how to report issues, ideas, incidents, near misses, and accidents in a more unified approach. Define work processes to include measure and metrics. Opportunity exists for more clarity and definition of the corporate risk management process so it is easier to apply to ISMS and work planning. This section also notes a need to define a consistent core set of SNL culture and safety attributes.

There are some gains in efficiency and communications with more centralized management tools that use principles and clear structures to promote consistency. The tools should drive documenting critical thinking and principle application so that the level of responses align with risks and have enough structured uniformity that SNL can share across Divisional barriers and find data valuable for metrics.

Live It offers ideas for improving how workers and leaders live, demonstrate the defined behaviors, in a manner reinforcing what SNL expects in its culture. One key to this is improved communications as most people believe they do not know where safety culture change is going and are not getting told. Division 4000 employs full-time communications SME for developing and executing their communication strategy around culture change and safety. The ESH coordinators are Division 4000's primary link to the line divisions and they need supportive communications about goals, visions, tools and resources that keep them connected to the central Division 4000 philosophy for ESH support—make them the change agents. Reporting has opportunities for improvements in both the attitude and behavior aspects as well as the electronic systems making it reporting easy and data recoverable. This section highlights a few leader roles in living safety and driving culture change such as accountability and demonstrating

engagement. Discussion about the silos created by independent divisions is noted as are difficulties in rolling out engineered safety and website ideas. That midlevel leaders have great responsibility for safety should be reinforced. ESH resources support line managers.

Measure It offer ideas about how defined behaviors form a significant part of measures. This section presents more concepts that other element sections because the interviews surfaced how much anxiety to self-assessment and measures exist and how challenged people are to create measures. Some ideas for metrics are listed as examples of linking desired behaviors to what is measured.

Metrics received much discussion. Leaders as well as the ESH coordinators supporting those leaders would appreciate well-considered mix of leading and lagging metrics (or measures) that provide insights on what to fix or improve. Having some consistency with a handful of SNL-wide measures, preferably leading indicators, might improve LLT level understanding of SNL performance and allow more focused responses to trends which otherwise have not been readily available. Divisions would benefit from sharing their expertise and concerns about metrics as part of organizational learning. Quite a few noted voluntary use of SIMP as a method to get help and how simple the tool was. This is in contrast to issued managed in the archaic AIS, difficulty in completing NOTES, ORPS not being friendly for near-event reporting or other similar reporting tools. I am not aware of any division developed and maintained issues management program including corrective action tracking systems although given the autonomy afforded each division, I am confident that redundant tools exist. Simple methods will help increase reporting – and reporting in of itself is a leading behavior indicator.

Reward It notes that SNL has corporate reward systems mostly linked about annual individual performance (PMP). Opportunities exist for reaching out workers and rewarding their strong behaviors and some techniques are offered.

Culture Overview

SNL continues to improve its safety behaviors and attitudes though many separate activities. Having not found a single high level concept or plan for leading safety change, it was easier for me to understand the many different activities led at Division level. From the many interfaces between mission support functions and the division and the sometimes cross-cutting nature of research, having a common set of defined behaviors (including systems) and attitudes championed and communicated consistently across the SNL could be valuable. There are some gains in efficiency and communications with more centralized management tools that use principles and clear structures to promote consistency. The tools should drive documenting critical thinking and principle application so that the level of responses align with risks and have enough structured uniformity that SNL can share across divisional barriers and find data valuable for metrics. Examples are a tool for ISMS/Engineered Safety/WP&C, a learning information management system to replace TEDS, QA/issues management, and perhaps more effective methods for maturing SharePoint sites. Continued reliance on division spreadsheets and local tools significantly

Reflections on Culture, Work Planning, and Metrics at SNL

reduces information sharing, drives much local training as it simultaneously reduces common training, and diminishes the ease of workers transporting qualifications across the SNL.

Although audits, assessments, reporting, and accountability have a strong negative connotation to many leaders and workers, these functions have been shown as critical to organizational learning and mission performance. My review suggests renewed emphasis on its value, implementation methods, and accountabilities as very supportive of change in a more integrated view on achieving the SNL mission.

Without doubt, the individual commitment by members of the workforce to safety are robust. I am impressed by the number who have voiced concern about gaps in programs and leadership support while continuing to push for improvement – many through participation on improvement activities. This commitment, actually discretionary energy, should be nurtured as it can readily disappear. The long effort to develop and implement functioning processes for engineered safety has taken a toll, and in quite a few cases, line and ESH staff are ready to embrace a more effective, clear, and integrated ISMS addressing work from the researchers' or mission support's initial creative ideas through operations to end of life. The attitude that engineered safety is just another layer on top of WP&C might be thwarted with rollout of the Engineered Safety/WP&C team's products motivated by Milestone 3.4.2. No one plans to be hurt or ruin a project, so overall they work safety and most felt a single structured model with risk-informed processes and a structure that cause critical thinking. This critical thinking aligned to a thought model would lead to locally applicable controls would help everyone from workers, to trainers, to leaders and quality assurance efforts to integrate safety.

Reflections on Culture, Work Planning, and Metrics at SNL

High-Level Perspective for Culture Change

Sandia National Laboratories (SNL) has many diverse organizations and staff members willing to participate in organizational and culture change. From the many people interviewed and the tone of numerous documents I read, key people are willing to engage, learn and help lead change.

To help me sort and reflect on what SNL is doing, I use the simple model for culture change borrowed from Ari Weinzeig and colleagues' ideas². Their model is: Train it, Define it, Live it, Measure it, and Reward it. "It" is the desired end state which guides the culture change and which aligns with SNL values, project management, quality assurance and ISMS. This report uses these five elements as major sections. Additional sections highlight other functions or cross cutting ideas.

The model is simple conceptually. Nurture leadership, employees, processes, and systems so these align with corporate mission, visions, and goals. Concurrently enable each to give his or her best to the organization assuring these five elements are addressed: Train it, Define it, Live it, Measure it and Reward it. The "It" is the culture you wish to live and work in. "It" can similarly be each person in organization. "Train it" essentially means get all employees up to speed on the concepts, values, processes and system you define for your organization. "Train it" is much broader than class room instruction or reading as it also entails learning performance behaviors and demonstrating competency. Collectively these are the corporate expectations of the other 4 elements. "Define it" is more academic as thoughtful analysis and planning creates clear behavior and attitude expectations. Defining is much easier to explain that do, yet effort to define makes the other elements achievable. "Live it" is our personal challenge to meet the expectations; take care of the people and processes; and, to be engaged in participating with organization's journey. Each of us is the living model of what we want to be and become. "Measure it" is the necessary activity of knowing by checking of where we are with regard to living what is defined. Are we doing what we agreed to do to meet the expectations and how well? "Reward it" is that very valuable activity by leaders and peers to recognize the contributions of all because without each of us, the process and journey is destined to flounder.

² When Inc. Magazine called Zingerman's "the coolest small company in America", they said that the "grand plan" the Zingerman's founding partners came up with for the future of their business was "far better than anything a management-consulting firm could have devised for them"

Five Elements of Building an Organizational Culture

- Train it:** Know and learn expectations
- Define it:** Define expectations for performance behaviors and attitudes
- Live it:** Lead and perform consistently to the defined expectations
- Measure it:** Measure expectations to help correct implementation
- Reward it:** Acknowledge people and organizational behaviors and their results

These five elements apply equally to the existing SNL models for project management, quality, safety, safeguards and security as depicted in the Center 4100 training graphic *Principles of Engineered Safety*. The parallelism between culture change elements and Plan-Do-Check-Act for quality, 5-Core Functions for ISMS, fundamental steps in project management, and elements of safeguards and security is intuitively natural with a noticeable change of focus toward our people instead of at the processes we apply. Most strikingly, our current models poorly reflect how we incorporate rewarding our workers, teams and organizations or our external teams and clients who offer much to SNL.

As part of causing change, an organization often describes its vision, a strategic plan, goals and some definitions of what 'good' looks like. As an initial opportunity because I could not find the SNL set of desired behaviors and attitudes and could not locate SNL's culture attributes that help characterize what is expected in SNL's evolving culture, publish these broadly.

Many speak of culture change as a slowly evolving thing or state. Research shows that having the behaviors and attitudes internalized so a person responds using the desired behaviors does take time, however, defining a set of behaviors aligned with values and systems can be done soon and well. These become standard of performance to which people apply the Five Elements. SNL has done this with many functions across the laboratories as well as within divisions. Others would benefit from additional thought and development.

Train It

Each of us can and should be accountable for our work. To be accountable one must at least know the expected standards of performance and be taught to these defined expectations. From an individual level one might attend a class and feel some sense of competency. From a corporate level there are many interrelated aspects weaving all five organizational change elements. My reviews and interviews started within the concept of safety and safety culture yet rapidly expanded to many others in SNL as the relationships became well intertwined. I have not studied each observation sufficiently, yet hopefully provide enough that Division 4000 leaders can blend the concepts with their ongoing efforts to improve. People must be competent to fulfill their roles and require training and learning in the scope and details of these roles.

1. SNL has many paths and training organizations for developing and offering training. This allows flexibility while confounding standardization and sharing.
 - a. Appears that HR talent management and organizational effectiveness does not directly manage the breadth of SNL training. Much is left to the Divisions who apply HR100.2.8 *Develop and Oversee Line-Managed Training and Training Programs*, as supplemented by the Line-managed Training Standards.
 - b. There is no single access system for training and qualification records as the HR100.2.8 authorizes line organizations to manage their own to set standards. This makes it more challenging for SNL to track and measure training effectiveness, costs, overlap of efforts and qualifications. The procedures do address how divisions manage their own training. A centralized Learning Information Management System, could consolidate efforts while still supporting division control of their courses and would allow more effective training management that could support intra-SNL transfers and Knowledge, Skills and Abilities (KSA) awareness for work planning and control.
 - c. Leadership Development and Learning Management. Leadership development appears to focus on the traditional concepts of teaching roles, traits, individual leader skills and similar with noticeably less emphasis on how to apply those within the SNL operations. For example, the Full Spectrum Leadership Development targets leader objectives including: deliver results, shaping the future, build effective relationships and energize the team and model personal excellence, integrity and accountability. While each of these or most similar leadership models are very important fundamental skills, there is a wonderful opportunity to develop learning using actual SNL case studies and current policies and practices so junior leaders can more rapidly see lead performance when back to the office. Leadership training or experiences could improve by developing the personal value for and application of the many line and support functions available to the leaders and inherently necessary to run an organization at any level. Some would be safety and health processes and resources, use of quality assurance, and integration of safeguards. Present on safety integration as a leader topic discussing the relationship between effective mission accomplishment, QA, safety, project management, operations and safeguards and security. Teach the vertical slice of worker safety and

health programs and safety functions, the business of safety, how quality is applied to safety programs, safety knowledge skills and abilities leading to competency, communicating safety with leadership and workers, and metrics.

- d. I did not locate a goal or strategy except from the highest level a strategy for attaining growth in the laboratories' foundation of 'people' where objective 3, goal 3 seeks to foster an environment that stimulates continuous learning, personal and professional development and inclusion. SNL has the Strategic Education Committee as a resource and for guidance and see that a Center 4800 senior leader is a committee member. My reviews did not identify many specifics of how SNL manages safety professional advancement although most staff interviewed wanted to advance their skills. Besides the competency ideas below, I think it would be fun as well as valuable for each SME to have to present key technical topics within Center 4100, to ESH coordinators as well as relevant 4100 staff people. In essence, define some Division 4000 centric learning development program that reaches beyond optional seminars. Could also include some of the events Center 4100 is doing to get ESH coordinators exposed to SNL activities. From my experience, many people almost have to be pushed to learn more as most feel that spending time learning takes away from their job duties. In reality, learning in the safety world is a job duty. Center 4100 is seeking to expand the technical capabilities of 4100 by seeking to hire systems safety professionals. This would be a good topic for 4100 learning about Div. 4000 helping change the culture, QA as it contributes to safety, interfacing with projects, and tons of topics your folks will suggest. It could provide long term value for ESH coordinators or some trainers from 4100 to visit other division training management meetings to support getting safety on the list of training requirements.
- e. Teaching project management, perhaps directly from project management professional criteria and linked as important to DOE project management, would give a leader a strong foundation for integrating all functions into a common management structure. I understand the reluctance of Division leaders to seek corporate defined training as it could be considered a cost and time sink; however, the SNL payback might be valuable.
- f. HR offered training for optional training is expensive compared to Center 4100 safety and safeguards & security developed and offered training. Based on ideas shared by ESH coordinators, Center 4100 trainers and line MOW, this cost becomes a limiter in how workers get trained. I believe that push back from Divisions on having more SNL required training has roots in at least these factors: Divisions what to control requirements imposed on their staff (perhaps not fully recognizing the corporate view), HR training costs use operational budgets that are always tight, belief that all training takes workers away from work and thus should be shortened, and to some extent, corporate training doesn't teach what the division needs so divisions create their own. The SNL for some safety topics could set a common model including processes and resulting documents. Then develop site-wide required training which would drive application consistency as well as having potential to reduce training and management costs. This is not a push for having HR or ESH manage all training.

- g. I heard that a couple of divisions have in-house training staff and have attended a safety class taught by a division safety staff member. While the training was sound and engaged workers, it seems somewhat ineffective for a line organization to teach topics closely aligned to what Center 4100 has been teaching. This suggests that the differences between the Center 4100 offered class and the line division expectations are sufficient to warrant local training. This begs the question of why is such a difference valuable when the goal is for SNL to drive common behaviors which become strengths of the culture.
- h. In the safety and health function, Center 4100 is able to develop quality training with many offerings in human performance improvement, work planning, failure modes analysis techniques as part of a holistic safety approach, developing a safety case, and others such as environmental, waste and IH. Many operators and ESH staff believe these should be required training as each is so important to the work. It would be worth the discussion to decide which few should be required for whom and push this idea through HR and senior management to set a broader required training list. I would suggest that each be weighed based on the behaviors the training drives and how these behaviors align with the goal of creating a better safety culture.
- i. Recall of ESH 100 topics like other training degrades rapidly. Consider recurring training every three years or a refresher online course. Part of retention has to do with how soon the class is taken after onboarding and the stress on learning so much so fast. Also consider how you can link the topics to the persons work. If a new hire doesn't know their real job, it is difficult to teach safety and health as they are probably challenged to mind map the information to the work.
- j. Should there become a single corporate endorsed model defining more precisely how WP&C is done, then have a line leadership lead a team of Div. 4100, mission support and line mission, QA and Training resources in developing single corporate wide training concept and deliverables. Common training will help perforate the silos of excellence, lay the foundations for common application of WP&C, give QA an opportunity to review each organization against same criteria, and will contribute to worker mobility within the laboratories.
- k. The need to decide the balance between funding operations and developing the workforce will remain a polarity. Should improving mission excellence including safeguards and security and safety honestly become the value, then leaders will be more willing to apply their resources to improving personnel performance through learning that drives desired behavior change.

2. Training Management Systems. Many large, multi-location business manage training in a single corporate level learning information management system as the tool for achieving learning quality.

- a. Workers must be correctly trained before beginning work. Opportunity to simplify assuring that training and qualification defined in work planning documents are current by fielding a single system preferably or multiple databases that are hard-linked. The

Training system managers participating with the EFCOG Training Working Group rely heavily on a robust system to manage learning, instruction, instructors, qualification and the many other integrated aspects of assuring competency. One tool has advantages when budgets drop and fewer people are available to support multiple platforms.

- b. The training system must be used to correctly match training to the person and that persons work activities. This is a leader/team lead function that deserves more definition. There are very limited number of ESH competencies required by SNL as mandatory training and automatically populated to each employee's required training list. I see value in having everyone understand (learn) what safety, security and quality are so some level of fundamental training should be required. Additional more comprehensive and rigorous training in these topics can be defined by duty position or roles and can be step-like from novice to expert. As a single important example, work planning and control training is not required by SNL corporate and divisions have much flexibility as to when and who takes the training. Even though not a requirement, most work planners receive training which indicates that divisions understand its importance in achieving their missions. Center 4100 could work with HR and some line leaders in deciding what ESH training should be mandatory and which are optional.
- c. The need for a single learning information management system (LIMS) has been evaluated before and efforts to select a corporate-level learning management system has cycled and churned for quite a while. Should SNL consider training an essential piece of organizational change, at least for improving safety culture, then increasing the priority for selecting an LMS could be revisited. I was told there were ongoing efforts to procure a LIMS but this has been delayed by desire to have a consolidated HR system. Some Divisions are developing training that could be shared or borrowed if others knew that training existed. Much is in TEDS yet I am told that the requirements and relationships between a division training function and HR training development are not well defined and that sharing of training records or transfer of records with a person is difficult.
- d. Training management system, preferably using a corporate-level tool, could define continuing performance levels and verify these with some form of periodic testing to see if material taught has strong retention for the most critical aspects. As a consideration, have an annual ESH test to confirm people know protocols for reacting to sirens, gongs and other alarms, location of assembly point, what to report and how, concepts of safety, application of WP&C or similar really important items. Consider which deserve practical application testing instead of the routine easily forgotten on-line review with overly simple test.
- e. Much training is driven by the PHS system. I did not locate or research deeply how the PHS system updates required training. Maybe not a factor, but some of the PHS questions have not been reviewed or revised since 2007. It is good that a group with diverse skills revises PHS questions. I was unable to locate ISMS training on the ISMS website or a link to such training. There could be an opportunity to link training to the ISMS software and PHS. The PHS system looks at hazardous energies without

consideration of other factors such as location, difficulty of work, uniqueness of processes, complexity of human interactions or other conditions affecting risk.

Although definitely a valuable tool, the PHS could be expanded or have ancillary tools to address conditions and people interfaces.

- f. Currently, the SNL corporate system is TEDS. Most comments have been about how difficult it is to use, mine for data and to update and that Divisions create their own systems. Corporate policy defines TEDS as the predominate LIMS for corporate required training and some of the divisional training. Divisions have authority to create their own systems and many have. Tracking training courses, training development, and training completion in multiple tools significantly reduces the SNL ability to know who is trained on what and when training is necessary. Discussions have been ongoing about procuring a flexible LIMS for SNL wide use. A single LIMS could streamline data management and cut longer-term operating cost. Transition costs and resource demands are inherent in change; however, new computer database tools can help transfer data.
3. Many divisions continue to wrestle with merging often misunderstood or vague principles and practices of engineered safety with long held work planning and control concepts familiar to implementation of Integrated Safety Management. Quite a few feel valuable aspects of safety by design and the philosophy of engineered safety are just another layer of safety management that were offered with insufficient corporate standardization, communication and resources.
4. Division 4000 funds and leads an ESH specific training organization (41xx) that is independent from HR training.
 - a. Alignment with SNL learning program methods appears sound. The classes I attended were well done and interactive. Instructors are very knowledgeable and bring the subjects to life with real examples and thought provoking questions. This training function in Center 4130 is valuable.
 - b. Center 4100 places courses and attendance into TEDS allowing line staff to schedule and manage training including currency of worker training. I believe there is value in offering centralized WP&C training at manager, worker and planner levels that are required SNL directed training. There are different interpretations of Work Planning and Control being taught in divisions. The WP&C training by Center 4100 such as WP&C410 are valuable in clarifying expectations and driving consistency in application. It is great to see more systems thinking in training and managers and planners could benefit from including systems thinking more robustly in the SNL Manual for work planning, *MN471021, Work Planning and Control Criteria for Safe Design and Operations*. Colloquially referred to as MN21.
 - c. The Division 4000 funds class development for many safety-related courses. Student attendance is very good as it gives many more SNL MOW opportunities that would not occur if Divisions had to spend their own money on more training. Quite a few students

would not have attended training if their parent division had to pay for the class as is required most HR sponsored classes. I have been told a few times that using line division training funding for “optional” safety related classes is a low priority compared with continuing education for senior technical and professional staff. Can Division 4000 receive additional funding based on head count for safety classes that might rise from optional to required. The rollout costs of potential ESH coordinator training and WP&C training to the new process might be an opportunity to refine this portion of the 4100 budget.

- d. Heard a few comments that the HPI and Human Factors classes were not required training and that these are too long and too expensive. Their value to safety, especially should a more systems-based approach to risk management becomes the norm, is well recognized within the safety profession as well as by quite a few line staff thus suggesting this be considered as required training.
- e. Not sure how widely line-managed safety topics training get reviewed by Center 4100 for consistency with 4100 expectations or agreement with what ESH is teaching. Such a review would help 4100 place culture change ideas into line training, assure some consistency, and actually help divisions achieve their missions.
- f. Training in safeguards and security using online sessions appears well received as people demonstrate strong attention to security and know how to use SIMP. Could believe there is more attention as the ‘why’ is more recognizable and communicated and the consequences for poor performance are clear.

5. The local training offered by Center 4100 is sound and most people I talked with feel it is worthwhile. Similarly, the Division 4000-sponsored training to Division-specific safety procedures appear well received. There is significant opportunity to improve the consistency and content of corporate, Center 4100, and other divisional trainings focused at safety by teaching a corporately defined standard of performance. With the ongoing efforts to Milestone 3.4.2 on revitalizing work planning and control (WP&C), SNL can provide more consistent expectations, focus that safety is inseparable part of the bigger integrated picture (as are security, quality and project management), assure leaders and line organizations “own” safety, and ESH organizations enhance direct support to the line leadership and processes. This comment is nothing new to SNL and really suggests renewed emphasis and structure to achieve clear expectations and more structured follow through.

6. Core Competencies

- a. In support of a setting clear safety expectations, Division 4000 could define core safety and security knowledge, skills and abilities for division line managers and other worker often exposed to greater hazards. Consider enhancing mid-level leader’s skills using adult learning techniques driving project management merged with QA and Safety. Risk management perspectives could become more consistent. I could not find any published competencies. Some of these could be required learning for incoming managers.

- b. ESH functional areas, regardless of line affiliation or duty title, should set minimum qualifications standards that can be achieved with experiential activities, contracted training and SNL training, self-study or any learning method. Similarly, it might be valuable for functional experts to participate with the consensus standards, EFCOG or other specialty groups as a path for development as well as sharing lessons. Competencies could be aligned with the HR100.2.8 model by having low-mod-hi risk somewhat aligned with novice, journeymen, master or basic and expert levels.
- c. Although perhaps not a core competency, all ESH staff members, many of the safeguards and security managers or leads, and perhaps some of the Center 4800 managers should get out to see what is going on in the labs and facilities they support as part of a qualification or continual learning (over time). In no manner do I suggest that this is not being done as I did not follow this thread. I think it should be part of a competency program.
- d. Might have value for ESH to work with line to define core competencies depending on positions or roles (scientists, technicians, mission support, work planners, ESH staff, accident investigation, causal analysis) Competencies could include for example more detailed ESH training such as HPI, FMA techniques, PHS, accident investigation, systems safety, reporting, and others.
- e. Skill of the Worker is a term applied to any individual who performs more routine, frequent work using skill expected of the craft of research technicians. However, skill of the worker is not assumed as inherent to a person or new hire; it is based on being taught and having demonstrated experience. The best management practice of defining the scope of activities comprising skill of the worker, validating or training to these, and formally qualifying through observations, OJT or practical testing forms a safety basis. It follows then that ALW documents (for those qualified) do not need to readdress the many typical controls that the worker already knows. This should focus an ALW on the more unique hazards and controls specific to the work without sacrificing safety or security. Skill of the Craft should be defined and trained to. This avoids confusion and misunderstanding about a worker's actual skill level.
- f. Some groups use a structured OJT to teach technicians. ESH could offer OJT lessons plans and qualification for some of its safety functions. These would be taught at the right time for the correct activity. This model for just in time training is being introduced in SNL-CA.

7. ESH Coordinator: Because each of the coordinators should model the safety behaviors and attitudes of SNL, there could be value in structuring and training to well-conceived ESH expectations. This could include further discussion about what might be the best organizational alignment, how to improve the ESH coordinator value to the laboratories, and what knowledge skills and abilities are most essential or fundamental to ESH coordinators. Such a collective knowledge, skills and abilities standard is not currently being used within Division 4000 or Center 4100.

- a. The current organizational structures for assigning ESH coordinators present an administrative challenge to assuring adequate training. Some coordinators are assigned to Div. 4000 and deployed, some are matrixed with less corporate ESH involvement, some are hired and paid by the line, and perhaps other arrangements. Defining and requiring a minimum knowledge, skills and abilities qualification for a safety function can be set at a corporate level thus providing consistency across the labs. We know safety needs vary widely among the Divisions, so the competency program must allow divisions to add Knowledge Skills and Abilities (KSA) supporting their operations, functions, and risks.
- b. Knowledge, skills and abilities should include a range of technical skills, emotional intelligence abilities, academic knowledge in mechanics, physics and chemistry, as well as the more recognized safety management systems, quality assurance and project management skills. A small group of senior ESH coordinators, SME, and various line operators and managers could build on already available competency programs. I have seen quite a range of skills from engineers, safety engineers, leaders from research and administrative function migrating to ESH, and as stories are shared, belief that some ES&H Coordinators were assigned because no one knew where else to put them. Regardless of pockets of excellence and everyone's professional and technical background, there is a need to standardize core knowledge to improve the technical capabilities of ESH coordinators and to make the coordinators more valuable to the laboratories.
- c. There are very good blocks of instruction such as the WP&C classes that provide essential training; however, these are not currently part of a planned approach for ESH Coordinators to achieve excellence.
- d. Core competencies with qualification will offer ESH more flexibility in managing staff to meet surges in mission needs. A robust program builds credibility which will increase ESH coordinators and SME integration should a need ESH coordinators in addition to regularly assigned staff. A competency program doesn't directly build the trust and respect an ESH coordinator must earn, but it definitely sets expectations for knowledge, skills and performance. Some competencies could include:
 - High level understanding of safety as a business function and the safety environment (DOE, SNL, Federal, State, consensus standards, etc.)
 - How safety integrated with project management, schedule, cost and quality
 - People skills
 - WP&C from an expert level
 - Change Management/Behavior change
 - Engineered safety/safe by design
 - Systems Safety
 - Human behavior
 - Human Performance Improvement (HPI)
 - Human Factors

- Failure Modes Analysis techniques and its applicability
- Fundamental engineering STEM-pressure, hydraulics, materials,
- Mix of Industrial Hygiene, Health Physics, Environmental,
- Legal bases, regulations, consensus standards
- Project management
- Program management
- Demonstrated performance in assigned laboratories and workplaces

- e. We must not underestimate the value of soft skills associated with communication, leading, championing safety expectations leading to culture change, project management, conflict resolutions and others you can list.
- f. Experience is hard won over time. SNL could consider shortening the time variable by making opportunities for the more experienced to share with the less experienced though defined details, forum discussions, leader (Div. 4000 and Line) talks on safety staff expectations, hand-on learning activities or any activity to share experience supporting more sound ESH decision making.
- g. “Book smart does not equal work smart,” statement by a more senior safety person targets the need for safety people to demonstrate practical experience to do the job well. Getting this experience should be part of required learning activities. Hiring staff with demonstrated experience is also important. When people are placed in positions because of a suite of valuable skills of which safety experience is weighed less, then extra effort to build this knowledge must become part of that person’s expectations.

8. New Employee Orientation

- a. A discussion about an FBI orientation session will remain for me a very important observation. It is one that could benefit SNL. One of your more senior leaders returned from an FBI Academy sponsored learning program and shared just how valuable it was to the class to stand in the FBI building while seeing commendations and hearing stories about the many agents losing their lives in defense of our Country. The FBI senior leader personally explained the role of each new agent to the country as a vital part the FBI’s legacy of service. Your SNL participant left with a strong sense of commitment to national service. One could mirror this for SNL new hires and transfers as their first personal contact with SNL leaders. This action would start a long career of loyalty, respect and trust in themselves and their peers. Each would be better positioned to belong to something important from day one. Each SNL MOW is similarly essential to the national security and no matter how varied their work duties, all directly contribute. This FBI method contrasts sharply with the slides of administrative duties and responsibilities explained during the SNL New Employee Orientation. Many are exposed to the unenlightening requirements long before understanding the laboratories missions, values, goals and what each organization does to support the whole. This level of building a culture is left to Division level orientations. While the Division 1000

orientation I attended was engaging and a few leaders were present with their new hires, the orientation did not do justice to the SNL as an entity.

- b. Bring people into the Labs with a clear purpose and structure that makes them part of a bigger picture, acknowledges their value, and sets expectations for continued contributions.
- c. Line leaders can similarly align new hires and transferees to the division mission and role in national security. Each could discuss their roles and responsibilities for ensuring safety and secure operations of all kinds. Set a safety expectation early—that safety is as integral to mission excellence and one that is not prioritized away. It is essential and be cherished. Highlight the major mission essential processes with their organization and major ongoing work. Perhaps the NEO would be a great time to introduce the many support groups including the ESH coordinators, HR, QA, Budget, etc. with each highlighting who they are and how they serve. The process steps for work planning and control can wait for a quieter focused activity directly related to that persons work.
- d. Define mission accomplishment from a higher level touching on individual roles, organizational roles, and support organization roles including HR, QA, SS, safety, building to the higher state of SNL laboratory roles. Note the importance of cross-divisional teams.
- e. As a learning technique, make sure at least some of this is a story with a person, a journey, and success of a more recent SNL operations or research project. Try not to limit the stories to research wins as I am sure there were big wins in building MESA and other facilities, great work with MC&A, and successes with communications, contracting, and others that demonstrate the value of SNL to national security.
- f. As to safety, ESH can provide speaking points about value of safety, ESH goals, safety programs, identify key ESH staff members, opportunities for individual involvement, reporting and etc. to Division leaders.
- g. The NEO checklist at day two asks managers to provide a reference and reading material. It would be an opportunity to provide managers with ESH/SS overview material (in support of NEO live sessions) and in more detail than is in the *NEO200 Guide for Managers*. It might be good to put more manager emphasis on the value of safety and security and to lay better foundation for being safe every day. Could also depict graphically the SNL reporting model, getting ESH assistance, scope of ESH functions, and staff expertise. Also could drive home the value of reporting and that this is an expectation. I know the guide says to “promptly report” but this doesn’t give feedback and improvement its due.
- h. Contractors have a different NEO process, even if long-term hires in direct support or staff augmentation. These longer-term embedded contractors would benefit from the same or comparable NEO that new employees receive, of course deleting the many SNL HR benefits and other aspects that wholly do not apply to the contractors. Also add training on networking, which organizations do what, who to talk with about what are important for the embedded contractors.

- i. The new Employee Onboarding Process includes new employee orientations NEO 100 and NEO 101. Division 4000 could provide talking points to Division leadership. This will reduce time managers need to prepare, focus their discussions in an SNL centric, consistent manner, and keep ESH engaged with line.
- j. Division 1000 leader offered that NEO 1000 could include more discussion about safety and how safety is part of research design. I did not attend any other division NEOs, but would suspect each division NEO could be updated. ESH coordinators might help to ensure a common Division 4000 ESH message is in each Division NEO as well as the division specific safety needs.
- k. As an outreach opportunity to share federally generated training, SNL could participate in the NTC and the EFCOG efforts to increase the value of the DOE Training Institute. Federal and contractor training is developed, vetted and offered for enterprise wide use. Training is offered through mobile qualified instructors, train- the-trainer methods, and some NTC or HAMMER (a DOE training development facility at the Hanford site) instructors. DOE sites have access to complete training modules including instructor notes, student guides, and course materials. Sites can have local instructor vetted and qualified to teach these courses which allows classes to be taught by known local instructors. Equally important to the continual learning efforts within DOE, contractor and Union training can be reviewed and then offered for other sites to freely use. Some of the classes related to worker and first line supervisor roles with safety could be good additions to NEO training.

9. Leader Development

- a. Leader development, especially for emerging leaders, should include safety and safeguards and security as essential competencies. As a continuation on the training theme, I did not identify in human resources or Division 4000 resourced training development a set of objectives and methods to help instill a sense of accountability for the safe performance at work. It will be very supportive of culture change when line leaders, especially mid-level fully understand that they own safety and the responsibility to ensure work is performed safely. ESH staff can help the learning process as well as provide technical and leadership support but should not own or appear to own the responsibility. The SNL leaders accountable for safety and security could more actively drive leader development.
- b. One could consider describing the larger values and visions aligning safety with mission, how the integrated model of research and operations is inseparable include safety, and the relationships of safety and help support tools and organizations to line leaders' ability to influence behavior change. This training could easily include the leaders' role in setting local vision, aligning resources to the visons, and techniques for assuring staff member development and accountability for leading safety. Emphasis on how Division 4000 fully supports the operational and mission support roles should help form the alliances important to communicating and implementing safety as part of the daily operations.

- c. Teach leaders what performance excellence is all about from the context of setting and achieving the behaviors necessary for that performance. This should have some link to improving safety culture; however, spend less time on the status of culture and culture surveys. Place effort into line leaders teaming with ESH and others to clearly set the behaviors. Explain the 'why' and value so emerging leaders understand that safety is a moral imperative as well as a significant factor of international respect, cost avoidance as well as cost saving, project management, quality and overall success. Show that behaviors can be changed when guided correctly, for example, with the great strides Safeguards and Security have achieved making each person accountable for security and in getting people to do it right. ESH can become more involved as instructors, guest speakers, and facilitators in defining the why, how and what of achieving safety. Consider the opposite, "Would HR expect ESH to teach HR topics?"

10. Teach to Think Safety

- a. Teach people ways to think and decide about safety in addition to the processes. Center on principles and how these apply to thinking through work. Check list might be based on principles and concepts such as how are roles and responsibilities defined, how we engineered out single point failures, or planned for the upset condition. Principle based approach, when linked to a set of activities (PHS, JHA, ALW) provides maximum flexibility to Divisions while still driving a rational, risk-based control set. SNL could consider having work planning address the Engineered Safety principles as well as the ISMS principles more diligently in the process and MN471021, *Work Planning and Control Criteria for Safe Design and Operations*.. This could be a targeted request for 2nd line supervisors to have discussion and if possible use the ESH coordinators to facilitate.
- b. Teach decision making as it applies to safety. Put more effort into risk management and its tools as well as normalizing what is meant by risk at SNL, what is acceptable risk, and applying controls to ensure residual risk is and remains manageable. It is very good technique to use Failure Mode Analyses as part of WP&C and Engineered Safety process. Line leaders with ESH and QA could measure effectiveness of how techniques are being used to get some idea of where improvements in application could be made.
- c. Reinforce the personal and organizational needs for having a questioning attitude. ESH and line could consider opportunities for teaching and providing experiences to planners, Coordinators and others in recognizing hazards caused by changes of conditions and what the IH community calls 'anticipating'. Obviously this is not a book learning effort as real conditions should be used to give realistic experiences.
- d. An opportunity exists to link with the communications team to develop thorough thought provoking posters for wide display sharing key principles and tools. Awareness about critical thinking is valuable.
- e. ESH classes in WP&C are valuable. I attended or read course work on WPC410, WPC420 and WPC 430, which clearly explain the concepts of MN471021, *Work Planning and Control Criteria for Safe Design and Operations*. Because this manual is not very prescriptive, I am confident that these classes are very valuable in teaching line

organizations the ‘how’ that is not in the manual. I also attended a Work Planer Community of Practice meeting that was very well attended and led to good discussions with quite a few people offering ideas and opinions. Here is a list from an interviewee:

- Business, money and risk acceptance
- Succeeding with more work and fewer resources
- Liability
- Proactive views of work and work processes
- Change management
- Risk and consequences
- Avoiding over loading the best and under loading poor performers
- Competency development
- Willingness to be honest, frank and open
- Safety, quality and security as part of the work mission

f. Assure that mid-level leaders get a full suite of safety training so they know the processes and systems and can thus make more informed decision at their work places. I believe this level of leaders deserve much more learning and experience before they take the job. That said, ESG coordinators and Div. 4000 should help fill the gaps. Leader specific safety scenario training might help.

11. Freedom to Explore

- I will also be grateful that my detail offered great latitude for exploring line organizations, talking with anyone willing to give me some time and pretty wide access to the SNL websites. More difficult to read on SharePoint because of site access controls.
- I recognized belatedly how valuable was the time I spent web searching and reading the many SNL and division documents. I read or scanned most of the Corporate policies and processes for training, ESH, and quality. Much less on security and almost nothing on Human Resources, finance and other topics not related to my work here. Just spending this time was so beneficial to understand the relationships between organizations, who was responsible for what, major processes, the uniqueness and similarities between organizations. Thus I could easily suggest that new junior leaders and senior technical staff members, including Division 4000, be challenged to spend a week or so just probing the SNL sites. Pick a topic such as training and follow the thread to individual's organization and functions, relationships with other organizations, including internal assurance. Scan the ORPS, search the AIS for safety, WP&C, engineered Safety, or whatever motivates you. See the OOP and NOTES. Understand how SNL achieve quality. Overall this time spend could equate to a year or more of learning as you go doing your routine work.
- I have heard wonderful feedback about a Division 4000 leader who is actively exposing the staff members to some of the fantastic research operations at SNL as a way to improve their understanding of their role and value to achieving the overall SNL mission

to enhance national security. Efforts by Center 8500 are strong and perhaps more urgent because organizational staffing levels require fewer staff members to be responsible for a wider range of functions. Trust that I have not seen the efforts of other Div. 4000 leaders at all levels to increase knowledge and abilities. I believe that most of us need more understanding of the higher level integration, support, and guidance roles Div. 4000 plays with the line and mission support. It's like 6 degrees of freedom where everyone frequently meets up with a challenge associated with who we support and within our own organizations. We should be ready.

Define It

The behavior and attitude change concept of Define It is fundamental to training, living, and measuring, which lead to rewarding opportunities. Without people clearly knowing what the expectations are they don't clearly know what to do—how to behave in the largest sense. This starts with a well-defined mission and clear vision of where you want to be (now and in the future). Then business systems guiding implementation of these of these critical functions are refined to get you there. These systems form the foundations for what workers are supposed to do to address the internal and external drivers as well as the mission. In a large organization such as the SNL (and equally with the NNSA) translating the vision into worker level expectations for behaviors and attitudes that can be trained to and lived is an ongoing. It is well challenged by the diverse set of missions, cross cutting and vertical requirements, differences in leaders and worker subcultures, and change. Here at SNL, I believe the term is “churn” for the ongoing changes. This complicates setting and maintaining clear, reasonable and achievable expectations for everyone to know what to do, how to do it and to defined quality.

As I probed and questioned the gracious SNL people I tried to capture successes, gaps, and dysfunctions related to define what we want to be and how we do work. It is difficult to identify to which system (related to functions such as HR, QA, Operations, facilities, etc.) these observations apply as many are cross cutting so I won't be as good as you at considering my comments value or applicability. I know my ideas and comments do not address the entirety of SNL or even complexities of the people, documents and organizations I interfaced with, yet they might present ideas that could be applied to improve attitudes and behaviors. Below are some observation and ideas related to Defining the culture and processes/systems.

1. I could not find on the SNL website a high-level set of what behaviors the Labs want to see. Is there a set of documents that flow from LLT to the divisions to the workers that explain what behaviors and attitude form the targeted safety culture? Defining these would provide information for training, measuring and rewarding. I would have liked to read communication and implementing documents that include key ideas linking to SNL espoused values.
2. Perhaps the best information I found is from the Jan 2013, *Final Review Report Integrated Safety Management Implementation using Safety Culture Factors at the Sandia National Laboratories and NNSA Sandia field Office*. If this report is the conclusive set of SNL culture attributes, then it could be valuable to share these in a more compelling manner so everyone knows SNL model and expectations.
3. From a corporate level, I found little sponsoring more collaborative and integrated teaming of line with QA, ESH and SS. I am sure my data sources are inadequate and I have no basis to judge other than what I learned through interviews: however, reinforcing broader collaboration with

some collective accountability should be valuable in managing safety areas as well as quality and security. Such collaborations could be defined as expected SNL behaviors.

4. Setting safety goals is very important. The SNL Corporate ESH Goals for ESH as shared on the Div. 8000 websites are ZERO job related injuries or illnesses, environmental incident and fines, violations or penalties. Much has been written about setting goals that are beyond the absolute control of the organization. For example, the slips and fall injuries contributing to higher DART for most practical purposes are beyond the immediate control of the organization. Should there be significant belief that SNL really want to report zero injuries, then incidents with minor injuries might not be reported. ESH could reconsider goal setting from the leading side of the injury potential. All (or perhaps 90%) work planning for new research, operations, construction projects begin with long lead time, have a defined inclusive set of SME, and apply critical thinking to project management, QA, Safety and Security. This may not be close but it suggests targeting things we do, behaviors we expect and product quality instead of a result.
5. As mentioned in the training section about ESH Coordinators, defining technical and professional skills is important. Keeping this within Division 4000, each center could more robustly apply the HR100.2, *Develop the Workforce* process by defining competency program for the more critical functions. Some of this was discussed in Training. Consider clarifying responsibilities and accountabilities and then build competency through training and experiences to achieve these. I believe the line mission support and mission organizations from leaders through workers will increase trust of and integration of ESH, Safeguard and Security and facilities support when the line sees technical and professional growth. Such an effort will help counter the old perceptions or reality that ESH coordinators are not skilled and that the ESG coordinator role does not deserve a high level of respect.
6. A goodly number of people from line and ESH have expressed opinions and concerns about reporting. An opportunity to analyze and then define much more clearly the roles, responsibilities, accountabilities and authorities related to open, desired reporting as well as the data collection tools could improve lessons sharing, project improvement, and proactive management of some safety conditions.
 - a. ORPS functions commonly given to ESH organizations that might be better suited as quality function or a corporate governance function. Just placing it in ESH connotes that ORPS is a safety reporting tool when it has much broader application.
 - b. Reporting is often spoken of through the perspective of safety; however, in a more quality based view, SNL could benefit from wide spread sharing of best practices, ideas for improvement, near misses (safety, operations, mission support).
 - c. Divesting ORPS and issues management with its inherent reporting from the ESH organization will help negate the stigma of telling ESH something went wrong and then feeling retribution from line because somebody did something wrong. At the senior levels fear of retribution is understood as something that should not happen; however, at the worker level, this remains a strong attitude.

- d. Set reporting up for success with easy to use systems and processes. Consider reinforcing that line owns the issue and then assign for each ORPS or significant issue an ESH (or QA or HR or right person) expert to advise, research, and coordinate any reviews as part of generating the report.
- e. Current OOPS, NOTES, and ORPS appear to be used much less frequently than what industry is reporting as expected. When OPRS reports outnumber ideas collection or human error or process near misses, the concept of reporting deserves additional evaluation.

7. WP&C with Engineered Safety

- a. To diminish existing confusion about using engineered safety and WP&C, Division 4000 as the responsible line managers could revitalize emphasis on mission success using a planned and coordinated holistic effort to implement the principles, concepts and processes of integrated program management, safety, quality assurance and security will increase success. When the many divisions and subcultures learn the value of integration and corporate infrastructure drive its more uniform application, the positive results on safety should not only be visible, it should be cost effective.
- b. Engineered Safety and WP&C integration with safety basis for single conceptual process for planning (start to closeout) could build a common process for these two overlapping disciplines. Logic Branches for nuclear facility safety and high hazard safety can still operate within the logic structure for ISMS. The level of detail will be more for safety basis.
- c. The risk management process driving a prescribed number of engineering controls seems to present challenges in real world application, especially when resources to retro fit engineering controls are usually not available or planned for. This forces or encourages workers to rely on administrative controls especially in operations where work changes routinely. When this behavior repeats the critical thinking that drives engineered controls or better processes is lost. This trust in admin controls might affect how well the existing engineered controls are used, maintained and verified.
- d. Principle-based using engineered safety, systems safety and ISMS to drive thinking. Five-core functions are steps similar to plan-do-check act the help phase applying principles to the work or process activity. Build the process to force discussion and application of principles. Avoid setting up processes that drive selecting controls without using creative thinking and principles. The check the box mentality should not be an option reinforced or driven by the ISMS/WP&C process.
- e. As system safety term, asynchronous development, came to mind after discussion why so many WP&C and safety case process are different. Each or many groups are working on their own methods to merge in new safety concepts such as the more holistic view that safety and quality mesh with projects and the concepts of integration. Organization 4130 pushes forward on integrated training before the large WP&C group redefines the WP&C process. Division local training does the same while also responding the newer WP&C classes. The more each develops independently, the less likely these

will all merge into a common set of expectations. This divergence, also unfortunately contributes to more silos and less sharing of lessons. The SNL milestone for WP&C expects a product by the end of the fiscal year. If this effort could get a higher priority and more dedicated resources, the product could be out earlier and less asynchronous development will occur.

- f. Consider a few standard documentation formats to capture results of thinking and analyses. Seek to avoid data redundancy. Same could be applied with safety cases where identical or nearly identical work is conducted in multiple facilities under multiple leaders. A few good safety cases might replace many division specific cases.
- g. Get past compliance. Process could drive work excellence. Division 4800 safety staff ensure flow down of key controls from the planning activities into the work orders so everyone is reminded of the correct controls. This is a good practice. Their PTP processes drives critical thinking about work site differences, changes to process and personnel and changes to consequence severity or controls not correct for the hazards.
- h. Make the analysis tool electronic with go/no-go criteria to help assure data quality. The go/no go questions should be focused on applying safety principles and not be the tradition checklist stating PPE is needed. It could also be used to identify required analyses and forms.
- i. Structured yet flexible allowing users to build a risk-based result. Address the principles.
- j. Clarify selection and evaluation of controls applied from initial planning through project closeout. Current process drives a set number of engineered controls, which may not be reasonable for the given conditions. Set the principles for engineered control and consider justifying why engineered controls are not viable or reasonable. This applies especially to existing structures systems and components where leaders are not will or are unable to apply resources to re-engineer the system.
- k. Use the process to more rigidly drive using the hierarchy of controls. It's still too easy to drop to PPE.
- l. Most importantly fully integrated with project management, quality factors, infrastructure and security. I observed good efforts by people to achieve such integration using an expert based system. Most QA, SS, facilities, and ESH people I interviewed and the documents I read suggest this is a good concept that already has expanding effort and integration. The revision of work planning changes defined in Milestone 3.4.2 to improve engineered safety could consider the issue more broadly.
- m. The WP&C classes I attended taught by Center 4100 and line ESH coordinators were good, sparked engagement and helped normalize the techniques.
- n. Many thought it would be valuable to have a logic model to guide developing safety basis, high hazard and moderate hazard safety basis and other work planning and control. A visual mapping or flow chart would help guide critical thinking. It could link the planning activities steps to relevant principles. The effort to make the model might help identify what many ESH coordinators feel is a current system detriment—too much redundancy in thought and products.

- o. Consider structure based on project management with integrated safety, Security and Emergency Management, and QA. Apply the safety principles. Of course some of the inputs and analysis tool much match the function and the output records/reports will be specific in some cases, while the overall “case study” or whatever demonstrates the integration, explains the Why it is a reasonable approach, links to specific support tools and drives decision making.
- p. Division 6000 offered that research planning begins early with defined roles and responsibilities. Safety representation on the planning team is two-deep to assure continuity. Sometimes Division 6000 centers participate on other center teams for cross fertilization of ideas.
- q. A few organizations have responsibilities at locations other than the Division office. Interviews at SNL-CA and SNL-NM share that assuring effective WP&C is more difficult due to the separation as it is harder to integrate and share. One mentioned that achieving safety for SNL at other agency locations is difficult, especially at the University or the remote sites. How this is managed could be part of the WP&C process so that work planning is consistent. Effective implementation then becomes a routine “live it” activity.
- r. The Site-Wide Strategy for Safety Improvement (SWSSI) correctly notes the confusion expressed by many ESH coordinators about how to balance compliance requirements with principle based elements of the MN471021, *Work Planning and Control Criteria for Safe Design and Operations*. There is a corporate sponsored WP&C evaluation and revision team addressing the M3.4.2 that could lend clarity by defining in a manual revision that would align with whatever integrated product they develop. I frequently heard that there is much room for improvement and that whatever is decided it should not be just another layer of work or idea of the day.
- s. As an idea for getting more attention to safety and engineered safe by design make line Division remodel or instrumentation activities hard-wired to Division 4000 approval from E#SH and facilities) SNL has a well-managed deferred maintenance activity that finds and matches funding and schedule to a prioritized list of needed maintenance. Would it be helpful for Divisions to create a list of operations, equipment and processes that would improve safety with retrofitting or replacement of engineering controls? The list could factor into annual budgeting, requests for funding, and serve as a prioritization for end of year unobligated funds.

8. Role of ESH and Safeguards and Security

- a. Keep up the good training and communications on these functions. In keeping with the ISMS principle for clearly defining roles, merge what ESH and SS do as into other training opportunities such as those taught by the Talent Management group of HR.
- b. Consistently communicate WP&C, Engineered safety ISMS, reporting and other ESH related functions using training the trainers to live the process in the line organizations where projects are completed and risk is accepted. Although ESH organization remain essential to support consistent understanding and implementation of WP&C, the line

planer and leaders should be fully integrated in the process step. I have observed strong commitment with ESH coordinators in engaging the line in the concepts and supporting line planning. Of course some are better than others thus the need for defined expectations and training.

9. Define measures and metrics to confirm effectiveness of implementation, not consequence based results. As with most NNSA organizations and laboratories, we respond to the events and its consequences much more actively. Many DOE investigated accidents, including those here at SNL, have identified dysfunctions in assuring the systems and human aspects work well and remain working well. Division submissions on the Site-Wide Strategy for Safety Improvement (SWSSI) included independent assessment themes and division responses. Most had some form of independent and /or peer review, assessment of quality, and evaluation of effectiveness. These show me a strong commitment to fix what is found ineffective. To help sustain safe conditions and improvement, perhaps Divisions could bring in QA and ESH to set a few cross-cutting expectations and measures that show the behaviors around critical thinking, effectiveness of work documents and managing changing conditions remain strong.
10. The SWSSI plan has created significant improvement of safety awareness and processes at each Division level. The consolidated SWSSI report shows a wide variety of safety solutions and culture change activities have occurred indicating local leaders and workers are engaged. The many Division results are valuable and reflect the diversity of the divisions. The many different solutions to achieving the Theme indicate an opportunity for discussion what the themes mean and offering a bit more common guidance on achieving the theme. For example, evaluating safety cases is part of Effectiveness, Extent of Condition as well as Independent Assessment. None of these are wrong, yet the variety of responses makes it much more challenging to measure progress. Perhaps the Safety Culture portion of this SWSSI continues could reflect activities with workers and supervisors that more directly contribute to organizational change than conducting survey and, defining culture in PMFs and updating governance documents. Notice how Div. 4000 effectiveness is rooted in people over the documents. I thought the organization evaluating engineered controls hit a big risk management concern and showed people that engineered controls are the best path. Without a more defined corporate strategy for clarifying and defining behaviors there is less likelihood of converging into a more unified Sandia culture versus a continuing set of division subcultures. With an increasing value for multi-organizational activities, a more core, centric SNL culture has benefits. My personal preference is to more clearly define what is not working as well as what is working so that all level leaders have a more relevant perspective of their organizations. For example, for a division to say that WP&C is fully implemented when consistent maintenance of the safety base documents is not very effective leads to a sense of assurance that could be misleading.
11. Systems, processes, and worker behaviors are defined and implemented to achieve success become the basis for developing metrics. I have heard during interviews and observed responses to accidents that SNL is still reactive based on the event consequences. The

considerable effort demonstrated by the divisions in developing and implementing the SWSSI are indicators of both the reactive response as well as efforts to define behaviors including systems and process designed to prevent occurrence and/or mitigate consequences. In other words, to operation within defined safe conditions. These behaviors can be the kernel of leading metrics that will help an organization stay within the defined safe operation conditions. Consider developing metrics that help track how well an organization is doing the right things more so than defining measures counting success or outcomes. These leading metrics give people a chance to correct behaviors and processes before they fail. For example, in developing WP&C/Engineered safety processes define and measure how well the process is used and that critical thinking and principles are applied to all work is better information than counting WP&C completed on time or reviewed on time. A well-defined and executed process will result in current WP&C. With good WP&C there is less chance of incidents. So measure developing instead of completion as completed measures don't indicate WP&C quality.

12. SNL has a corporate process for committees. I was searching for safety committees, integrated issue management or other similar committees and had little success largely because I could not access sites.
 - a. It would be beneficial from a learning viewpoint for committees that do exist to post issues and solutions as part of lessons learned. I did find the Behavior Based Safety Committee (line led) observing that over 6 years there have been 3500 views of the website representing about 1.6 views per day from the SNL population of over 11,000. I have seen frequent update of BBS sponsored posting in some of the stairwells which I feel is great way to share and a commitment by the BBS folks. Not sure if there is a lesson learned committee crosscutting of the line organizations but it might help foster more open sharing. The LL website posting show many more posting in 2016 than 2015 or 2014, however, given the number of operations and MOW from which to collect lessons, there is much opportunity for improvement. Worker engagement efforts could seek more involvement with LL. I was told that lessons learned are too "tribal" in that lesson are shared within the tribe or silo and largely among a networked peer group. Peer to peer sharing is one way that lessons move between divisions.
 - b. The Division Operations Coordinators Council lead and primarily attended by ESH coordinators is a community of practice started a few years back by the ESH coordinators as a sharing group. Their expertise and commitment could be leveraged to help identify corporate safety issues and research options for improvement. The council could have more influence with increased leader sponsorship.
 - c. Division 1000 is sustaining the Workplace Enhancement Council and could post their achievements since 2013. Division 2000 has a Workplace Enhancement Center with website offering a few postings.
 - d. There are many committees focused at ESH functions such as explosives and pressure which bring subject matter experts and concerned SNL MOW together. These are largely participated with by 8000 and for some, 8500 has local committees. The NM-CA

teaming is valuable and appreciated. Active participation in and recognition of the value of these committees contribute to improve safety culture.

13. Engage the Div. 4000 workforce to merge Division 4000 vision with lower organization's visions and goals. Try getting the communications, quality assurance, project managers, safety, security infrastructure subject matter experts all discussing the same topic at the same time. A few topics perhaps worth considering;

- a. Increase use of measures and metrics? (Tools simple, leaders demand, communicate the why, train the how, etc.)
- b. Cross training for depth of skills and increased staff capability
- c. Issue management including corrective actions
- d. Open, voluntary reporting
- e. Database needs
- f. Building a link between needed engineered and facility controls and infrastructure demands
- g. Quality systems as part of everyday activity.

So many of the Division 4000 staff have huge levels of experience and motivation to improve systems and work.

Live it

These section is related to consistently doing the right things at the right time as you have defined them. That the tip of the spear are the highest level leaders whose behaviors and actions to meet culture expectations are always on display. They are the most significant models of expected behaviors.

Leaders at all levels model—either correctly or poorly—behavior and attitude expectations of their organization and workers. People see how leaders react to difficult situations. People recognize lip serve. They see accountability and how leaders own it. Fundamentally leaders must personally live the culture they wish to have as they defined it.

Therefore, this section more so than others reflects my insights, what I share from interviews and sometime just my beliefs. Just so you know, I do the same with my NNSA. I am proud to support the national interest by working at NNSA and for this detail. It is my goal to not be blind or silent about opportunities for improvement as I consider living the culture a personal leadership duty. Yes, I don't live up to it as I should but I keep trying. So feel free to throw me under the bus.

1. SNL is challenged to have a core culture when each Division has such latitude to do almost everything their way. The behavior and attitude expectations will vary widely as the corporate processes either support or motivate division uniqueness and individualized processes. I have seen many years (couple decades) of SNL success using this model so I will not judge its effectiveness. I will try to explain how I see this impacting the ability for SNL to define and live to its culture attributes.
2. Ask yourself if SNL is really 11 different companies or if being told there are silos and pockets of excellence means SNL is really one entity. When line, safety and quality staff members across the SNL explain the silos or pockets they acknowledge division's success while simultaneously bemoaning how difficult it is to share knowledge, skills and abilities, information, creative ideas, and lessons. I have heard much about the wide variation in Safety Case, PHS and ALW documents and drill down to hear that each division does it their own way with lots of interpretation of the *MN471021 Work Planning and Control Criteria for Safe Design and Operations*. When a division truncates the MN471021, believing it is too long and complicated, or developing documents checks the box, then SNL is diluting safety and value-based behaviors. Pockets of this behavior do not suggest that it is widespread or a common acceptable practice, yet such misalignment with what SNL is working to correct besmirches the SNL good name and what it means to be Sandian. These variations with pockets of excellence and silos, I suspect, makes it difficult for the Corporation to explain how it is moving in a common direction to change organizational culture.
3. In a similar vein, each of the research divisions do very specialized and unique work and have international recognition for the quality of this work. This uniqueness does not negate using common tools for research project management that inextricably addresses safety, security and quality. I believe that SNL can define common processes and systems that will contribute to division

research uniqueness or operational uniqueness while building strong commonality that can benefit from shared information and increased ability to collaborate across Divisions.

4. SNL could stress the need for leaders to know their people and processes. I am sure leaders have the principles and skills. Part of changing culture is linked to how these are applied, how often and to whom. This topic could be discussed within leader's circles at all levels.
5. Leaders are responsible for safety and all the systems, processes and actions associated with it. From the little I have observed this is easier stated than lived. ESH organizations, as well as the ESH coordinator staff, must be strongly embedded to help guide, resources and critique safety actions; yet, must not by actions or inaction let the appearance of having responsibility fall on the ESH organizations. This is not because ESH professionals including security and some of infrastructure don't want to do it right and assure safety is achieved. It is because this is a line responsibility. Line leaders lead, control resources, set priorities, manage staff members and so forth. ESH staff members must be fully engaged and accountable. Assuming the responsibility dilutes the leader's role and places responsibility without authority and resources on the ESH.
6. Communication is an essential part of working and leading. This topic has surfaced many times with good discussion about those that communicate well and those organizations and processes that can improve. Divisions could reinforce the collaborations that help each believe in each other.
 - a. Communications between centers and lower level organizations within the same division are not building teams so some departments don't know what the others goals are. This was common complaint from many of those interviewed mostly driven by an honest desire to know what is going on within their own organization. There was good effort between a couple divisions during the SWSSI to share expertise in external peer reviews which has endured through both networking relationships as was as Center processes. This has contributed to more understanding about what each other does and more importantly how they do it—better practices are shared. Cross divisional sharing should be encouraged and rewarded.
 - b. That a single consistent story from all SNL senior leaders to 'sell Sandia': branding, service the nation, collectively we are excellent would be very valuable. Again Division silos of excellence are valuable to align the division; however, when the silos retard scientific and professional inclusion, SNL is less able to capitalize on the many skilled professionals' contributions. Projects reflect inputs from all disciplines and stakeholders (i.e., ESH, SS, Research, IT, HR.)
 - c. I know I cannot speak holistically on communication as I have been engaged at SNL for such a short period. What I have been told and what I find—or don't see—on the SNL web pages suggests that the focus on communication could be increased. I have seen some division pages with strategic plans including Div. 4000 and these have a goal increased communication. The efforts Division 4000 is making by attaching a communication expert who is developing a plan with measurable actions and deliverables that target broad audience using multiple media methods will help Division 4000 MOW learn, remain

personally engaged and increase their willingness to preset ideas and concerns. I am pretty confident that other divisions and centers are doing similarly, or should.

- d. High priority, big pressure issues receive effective downward communications. Normal work and routine process information is not flowed down well or in a timely fashion. Items presented at division or higher level should flow down to center coordinators hopefully before divisions flow down to own people.
- e. There appears to be a very great opportunity for senior leaders to share much more frequently how their organizations are engaged with SNL corporate strategy and plans to increase awareness of what the plans are, progress in achieving plans and positive feedback and direction about how the desired safety, security and operations behaviors are improving how SNL does work. Because I am more connected within Division 4000, I can comment more accurately on what I see and have heard here. Some workers were frustrated that they were not sure where their division and centers are going. Some still question what their leaders' visons are and how each worker plays into achieving this vision. Quite a few have said they very rarely hear from senior leaders about how Division 4000 plays into changing the culture within SNL. As a consideration, use the higher level communications such as the Quarterly ESH Update to focus on the big picture. Let the ESH staff develop handouts and briefing sets that flow to line mangers who can talk about slips and falls or other specific hazards awareness.
- f. Division ESH coordinators and division leadership have recurring safety meeting as a method to share ideas and resolve problems.
- g. Center 4800 has been using behavior based safety as part of its safety management activities. When joined with other safety programs, BBS increases worker awareness and help build the reporting culture. Worker are better able to inform coworkers of safety concerns and the BBS logging system provides data collection. BBS could become part of the ALW system if used for increased awareness and openness. It should not be another separate program layered on top of WP&C.
- h. The SNL uses the websites extensively for sharing and making documents accessible. Update ESH pages. Better--relook the many interconnected but not planned ESH websites to evaluate consistency, centralize lists such as contacts, expertise, major processes. If not centralized, then Div. 4000, could flow down to the Operations division some standard communications--formats, reporting links, monthly safety stories, etc.
- i. Communication methods:
 - i. Culture communication opportunities in each building, on display screens, emails, porcelain press, talking points to division leaders.
 - ii. Talking points to mid-level center leaders about risk management as applied to their work, concept of "it's all integrated and each part must work"
 - iii. The vast majority of facilities I walked through have little to no visual communication of values, goals in safety or awareness postings or worse those are faded and outdated. Great opportunity to send fresh, relevant visuals to workspace.

7. Following the sled track accident, SNL developed the engineered safety concept. I believe as many others have told me that the concepts are valuable and will help safety. The concern expressed more often than not when talking WP&C is that engineered safety was rolled out with insufficient integration with then current practices and as another layer on top of work management. This contributed to many feeling it was just another program of the day. As counter to this, the focused effort by SNL Deputy Laboratories Director and champion of Engineered Safety during visits to SNL-CA provided the personal commitment and explanations to make it understood for that group. At SNL-NM the line divisions where it most applies implemented it in within their vision of how it should work. For reasons and implementations methods I will not know, I understand there was not good top to bottom communication of value and process such that it merged with or modified existing work planning tools to address the new principles. That is hindsight; however, it is a learning point suggesting that new versions of WP&C with engineered safety could be rolled out with a strong plan, clear schedule and robust communications.
8. As a new person to the safety systems just reading the documents on the websites, I found it difficult to understand what a worker's daily safety responsibilities are and what documents exist to tell me how to do it. Of course this becomes clearer with training. It might be valuable to have a higher level description of the ESH functions, and how the many safety organizations and their activities fit into the big picture of safety as part of a project.
9. What groups, committees, recurring discussions about culture change, WP&C, organizational alignment, issues are ongoing (fully chartered, informal, ad hoc) that could benefit from sharing with each other? Current web-based sharing tools could be used to consolidate the many different committees and work groups information, their goals, and memberships to a common few SharePoint sites so the groups values are better communicated. Their contributions of product and sharing of ideas are very important to the organization and their value increases when more can find the information.
10. SNL-CA has matured their Interdisciplinary Team (IDT) with great interactions for its leaders and supporters who are line people with support from safety, facilities and other functional staff. The IDT has become the voluntary go to group for seeking creative and considered outside opinions about what will work to do research as well as ways to keep research safe. It is an informal flexible arrangement that is so well viewed by peers and used so often that it is part of the SNL-CA culture. In SNL-NM some divisions have local teaming and research reviews. These are helpful and maturing but have not reached the level of being a natural part of work planning and problem solving.
11. There has been a wide range of responses to questions on how well and frequently leaders communicate vision, goals and expectations. Some are frequent to planned schedule, many are ad hoc to address current issues, and some are infrequent leaving staff members feeling under-informed. Leaders too silent on forward looking ideas and status. General belief that there is insufficient regular flow down of the look ahead plans or current status of current plans. Good communications will provide direction of change. I have heard the worry about sending too many

emails and having too many meetings just to share information. I can't agree that there are too many emails because it takes so many repeated messages for a person to retain a message. If the message is redundant to the person or they don't see value, they will delete the message. Meeting just to tell information that could be emailed are frustrating. Make efforts at meeting to seek engagement, challenge ideas, guide performance and have attendee participate in problem solving. In the end, don't give up on the dialog because some complain. Use your metrics to help determine when and what needs to be discussed.

12. ESH Coordinators are definitely a front line resource to the divisions while simultaneously serving as the eyes and ears of ESH. They are also a voice for sharing safety culture behavior change with the divisions. Division 4000 could capitalize on these skilled safety professionals with a coordinated push to reaffirm ESH expectations, seek crucial feedback, motivate reporting, and present a common safety message across the SNL. Develop ESH coordinators, whether funded by line or Div. 4000, to be safety integrators and emissaries for behavior and attitude change. Use the diverse Division 4000 expertise and resources (team with HR, IA and training) to strategize and develop tools handouts, guides, etc. to support ESH coordinators spreading the actions of Safety. Lead ESH coordinators to be the safety culture change agents to share division efforts and promote Div. 4000 and SNL LLT goals.
13. A few examples where the system and the people are living their processes. A trip hazard caused by sidewalk expansion joint material sticking up such that it could catch shoes was reported with help from Div. 4000 office staff. It is very good that the maintenance system and staff acknowledged receipt of the email notification and that they reported back status and completion. Follow up was timely and friendly. In a similar vein, someone reported that an electrical panel was blocked and the next day Center 4800 safety staff member visited the location. The WP&C training staff are engaged seeking better methods to capture the meaning of WP&C with engineered safety in their outreach courses. The SWSSI is active and the September 2016 report reflects strong contributions from the many players across the Divisions and within Division 4000. I met with many highly committed ESH coordinators in the line divisions who explained their methods for assuring safety is a fundamental aspect of research. Collectively, SNL members of the workforce are well aware of the safety programs and are working to be safe.
14. This website has very little information on where SNL is headed with safety culture change. Might be a good place to put logic charts, templates for Safety Case, WP&C, etc. Of course cross link to source document. Within Division 4000 there is a much more focused effort in actively shaping culture than I heard about other organizations. I am sure I know little about the other Division efforts. I believe the Div. 4000 strategic plan will help increase communications and guide defining behavior expectations. Some did say that Center 4100 would benefit from more internal discussions and top down communications. It is too easy for a service organization to look outwards and sometimes miss the opportunities to share with the in-house service providers. More internal communication and learning about upcoming safety processes, culture expectations, and progress updates would be helpful so Center 4100 can better support the labs. A thread also rose that people

did not know what their sister organizations are doing. I have less feedback on 4200 and 4800 communication effectiveness. I believe Center 4200 outreach to the labs around security and emergency management is strong. From a Center 4800 safety implementation perspective, I observed a strong commitment to keep staff and contractors safe, much field interaction with contractors, and good discussions on work planning. The ESH staff in SNL-CA were comfortable with their closeness and frequent interactions. Their methods of doing business with diverse skilled teams representing infrastructure, QA, safety and operations to manage local concerns has over time, they explained, to very open and effective problem solving. Obviously their smaller size and location are a factor yet their success in largely because the leaders encourage the discussions.

15. Can SNL publish who is on the work group improving the Work Planning and Control/Engineered Safety processes as is done for ES&H coordinators and Division leaders. This would help improve feedback from the line implementing organizations and MOW as they would know who to talk with. Site could provide an ideas/reporting tool if one does not already exist elsewhere. If it exists, make a link to it.
16. The relationships between line research and their operations support resources with regards to planning for integrated safety and security from early project inception are not very clearly presented in MN 471021 and could be in section 4.2, Establish a Work-Planning Team. I believe that the long term value in stressing the need to meet early to define projected scope of work and major research, operations, facility and safety needs. Have heard that when this does occur, it is often too late to more effectively engineer in safety controls. This results in continued use of previously existing controls which may not be current or as effective.
17. "The real reason for safety is not what it costs but what it saves" is a good communication thread. It could help leaders understand the loss of productivity costs and injury costs are great and usually avoidable with prudent spending on safety. System effectiveness and reliability often increase as more effort is taken to engineer, plan, and conduct work safely.
18. Take down all posting that safety is #1 priority. Replace with something like Mission success takes all--operations, safety, quality, and security. Safety is inseparable for success.
19. As part of learning and leader discussion among themselves and with organizations, have open discussions about expectation for sharing what is broken, issues and ideas. Base this on the typical behavior for people to be reserved in speaking up, most often expressing things in a manner they think the boss wants to hear it. Filter statements to reflect personal goals, fears or their reality. How the leaders accept these comments drives immediately how workers respond and present information. Similarly, communications down chain are diluted, subtly altered to reflect the attitudes and beliefs of the manager chain. By the time it gets to the workers the intent is often blurred. Corporate communications for important topics help maintain consistent communications. Communications should be planned.

20. The connectivity between the various organizations is poorly understood. SNL could clarify who supports what missions and how. This would be refined with teamed participation of work planning.
21. Ongoing dialogue is developed between the leadership and workers about safety issues, thereby maintaining an ever-present awareness of the importance of safety in the way things are being done.
22. Overall I see good commitment by Line Managers integrate safety into every activity of their groups. Most of this opinion stems from ESH coordinator inputs about leader walk downs, meetings, and local issues management for safety topics. I was able to talk to a couple dozen or so mid-level leaders and staff members to learn their views. There is good commitment that can be applied to improve the processes and quality.
23. Safety communication is supportive, proactive and consistent with ISM and other safety activities.
24. Need to build near miss reporting. Do not respond initially to the avoided consequences or loss, rather recognize the person for reporting. Act to resolve the issue and report back to build trust.
25. ESH Coordinators: There are background noises within different divisions as well as within Division 4000 as to the varying levels of respect and effectiveness of ESH coordinators, their ability to support and engage with line managers and work planners varies. I was told by a few that once trust and respect are earned then involvement becomes much more seamless. This impression can be changed with competency training, mentoring and getting more engaged with the line activities and people.
26. For perhaps greater efficiencies with the SNL corporate training budget and sharing of knowledge, the DOE National Training Center and the HAMMER training facility sponsor the DOE Training Institute as an enterprise wide common training resource especially for safe guards and security and ESH training. It might serve SNL well for an ESH training manager and a SNL corporate training representative to investigate opportunities.
One of those interviewed noted that organizations might work towards operational excellence as a forward looking goal instead of focusing on risk which is hard to define.

Measure It

Most people I talked with would really like help in setting up metrics and methods to capture data. They see a need and will support. Many feel there is no process or topics declared for tracking. Some also see value in more targeted internal assessments and management assurance reviews. I felt that overall people wanted assessments that would help them do their jobs and if it didn't do this, people did not have extra free time to support.

Some correctly felt that most metrics and data collection are driven by DOE directives, some without true understanding of local realities and some without understood purpose. It would be beneficial for SNL and NNSA to more carefully select measures based on the behaviors expected that cause or directly contribute to the outcome, instead of measuring the outcomes. That metrics are important to an organization's "situational awareness", to borrow a safety and security phrase idea, is more known academically than through local application. A frequently expressed concern that it is challenging and difficult to develop and implement measures, should not dissuade higher level leaders from setting expectations nor line organizations from developing local measures. I did notice how many strategic goals include some form of quality assurance metrics. I did not try to track down subordinate level metric alignment with LLT expectations or their flowed down metrics. Metrics driving the behaviors will help an organization improve, while evidence shows that lagging performance indicators are often inaccurate and counterproductive to positive reporting and change. It will remain a challenge to define metrics until there is a clear understanding of how corporate visions and expectations apply to line organizations and then these are defined in terms of behaviors, which are part of processes and procedures for individuals and work groups.

One could consider defining metrics that capture data on some key behaviors (clearly defined, trained and lived) that are precursors to safe performance. One example receiving much discussion was infrequent reporting of concerns, near-events, and events (both good and bad) as these can help forewarn of larger often systemic issues or proactively contribute to improved processes. Most notably was the difficulty felt in reporting and varying continued concern about such reports not being well received.

1. After looking back on my decades of safety service, I will be the first to say that measuring performance is the most emotional and most difficult to achieve. We are dealing here with personal feelings and emotional responses to criticism. No one likes to be told their programs are not working well; that communications are in need of improvements; or that people aren't doing what everyone agreed to do. Add to that the human nature to blame and one-up over the next organization. We continue to place little effort on knowing how well we are doing.
2. A few people stepped up to offer that their organization had a strong aversion to publishing their 'red' status items and that they were aware of people changing reporting results so the organization would not appear red. There are many reasons why no one wants to look bad. The

learning point that you all know is the attitude behind bad or red. The person also recognized there was little transparency and the organizational leader was not trusted. Although I believe this is not the norm, we have evidence that open reporting of deficiencies, errors or problems is also not the standard behavior. Human emotions surrounding negative content reporting will always be a leader's challenge.

3. These emotional traps will never be vanquished; however, when the target of measures and metrics focus on attaining performance shifts, more people learn to appreciate the values of metrics. Division 4000 staff members with responsibility for measuring and those with prior experience, often in the private sector, recognize the value of monitoring where the organization is against where it planned to be. In line with this culture change model, how success is defined—Define it. I see a willingness to increase using metrics. Simultaneously I see confusion and concern about how to define a metric.
4. Goals sought without following your core values skew behaviors. If the goal is really a “number” that is tracked and considered very important by senior leaders, then those leaders by and large will have that “number” reported to them. This creates or at least reinforces behaviors to meet that “number” often in contravention to the stated organizational values. Then workers don’t own the value, which directly translates to behaviors that are not living the ideal value. It follows then that the value they are living is not aligned with the true values necessary for mission excellence. From a human performance perspective, workers who have been retaliated against, demeaned, or disrespected are jaded from reporting conditions not supportive of reporting anything, even good efforts.
5. So what do we do about it? Flip the cycle. Make measurement and improvement a demonstrated value that is rewarded and acknowledge those reporting regardless of the report or its consequences. Develop the attitude that self-assessments are to be sought after as essential to process improvement. Motivate capturing data on the behaviors—expected and communicated—that contribute to the desired outcome. Of course we clarify and teach the behaviors helping ensure congruence with values and similarly the goals.
6. The change must start with senior leaders. By and large, the most pressing comment I have heard from a wide range of functional capabilities and duty responsibilities is the ongoing desire to have much more leadership engagement in communicating expectations and progress toward corporate and division goals. Set the standard of performance with valuable engagement. A common short criticism received was ‘walk the talk.’ Contrarily, leaders who are engaged received very positive comments about their willingness to listen, frequency in visiting the work places and more frequent communications.
7. This requires leaders to improve their openness to fully accept and address the results or reported conditions by fixing the behaviors that lead to proper performance and organization functioning. It does not at all mean that the leader has to like results of measuring or having to

be accountable for the conditions to their higher ups. They do have to demand to know the actual conditions, lapses or mishaps that could or did lead to unacceptable consequence (or even more positive outcomes), and how well expectations are being met. It is definitely a challenge to change a personal behavior yet leaders must do so in a very visible way accepting responsibility and accountability for what went before and living to future expectations. One noted that more leaders, especially first-line supervisors are not grasping for help from safety or any of the other mission support function including QA since leaders have the responsibility and often not the time nor skill set to address the safety concerns.

8. I have heard the VP for Division 4000 say a few times that we defined what success is for my detail, which drove this report. Similarly, what constitutes success for behavior and attitude change can be defined. It won't be easy however, it is necessary. Seeking inclusion, some of this effort suggests using leadership ideas, corporate governance, IA, Div. 4000 and others. What to measure is a definite challenge and it is equally hard to craft a clear metric. Some safety articles I have read lean toward a mix of leading and lagging metrics or indicators of about 80/20. In the NNSA world where we have used so many lagging indicators, it might be valuable to slowing increase use of leading measures. The leading indicators seem to work well when aligned with how well a process is being implemented, trained to and lived more so than looking at the results. The measures warn or confirms that the set or processes is working and that the expected behaviors are being used to drive the results. Measuring the result is a lagging indicator just showing where you are and not how you got there.
9. Division 4000 has an opportunity to clarify what key activities are essential to safe operations, improving behaviors and attitudes, and achieving the Division 4000 strategic goals. Work with 4100 assurance staff members and the 4000 quality assurance experts to define desired results and then publish and track performance using metrics. Some of these metrics could track how well the organization trains, defines expectations of safety, behaviors and attitudes, lives the defined actions, and rewards progress. It was refreshing to understand that some staff members have private sector QA experience that could help Division 4000 more effectively apply QA and metrics.
10. The SWSSI has enough institutional awareness and leadership support that it could form a basis for capturing data for indicating site wide behaviors that could become metrics. Effectiveness of implementation can be defined and tracked. Should specific attributes of culture be clarified and behaviors defined more precisely, how a division works to achieve these behaviors would be a valuable indicator. Because many already participate in the SWSSI process, it would make inserting metrics more seamless and easier to accept. Of course don't make the SWSSI a new layer of safety when the daily operations include safety and this is where many behaviors manifest.
11. As an example of measure it, the SNL HR metric on researcher GPA that is so sensitive with the research community as an indication of the great things they are doing is perhaps

misrepresenting of the worker's skills and doesn't truly indicate performance behaviors. Yes, those with high GPA got good grades which is an essential, strong factor in hiring but does not show the 'whole man' concepts espoused in inclusion or diversity. The grade does not reflect the behaviors and challenges overcome by the student which might be equally valuable to the SNL. It does not consider being a student as an after work career development activity or how many hours a person spent as a technician in a lab before embarking on continued education or even work experience. As a more leading indicator of potential success at SNL, the metrics could reflect both leading and lagging. Leading could be some simple measure of how well the hiring body applied an SNL process for evaluating an applicant against a range of knowledge, skills and abilities needed to achieve success in the position. Factors could include experience depth of hiring team, clarification of hiring skills, what they did to 'sell' SNL, their beliefs on how well the interviews went. This is much more subjective but could be team self-evaluation or the view of the deployed HR representative and line leader. The lagging metrics could be % of new hires and % on current staff hired with greater than 85% of the targeted knowledge and skills. This set of measures would better predict success. From my discussion, I also think it would allow more effective comparison between divisions and mission support organizations about hiring quality as so many noted that mission support staff members that they bring lots of experience and maturity that are not captured in GPA from 15-25 years ago. The perception that SNL tracks at high levels only GPA for research scientists is thought minimize the skills and contributions of non-researchers.

12. Similarly, in the safety arena where work planning and control and engineered safety are key processes, it is misleading to track how many Safety Cases are developed or whether each is current on the WP&C website. These tend to be lagging indicators that do not address the completeness of document development in using principles and critical thinking, effective use of engineered controls, development team skills and quality of final product. It was suggested that WP&C review criteria be reinforced and applied as a metric to gain insight as to how well the WP&C system for safety cases is working. QA staff members at SNL-CA spot check safety cases for quality and seeks correction when issues are identified. If significant safety training is to remain optional, it could be a good leading metric to trend by each division, participation in optional safety training by leaders and technical staff. One could infer that more people learning the common SNL methods and processes will equate to more consistent and thorough application of WP&C concepts essential to safety behavior change.
13. The concepts of Behavior Based Safety used in Center 4800 are essentially leading indicators as these measure involvements in doing and improving behaviors; not the end result of work. This is very important because products are usually built without injury. Just tracking safe delivery ignores the many near misses and many opportunities for improving safety that are misses without looking at the behaviors. Of course BBS is just one of a suite of controls. How work is planned, communicated, executed, modified and closed also present opportunities as leading measures of living the defined processes.

14. The demand on IA to perform line-level assessments is large and I would suspect that with current staffing is strained to cover all its responsibilities. Their independent reviews provide valuable information to the divisions, yet it is not enough to give the line or the Div. 4000 functions adequate awareness of line safety status or process quality. The ESH coordinators could have more defined criteria for doing safety audits of processes, controls and worker topics. Setting common assessment themes and criteria will support measures and metrics for safety quality. The results of self-assessments from each division could be shared to show others what is being done and what is working within the assessed division. Any assessment would apply the SNL corporate processes in CG100.6 series especially CG 100.6.13 for measuring performance for management activities. A key point could be to define a few common measures and assess across all divisions. I am not sure how the governance and IA organizations are participating in helping improve the safety behaviors.
15. The Sandia Performance Scorecard shows the necessary indicators for TRCR and DART-CR. These might be all that is needed at the LLT level. Add to these some lower level measures that more clearly show what is being done and where there are opportunities for improvement. The DART is a difficult measure to manage as the injury results are so unpredictable. One fall could result in dirt on knee while another person at the same incident could require surgery. This suggests that at a division level that actions to keep the workplace conditions safer and to proactively communicate and control risks would be good indicators for injury reductions.
16. It was refreshing to hear how many interviewees really wanted to know how well their units were doing and what they could work on to get better.
17. There is much good data in the DuPont *Present-State Safety Culture Assessment, 2005* and its follow-on 2014 survey data especially the questions related to engineered safety. Center 4100 is reviewing the question set for the 2017 DuPont culture survey. I was asked to develop a set of questions and tried to focus more on behaviors, engagement and application of safety principles as I felt these will help you understand application of WP&C and behaviors. The results of additional question set might help you consider what you can do to change the behaviors to your defined or expected behaviors. The actual response options hopefully provide insight into how people participate in the SNL systems. The questions are included in this document at Attachment 2: Potential Questions for 2017 DuPont Culture Survey. As with any survey, the challenge is to compare the response results directly with SNL efforts to cause change around the surveyed topic. Without this link, it is hard to tell if, or how, what you are defining and communicating are driving the change or if change is just happening.
18. The SNL QA video, Developing Good Measures and Performance Targets published April 2016 is very clear and a good tool supporting CG100.6.13. It could be a good introduction to division level discussions about what to measure. The video advocates for quantitative measurements which avoids opportunity to measure attitudes, which many say cannot be measured. If part of

culture change involves attitudes, then measures could be developed to help show positive change in attitudes toward a desired future state. These may not be quantitative yet they do give leaders necessary feedback that should not have to wait for some big external survey. Locally, if nothing other than a show of hands, ask if the environment is getting better for open reporting, accountability without blame, work fun, are you getting the resources you need (and requested), and are your contributions being respected. As part of a meeting, just ask the question. One could get a feeling based on more/less or a high/moderate/low measure just as used for SNL corporate level displays.

19. A few targets of opportunity for metrics.

- a. Not meeting planned delivery schedule such as divisions doing internal assessments, crucial document revisions.
- b. Number of exceptions approved divided by number of exceptions to corporate governance requested.
- c. Set a standard for initial planning for research and operations future work so that it is early enough to allow facilities, safety, safeguards and security and other functions to interact with enough lead time to properly support research.
- d. Track increase in amount of reporting. See the SIMP metrics as an example.
- e. Attendance at optional safety training or other development training (any learning activity would be good such as the many SNL sponsored symposiums or Division 4000 sponsored events)
- f. Quality of work planning.
- g. Mission work being planned using multi-disciplinary teams.
- h. Use of metrics at 1st and 2nd line levels. This flow down is difficult to see in the CG100.6 processes.
- i. Metrics for competency development aligned with competency program would be helpful in motivating learning as well as giving some inputs for training and travel budgets.
- j. Until a single LIMS is fielded or requirements for using TEDS increases, motivate increased use of TEDS by measuring division training management compared to SNL TEDS.
- k. Tracking how project milestones are met by owners and not having milestones extended without approval by senior managers. If metrics on completing assigned work and milestones on time is reported, then it is more likely people will meet deadlines.
- l. Measure ESH involvement with Divisions research and operations such as early contribution to new research planning or involvements with operations and facility changes.
- m. Fire Protection impairments limited to 2days with compensatory measures.
- n. Incident debriefs within hours not days.
- o. Teach metrics.

20. There are many separate tools supporting reporting including Security Incident Management Program (SIMP), OOPS (311 call), AIS, ORPS, SITS, employee concerns SF-2001-QC for reporting concerns, or the Center 2700 near miss/ lessons learned reporting tool. I think the organizations are working to capture information and would believe that simplifying into a few tools linked together to guide the process could make reporting easier. As a MOW, it may help to go to one site regardless on division affiliation, state the issue or concern and then be guided to OOPS, ORPS, SITS, LL or whatever flows from the event. ORPS entry criteria is typically based on consequences and I see it less likely that a MOW would now how to characterize so it could help if the system linked an ESH person with the person reporting. Similarly, the process would guide a near miss or best practice to the correct subordinate tool and ESH SMEs. Many from the line organizations appreciate the simplicity of SIMP, Center 4200 responsiveness, and that the goal is resolution over finding error.
21. As an extension of Center 4100 assurance needs, the ESH coordinators could merge their local safety assessment activities to also address Center 4100 assurance needs. Having common basis or criteria for a few, not many, corporate-level safety program metrics will be a large step in breaking down the various divisions silos. That said, interviewees note that the transparency and sharing within the ESH community is much more mature than most Division to Division interactions they observe. The DOCC could be a partner in developing these cross-cutting safety assessments as could the Center 4100 assurance section and 4200. Similarly, senior leaders from 4000 and 4100 and perhaps research and operations divisions could share with the DOCC more frequently about values, updates on where they are leading safety, topics of concern and anything that could help the DOCC better model and support corporate safety expectations. It appears that this group has endured for many years without it becoming a fully engrained tool for sharing between senior safety leadership. It remains a great resource among the ESH Coordinators.
22. Although I do not have access to metric information or assurance processes I have heard that Security and Emergency Management has a more mature quality assurance process. This is an opportunity for sharing with Division 4100 assurance processes.
23. Risk and risk acceptance is very hard to clarify and achieve yet it is an essential factor in business operations and more so in defining safety. I can't give any reasonable ideas for risk metrics and believe the topic deserves measuring. Perhaps measure the conduct of risk management as a way to know if and how well risk is analyzed and if actions are taken to manage residual risk.

Reward It

Most people work best when they are respected for what they contribute and have some form of reward. Everyone needs money; however, as you have heard many times, it is not sufficient to cause a person to change behaviors or attitudes. Of all the sections, Reward It, is the most repetitive of your many professional development learning opportunities. Human Performance Improvement principles include rewarding as a key concept in changing safety attitudes and behaviors. I did not directly ask people I talked with about rewards, yet it often was discussed. Most comments reflect on SNL document reviews and culture factors.

1. Rewarding is so important. Rewarding should be consistent with the values, attitudes and behaviors leaders define in their journey for culture change. Encourage a wide range of personal recognition and rewards for people doing the right things. Be cautious not to reward a positive outcome that was not achieved following the processes, systems, behaviors and attitudes that SNL considers attributes of culture change.
2. Types of rewards and recognition vary depending on what works for the individuals—how each likes to be rewarded. It's about the people more than being some measure of how much a corporation reward folks.
3. The theory behind recognition and rewards align with some HPI principles taught at SNL, which reflect what works well in helping change human behaviors. Of note are peer-to-peer recognition and honest leader feedback. In the long run it is recognition for doing a tough job well and providing benefit to the bigger ideals clarified in a culturally-held set of values.
4. The HR100.3.3, *Request and Fund Recognition Awards—Non-monetary* and HR100.3.9, *Determine Compensation and Non-Base Awards* are an important part of recognition; however, money is not a long term motivator of strong performance and does little to reinforce correct behaviors. The continued leader awareness at all levels and acknowledgement of good behaviors is more important in making people feel they are respected and valued. Give it the personal touch.
5. Most corporate programs and divisions have recognition awards procedures. To name a few,
 - a. The Senior Fellowship awards as posted in building 800
 - b. ESH Star pins awarded by Division 4000 and Center 8500
 - c. The ESH coin for contribution to safety
6. Some divisions have model recognition forms, parallel to SNL policies and similar rewards local to the divisions.

7. There are personal intrinsic rewards in actions such as leaders Stay Interview, which builds respect through honest communication about what is working and what is not.
8. The leaders at the Division 8000 ABL are actively recognizing the workers for achievements and contributing ideas. They have current electronic displays of people and their accomplishments. People are publicly and personally recognized for their engagement in team efforts as well as individual accomplishment. I was impressed with the leaders' attitudes about rewarding and their philosophy and actions could make good discussion.
9. Found a tidbit that is pretty good at hitting the high points with each actually being a reward to the receiver as each personally reinforces the value of the individual and team. What leaders say to their people.
 - o Thank you
 - o What do you need from me to make this a success?
 - o I value your contribution
 - o What did we learn from this that we can use next time?
 - o I have complete faith in you
 - o You've done a great job
 - o What do you think?
 - o How could we do this better?
 - o Do you have the capacity to do this now?
10. The HR department videos supporting employee recognition are good and deserve wide spread use. It would be interesting to know readership.
11. The posters (preferably current) that could be shared around the campus reward people for their work. It is helpful to identify the organization, and who the team are and their contribution. It's almost humorous to see pictures from 19xx—"early Sandia" of secretaries, as they were called then, wearing clothes and shoes from the early 50-60s. I stand there and think of how much has changed—yet simultaneously—that little changed. Each beamed pride in their smiles and I just bet they were as proud then as we are of the great efforts and successes for national security. A photo is easy and of much more value than the cost of printing and posting. Rotate them like artwork.
12. I know emails get broad distribution when people are recognized by SNL or outside entities. These are helpful yet quickly fade from memory. Continue to reinforce these award through leader actions at all-hands or more impressively a visit to the awardees office. Short drop by for a "thank you and well done."
13. Rewards can be inexpensive. One newer leader arranged tours of SNL facilities and work for the team as a way to build understanding of the integration of mission support with mission work. This is not only engaging but a reward from the leader as recognition of individual value.

14. Reward desired behaviors, not only team success. Peers thanking peers and first line managers appreciating their team, rarely formally, for helping do the right thing or contributing to safety and security or whatever is so easy and costs nothing. In fact, it actually pays back the leader in many ways.
15. Center 4100 has received a few positive comments about their responsiveness to deployed ES&H Coordinators and other line requests and of how valuable the Center 4100 staff members in addressing safety concerns. Feedback and improvement indicating success should be shared more frequently with individuals and organizations.
16. As an indication of poor rewarding one interviewee stated, "I was hired because I have skills and do good work. I am a professional. We are 'Treated like Kids.' Why everyone is treated the same. Recognize our skills and empower us."
17. As self-reporting is a very valid behavior supporting organizational culture change, consider this a high visibility topic and recognize those many organizations showing steady increase in reporting without concern about the subject. SNL could increase reporting participation by seeking simple information that is not closely linked to what people now are reluctant to report. One could publicize and track reporting of ideas for improvement or things Divisions are doing well. As people become more familiar with reporting tools and its ease and are acknowledge by leaders at all levels, and trust built be leaders' responses and closure increase, then seek more difficult reporting such as personal near misses. Trust is hard won...Reward accountability.
18. I was told that a really good book for understanding how people best accept recognition for good work is the "The 5 Languages of Appreciation in the Workplace," by Gary Chapman and Paul White. It explains types of appreciation including words of affirmation, tangible gifts, quality time, acts of service, and work appropriate contact. I trust that the SNL leader development organization have "go-to" professional development books or references address rewards, negative reinforcements, and motivation. Seek advice from one much more knowledgeable in this area as it is not my strong suite. I do personally know what I like for recognition and what has embarrassed or made a friend a target for discussion based on some award that was given with good intentions.
19. As a follow comment from a senior leader related to rewarding, continue to reward the positive behaviors yet be cautious of telling an organization, function or person that their products are so good that they start to believe there is no room for improvement. Such is not nor ever will be the condition as goals, social times, priorities, resources and technologies continue to change. Make continual improvement and organizational learning an ongoing part of performance. Reward the desired behaviors and be astute in rewarding the products. Rewarding products, like lagging indicators, is a snapshot in time. Doing well today does not necessary mean tomorrow will be good. The behaviors of diligently applying processes and systems are better

Reflections on Culture, Work Planning, and Metrics at SNL

indicators of future performance. Don't let telling someone or group that they are so good diminish their drive to be better.

On SNL Culture

As an introduction to this section, let me relate a story. I told a management assistant of a fun read. I didn't tell her it was about culture change. As she saw the title she replied, "this is a fun read?" Of course I told her it was written to communicate and is really good. After reading the first bit she agreed and then explained here are Sandia they send you to a class and expect you to cause the change. They want you to think it is driven by the workers but it is not. The leaders have to lead it and that's not done well. Acknowledging this, I then told her each of us has to play our parts. We must work with our peers to help cause the change. You know you have to talk about it and help your coworkers do the right thing. To this, she quietly said that you can't do that because everyone lives in their own space and don't want any outside influences or suggestions for change.

Of course you can see her point and probably have some affinity for it. However, major efforts at SNL are helping to shift the culture. This work is very good and deserves continued support at all levels of leadership especially, in my opinion, the mid-level leaders who manage the daily budgets, work and people. Their actions, how they Live It, are most telling about how the organizations are changing behaviors and attitudes.

All the strategic planning, Site Wide Strategy for Safety Improvement work done by divisions, and training will fall short if leaders lose focus and mental energy. Ask, "Are you living the SNL culture expectations?" Your communication efforts targeted at the culture change must keep this alive with the leaders as well as the workers. Significant improvements would arise if division leaders had or worked together to create a similar view of the culture they desire. Follow this with cross laboratory teams to define these and processes needed to achieve them. Reinforce the 'why' we do what we do.

There are many different lists of culture traits, organizational effectiveness principles and similar. However, because we work in the DOE Enterprise, we should consider the ISMS terms. Culture is defined: *An organization's values and behaviors, modeled by its leaders, and internalized by its members, which serve to make safe performance of work the overriding priority to protect workers, the public, and the environment.* DOE Safety culture focus areas, not comprehensive, are leadership, employee/worker engagement and organizational learning. These break into supporting attributes that are in mind frame of reference when looking at systems, processes and people.

1. Leadership
 - a. Mission vision
 - b. Planning
 - c. Communicate
 - d. Measures to help guide change
2. Employee Engagement
 - a. Participate
 - b. Communicate
 - i. Peer to peer
 - ii. Reporting

- c. Support work processes
- 3. Organizational Learning
 - a. Questioning Attitude
 - b. Sharing
 - c. Personal growth
 - d. Inclusion for better solutions

I have not been privy to how leaders are leading their colleagues so this might be just a shot in the dark; however, this condition is so widespread across the Enterprise that it might have value at least for discussion and understanding where your organization is. Many of us feel we must wait for direction and must have senior level approval of most decisions. From a cultural perspective this is stifling. Leaders can help manage the abundance of tasks by empowering in the true sense competent staff to use self-direction, autonomy and their creativeness. Set the tone by assuring people make decisions after asking "is it safe?" and "is it the right thing to do?" and understand the boundaries for which each is responsible.

One of the biggest lessons or ideas from my research and discussions is an overwhelming belief by so many employees that the Divisions have so much (or too much) autonomy and ability to shape the corporate standards that it adversely impacts effective SNL organizational change, especially as it applies to safety culture. Having common visions and a cohesive corporate path to improve safety that Divisions really own and lead is impeded by the strong silo cultures of these divisions. I would suspect it challenging for a division to change without its peers changing because there are so many common systems shared at the corporate level with even more Division specific systems competing with those corporate systems. For example, the internal assessment organizations are said to not have transparent access to division work and the divisions performing assessments do not have to publish findings (pro or con) from critical self-reviews on a common SNL issues management platform. This silo condition, as long standing as it has been, will not go quietly into the night without significant senior leadership attention. This comment is not to say that division authority and semi-autonomy is wrong. This model has worked for decades in achieving research results. My intent is to show an area where the model has perhaps inadvertently created barriers to change, especially to change lead from the corporate level. The silos nature might also impede understanding corporate understanding derived from its internal assessment activities or wider reaching activities such as employee concerns and reporting.

After interviewing so many people throughout SNL Divisions and organizations, and comparing their feedback to what I have learned about current business practices and what tools are available to modernize I realize that NNSA and its contractors including SNL are very challenged to bring the complex up to industry standards. I feel that we are not modernizing systems as I noted in the Define It section. One distinguished member of staff, with true concern, noted that the lab is 10-20 years behind the times. I look at what the DoD Air Forces is doing with AF-wide ESH information management tools, and what I did in 2000 to have a single comprehensive ESH database tool for all ESH functions and operations, and I wonder why the renowned SNL does not have more modern tools. I would be curious to understand the DOE/NNSA perspectives on this as a goal and a funding topic and similarly how the

Labs vie for substantial system changes and strategic funding. I know such a large scale implementation of a corporate-wide ESH tool would be resource intensive, yet the payoff would be huge. If the tools and attitudes about them are largely outdated and difficult to use, then changing a culture to be reporting, self-reflective, and learning could be equally challenged to be their best.

SNL culture is rooted in old principles or beliefs that for a division to be successful and respected, because of its uniqueness, it had to manage its own work activities. Thus the definition widely used term at the labs—silos. This has led to SNL having: 164 different WP&C tools of varying maturity; multiple databases and spreadsheets for training; separate reporting, issues management and corrective action processes; expert based systems probably stemming from one to a few SME responsible for activities; and, poorly identified liaison pathways between other divisions including the important business management divisions. More importantly to me for this review are the existing cultures of divisions to the Division 4000 functions. For example, SNL was working to a single recognized rad worker I training program and after a training self-assessment, found three others recognized with the laboratories. These variations on a theme, besides typically costing much to develop and maintain, appear to dilute the SNL corporate vision for achieving a common safety culture as a subset of the culture for “service to the nation.” My experiences suggest that processes driving common tools still allow the important flexibilities needed for a leader while improving the bottom line. Program maintenance costs are less as fewer systems are maintained, a few qualified staff members can support a program tool taking the costs from or sharing a reduced cost with line, and quality increases. Consolidated tools also contribute to simpler metrics data collection and more importantly information sharing. It is likely that many consistently using a common tool and sharing accountability as well as benefits, that workers will gradually plan and conduct work around these tools. This attitude and behavior shift is culture shift. The shift will help lower the silo height and encourage more lateral coordination as now there is someone else knowledgeable of the system who can share your complaints, issues, and suggestions for improvement.

Keeping to safety aspects, the important rollout of engineered safety after the sled track accident did not drive consistency between divisions. The revision of WP&C to include engineered safety in the soon to be revised MN471021, *Work Planning and Control Criteria for Safe Design and Operations*, even with all the optional Division 4100 training classes, has not lead to very consist interpretation of the WP&C/Engineered Safety. A review of PHS and ALW variations and the range Safety Case of quality of documents with some poor and could suggest more defined implementation is possible. Revise PHS to address life cycle project management changes to scope and risk.

Another aspect of silos I question it that to maintain a strong silo, others can't know your weakness or opportunities for improvement. This is a factor in why people don't want metrics. To have a metric shared within the SNL, then others will know what your silo is doing. As we leaders and workers push to believe, or accept for right now, that strong, thorough self-assessments are valuable feedback for improving systems, then the mission product will be easier to achieve and of better quality. Some seek knowledge of their organization's weaknesses as a challenge to fix and get better. This attitude is part of walking the talk and hopefully the talk to workers is more along the thread of, “I challenge an auditor

to find weakness in our program.” Of course this presumes that the organization is working every day to not only to meet the requirements, but to go a step farther.

Knowing that the culture of SNL is linked to expectations and relationships with NNSA and DOE, I see the point of the person who told me that some DOE directives that set low standards. When DOE pays contractors just enough to achieve these sub-standards, then it is hard for SNL to sustain being much better or achieving industry best of class performance. The oversight concept of being graded against compliance standards with less regard for operational excellence (as this is much harder to define and measure) tends to lead achieving lower expectations. This topic deserves discussion at much higher levels.

Every worthwhile safety and organizational change discussion and model includes some form of feedback. In the QA world this is the ‘check’ of P-D-C-A; or in the ISM vernacular, Feedback and Improvement; in culture change models, being a learning organization. Regardless of the model you draw from, feedback, reporting, metric collection, ideas for improvement, investigating best management practices, assessments, and other variations on feedback are shown as essential to continual improvement. Most understand the conceptual need. I want to weigh in on the leaders’ roles that are taught in classes and how these affect reporting.

- Accountability – Reinforce in yourself and your staff that the organization “must” know the true status of its people and operations. Acknowledge the challenges, dysfunctions, etc., and set about fixing them. I personally appreciate working to get better when I know my leader owns the situations and prioritizes resources to allow me to fix issues.
- Don’t shoot the messenger – Be grateful for the information, but more importantly be grateful for the person willing to tell the boss the truth (at least as the worker understands it). I visited on incident at SNL and within minutes a worker clearly expressed concern that the involved didn’t report because he feared retaliation. Building trust is hard but it is an ongoing factor to getting feedback.
- Reporting systems – From leaders to the most junior workers, no one likes fighting with an inefficient computer data collection system (reporting tool). If given a choice between doing the right thing such as voluntary reporting of issues, ideas, near misses and fighting a computer. Guess which wins.
- Too many options are confusing – Personal acceptance of reporting will go up when a person doesn’t have to guess or call a friend to figure out how to report. Define the corporate method so it manages the range of reporting topics or needs and then train to it. People won’t have to waste time.

A challenge I see at SNL is keeping attention on the efforts to build the behaviors and attitudes that define your culture. I have seen and read much describing goals and corporate and division strategies and plans to achieve these; however, I haven’t seen or just haven’t looked in the right places for activities and communications demonstrating that safety improvement is a recurring discussion and a resourced business imperative. Division 4000 is working to its milestones and strategy. The Division is

making great strides in organizing for safety success such as with setting up Org 4133 for Strategic Initiatives and Communications; bringing a communications SME into Div. 4020; empowering 4100, 4200 and 4800 to integrate more actively safety into everyday work; and sharing in the individual and organizational successes. As added benefit, the Div.4000 leaders might benefit from more sharing of progress and discussions about why the effort is important. Engage more of the work force in achieving these goals. Continue to keep awareness on the value of improving the safety behaviors and attitudes.

As a side line note, I have been duly challenged to consider metrics, work planning and control and aspects of safety culture. In hindsight, my efforts to look at SNL as whole because of the crosscutting relationships of security, infrastructure and ESH to SNL directly affect the Div. 4000 culture might have missed the mark for more closely looking with Division 4000. I now believe that I could have learned much from drilling deeper into Center 4200 and Center 4800. Misapplying this opportunity limited my ability to learn and share more deeply. I hope that the many ideas shared of what I saw, understood or believe I understood can motivate critical discussions and self-reflection. I appreciate all who have so willingly and openly shared ideas, concerns and observations that can help improve your organizations. I take away from my short detail, knowledge and awareness of how the SNL operates. A basis for understanding the people, leaders, processes and challenges faced by the labs and actions you are all taking to become safety and more efficient. I have had a rare experience to see what you do from your perspectives. All of this will help me to be a better safety SME and Federal employee with responsibilities for improving safety across the NNSA.

In closing, the people at SNL are great and committed to excellent research done safely. Their level of commitment to safety varies by organization and local factors. SNL has opportunity to address and strongly communicate through line leadership supported by ESH the safety principles and processes that will increase clarity and work efficiency. Communicating and living the desired safety behaviors and attitudes will increase worker engagement and commitment to safe work. DOE/NNSA are committing people with expertise and money to understanding its culture issues and developing way to get better. SNL LLT, MST, and many line and support organizations are equally and strongly focusing on improving our behaviors and attitudes in many areas, especially safety. Many paths and options are being tried and each causes improved alignment of people, processes and systems to defined behaviors and attitudes. I commend all who commit to being a change agent. To end on a humorous yet poignant note, Captain Jack Sparrow exclaimed, "The problem is not the problem. The problem is your attitude about the problem." Be a generous contributor to making SNL more effective in achieving Exceptional Service in the National Interest.

Attachment 1: Concepts for integrating ISMS, Engineered Safety, and WP&C
Work Planning and Control

The clarity in defining and explaining what SNL wants and needs to guide work planning and control is a big, big deal as it is the foundation upon which all the SNL operations and research proceed mostly safely. From a cultural view, what you implement drives what people do and when people do it enough and understand why, they gain respect for its value. Then it becomes part of everyday work. It becomes part of who they are and what they share with newcomers. Essentially this becomes one more foundation of their 'culture.'

If you accept this view, then the importance of developing a WP&C process is almost self-evident. It would be a long resource intense journey but it would set precedent for all of DOE should SNL rethink their work planning and control processes and ancillary tools and documentations/procedures. In no way do I believe what you are now using is wrong or largely ineffective, it's just not always clear and could do better driving the creative thinking the SNL is noted for. I have heard and seen so many good ideas toward improving and heard comments of inefficiencies and confusion that perhaps the ongoing review be done from a fresh perspective. Everywhere I have worked, such as with DOE Orders, we unfortunately start from where we are and largely wordsmith and tweak, often ignoring new research, best management practices, and opportunities. The team formed to revise WP&C has done considerable work identifying tools, processes and ideas currently used at SNL uncovering over 160 different procedures, processes, and tools supporting WP&C across the many semi-independent divisions. This team could reach outward to evaluate best management practices, current research in human behaviors, and control theory as inputs to a SNL WP&C. One that begins when operations or research begin discussing future work or modifications to ongoing work and ends when project becomes records in file. The WPC must be life-cycle and consider structural, operational, personnel and business environmental factors and conditions. You may recall from the SNL accident reports as well as many others across DOE that management systems and how people interface with these systems are predominate causes of loss. Thus the WP&C could use this opportunity in its ongoing revision efforts to fundamentally relook the WP&C with respect to large systems theory. Take the time now to remove the layers, increase clarity, and integrate project management, quality and safety.

The following are major concepts that might help the SNL team.

1. Revision provides a great opportunity to bring together many safety disciplines including aspects of specialized safety functions (electrical, fall protection, IH, etc.), systems safety, safety engineering, human performance improvement, behaviors, just culture considerations, logistics, construction, project management.
 - a. Make the model rigidly flexible. Process is quite structured and rigid with respect to line changes and limited deliverable formats and content, yet build it so the results drive creative thinking, use or principles, and risk acceptance. For example, offer flexibility in applying analyses and analysis format, while stipulating how the results are captured in the common SNL system.

- b. Merge PHS, FMA, JHA, WP&C, ALWs, safety case, permits, work authorizations,
- c. Fit in valuable lessons from reviewing the 164 different SNL WP&C tools.
- d. Evaluate how the NM 471021 can support higher level systems work planning as well and the more detailed activity level that is in the manual.
- e. Break from the current mindset so team can look at ISMS/WP&C objectively (ok, try).
- f. Resource this effort with defined staffing commitments. One full-time project manager might be good idea. Define level of support from others as required duties or partial FTE.
- g. Communicate progress and challenges broadly so everyone knows where SNL is going. Less shock with it rolls out.
- h. Make this a corporate process that the lines cannot alter. Sure they can add internal requirements for additional training, self-assessments, metrics, and how to live it. Divisions should not be able to alter deliverables, process, etc. independently.
- i. Avoid Swiss-Cheese safety model thinking.

2. WP&C model should identify when a process or person has to link with another SNL system and to what degree.

- a. Data management tools
- b. Leader concurrence, resource limitations/availabilities, future hiring, training demands
- c. Training needs and resources (e.g. Div. 4100 classes, internal instruction)
- d. Issues management and corrective action systems
- e. Project management
- f. Human resources such as for specialized staffing
- g. Infrastructure for existing and new and especially modifications to existing.
- h. Safeguards and Security
- i. Procurement (end items as well as inventory management especially chemicals)
- j. Agency interfaces such as KAFB, professional societies, collaborators, collocated agencies
- k. Others you identify

3. WP&C is a subset of ISMS. Consider WP&C design so it maintains clear relationship with ISMS. Look to build a process rooted in first principles, including those of ISMS. The WP&C analysis steps must drive asking the principle question as part of analyses and procedures. It should not be a big list of answers driven by questions as much as the defined operating envelope and conditions that need to be maintained for safety reflect considering the principles. Could reinforce the connection between Risk Management including unacceptable consequences, decision making to accept unmitigated risk (unprotected consequences).

4. Engineered Safety principles. SNL made great steps advancing 5-core functions and ISMS with the rollout of Engineered Safety. It made important and part of SNL work planning and execution. Now might be a reasonable time to merge the engineered safety principles not already covered under ISMS into ISMS so you operate with a consolidated set of principles. Much of engineered safety fits neatly into the current ISMS principles with only minimal explaining of how the engineered safety concepts align with the current ISMS principles. The one-page graphic, *Principles of Engineered Safety*, has key point questions which must be part of the work planning process.

5. Attributes of a safety culture.

- a. The behaviors and attitudes SNL expects in its workplace need to be defined and ISMS with its WP&C are fine processes that should highlight safety and performance culture attributes.
- b. It will be a challenge to convert culture attributes into expectations for operational behavior. Do think it will be a valuable discussion that helps build a mental framework that the team members can recall and apply when making the more technical decisions.
- c. Measure/metrics points could be defined in the WP&C for that work. Drive continuing safety through questions such as, "What would I check at what frequency to assure my work continues with a safe operating envelope. What conditions do I have to preserve to stay safe?"
- d. Address reporting. What can we improve? What is broken or about to break?
- e. Merge in leader responsibilities and actions.
- f. Etc. Could compare to what SNL publishes as culture attributes and expected behaviors.

6. Confirm you have the right team

- a. Line operations SME
- b. ESH SME, both coordinator and functional
- c. Mission support roles
- d. Link to consensus bodies if valuable
- e. Recognized supportive sponsor
- f. Address life-cycle

7. Model

- a. Clearly define the problem so the solution(s) address the problem
- b. Develop a mind map that shows:
 - i. minimal deliverables (analyses, reports, documents)
 - ii. Concept of cycling during analysis to update premises, feedback and improvements, questioning of assumptions
 - iii. High-level time line interface with the process
 - iv. Links to other systems such as LL, AIS, TEDS, reporting
- c. Model that includes QA to help assure metrics, product is thorough and meets quality needs.
- d. Very graphic and color coded to help step those with basic understanding of ISMS and work planning through the many expected process contortions.
- e. Communicate, communicate the model
- f. Div. 4100 WP&C staff have draft model worth considering.

8. Prototype

- a. Working model
- b. Field test to a plan
- c. Run to failure
- d. See what works and doesn't

9. Implement

- a. Roll out with all the trappings of success, fanfare, gimmicks, whatever it takes
- b. Really strong communication plan
- c. Expectations for initial use on limited projects with a Division
- d. Schedule for break in period

- e. Scheduled assessments in the not too distant future so early issues can be seen and fixed.
- f. Effectiveness reviews and discussion forums.
- g. Leader accountability
- h. SNL corporate standard. Avoid the intentionally vague language.
- i. Periodic reinforcement with SNL wide communications
- j. Steps to maintain product effectiveness and quality

SNL and Division 4000 has many skilled people who have expressed similar concerns and ideas. So this might just be an outsider restating what you already know. Perhaps it will provide motivation to relook the current WP&C documents and processes while defining a simpler model.

Attachment 2: Potential Questions for 2017 DuPont Culture Survey

Potential additional questions for inclusion in the 2017 DuPont managed culture survey.

1. To what extent does your center value reporting of ideas, issues, near misses, human errors, and opportunities for improvement?

- Very strongly desires and acts on reporting
- Accepting of good things but not the safety issues or human errors
- Center would be content not hearing these
- Reporting of human errors is negatively received
- Retaliation motivated me to not report issues, near-misses or errors

2. To what extent does your center apply ISMS principles and Engineered Safety principles when planning new operations or revisiting effectiveness of existing operations and facilities?

ISMS	Engineered Safety
Line management responsible for safety	Safe by Design intent
Clearly defined roles and responsibilities	Understand technical basis
Competency commensurate with responsibilities	Identify and control energy sources
Balanced priorities	Define unacceptable consequences
Safety Standards and Requirements Are Identified.	Risk assessment approach
Hazard controls tailored to work	Positive verification
Operations are authorized	

- Everyday part of planning and execution
- Usually discussed with work planning
- Work planners use. Workers do not commonly consider
- Taught in class and then not applied
- I am not very knowledgeable of the principles.

3. What best describes your encouragement and ability to engage in corporate or division safety initiatives?

- I am supported to take many opportunities
- Typically limited to Center activities
- Work pressures limit my engagement
- Leadership is not typically supportive
- It is not a strong personal interest

4. What best describes your Center's commitment of energy and resources for long term safety excellence?

- Strong verbal commitment with little resourcing
- Strong verbal commitment with good resourcing
- Strong verbal and action commitments supported with good resourcing
- Some action demonstrating support with poor resourcing
- Some discussion with ineffective follow through
- Do not feel much is happening with long term safety excellence

5. How effectively are leaders and workers demonstrating accountability for safety as one part of mission excellence? Accountability includes owning and correcting safety problems, holding lower managers and staff accountable for safe behaviors as inseparable part of mission.

- Leaders view of leaders high moderate low unsure
- Leaders view of workers high moderate low unsure
- Workers view of leaders high moderate low unsure
- Workers view of peers high moderate low unsure

6. How effectively are new safety requirements or initiatives communicated and implemented?

- Very clearly and frequently
- Clearly
- Moderately
- Limitedly
- Not often or only with big SNL initiatives

7. How are tenants of Just Culture applied within your center? [Console the error, Coach the At Risk Behavior, and Punish the Reckless, ref. David Marx]

- Leaders are conscientiously prudent in applying just culture
- Leaders commonly consider Just Culture
- Leaders typically respond based on the consequences
- Leaders often play favorites
- Leaders do not appear to apply Just Culture thinking

8. Metrics and measures are important for knowing how well we are doing. How well are safety metrics or measures defined and used at workplace?

- Very well
- Well
- Moderately
- Some extent
- Limited

Attachment 3:

References to Culture Change

DOE 450 set of directives for ISMS Policy, Order and Guidance

DOE Order 414.1D, Quality Assurance

OSHA Attributes of Culture presented as Conditions or Actions to Achieve

SNL research documents survey culture concepts and tools

HPI course

DuPont Safety Culture Survey

DuPont Safety Culture Model

DOE Safety Culture Improvement Panel

DOE Training Institute (DOE and Contractor colleagues

EFCOG

Institute of Nuclear Power Operations

INPO 12-012, Addendum II, Traits of a healthy Nuclear Safety Culture

Zingtrain.com five Elements of Organizational Change, [Just one of many organizational change models available]

NNSA Safety Culture Survey

U.S. Nuclear Regulatory Commission, Safety Culture Trait Talk (9 traits discussed)

Just Culture by David Marx

Engineering a Safer World by Nancy Leveson (concept applying systems safety)

ANSI/ASSE Standard Z 590.3, *Prevention through Design: guidelines for Addressing Occupational Risks in Design and Redesign Processes.*

The many James Reason's books on safety

**There are many information sources to support understanding culture change and safety culture topics. None are absolute or fully applicable to NNSA or SNL yet all contribute.