



Indoor Environment Quality + Workplace Environment St. Anthony Falls Laboratory (SAFL) Report 1

**June 2014, Minneapolis, MN
Sustainable Post-Occupancy Evaluation Survey (SPOES)
B3 Guidelines**

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1.0 Overview

The purpose of this report is to examine the connection between sustainable design criteria used in the design of the St. Anthony Falls Laboratory and employees' satisfaction with their work environments. The St. Anthony Falls Laboratory (hereafter referred to as SAFL). The SAFL was designed using the B3 Guidelines (formerly known as the Minnesota Sustainability Guidelines or MSBG) and completed for occupancy in 2013. The B3 Guidelines track specific state-funded buildings as a means of demonstrating real outcomes aimed at the conservation of energy resources, creation and maintenance of healthy environments, and occupants' satisfaction with their work environments. The Sustainable Post-Occupancy Evaluation Survey (SPOES) was developed to assess human outcomes in classroom and workplace settings in compliance with the project tracking requirements for the B3 Guidelines. The survey was conducted in June 2014 and serves as the first of two required POE events.

This SPOES report focuses on employees' satisfaction with the physical environment as related to 15 indoor environment quality (IEQ) criteria such as lighting, thermal, and acoustic conditions in their primary workspaces, i.e., offices. Employees' satisfaction with the facility (site, building, and interior) and the effect of the facility's physical environment on employees' perceptions of their work performance and health are included. The report provides descriptive information about employees' perceptions of the IEQ with their primary workspace. This information serves the broader development of knowledge regarding the influence of IEQ on employees. Finally, a brief look at employees' commuting and physical activities within the building are also reported.

2.0 Method

SPOES consists of a self-administered, Internet-based, questionnaire submitted to and completed by employees. The SPOES questionnaire has been tested for **validity** (measures what it is intended to measure) and **reliability** (repeatability or replicability of findings) in studies involving similar facilities and employees. Employees rate their level of satisfaction on a **Likert-type scale** (measurement scale) from 1 (very dissatisfied) to 7 (very satisfied) with IEQ of the facility and their primary workspaces. They also rate the influence of their physical environment on their perception of their work performance and health on a scale from 1 (hinders) to 7 (enhances). There were no physical measurements taken of environmental conditions such as temperature or acoustic level. This study is limited to employees' perceptions.

The report provides a descriptive summary of the results stated as a **mean** (M = average of all responses), **standard deviation** (SD) (how different scores are from each other and the mean), and **number of responses** (N) for questions analyzed. The mean for a 7-point scale is 4.00. Lower or higher means reflect stronger tendencies towards dissatisfaction/satisfaction and hinders/enhances. Means that are close to the center of the scale (4) are considered to be neither dissatisfied/hinders or satisfied/enhances.

When interpreting **mean** responses, the following labels were used:

- 1-3.99 dissatisfied (hinders)
- 4-4.49 neither satisfied (enhances) or dissatisfied (hinders)
- 4.5-7 satisfied (enhances)

An IEQ Satisfaction Score is also calculated for employees' satisfaction with IEQ in their primary workspaces. This is a statistical combination of all IEQ scores for selected 'overall' criterion, which results in a single IEQ Satisfaction Score for all employees on all IEQ criteria or variables and is reported in an IEQ Scorecard.

2.1 Description of the Questionnaire

Employees first rate their level of satisfaction with the facility and the influence of their physical environment on their perception of their work performance and health. Then they respond to questions about their satisfaction with their primary workspaces in relation to the IEQ criteria. The questionnaire uses IEQ criteria from the B3 Guidelines and relates each of them to employees' satisfaction with their physical environment.

Criteria include (in alphabetical order):

- | | |
|---------------------------------|---------------------------------------|
| 1. Acoustic Conditions | 9. Lighting Conditions |
| 2. Appearance | 10. Personal Adjustability Conditions |
| 3. Cleaning and Maintenance | 11. Privacy |
| 4. Daylighting Conditions | 12. Technology |
| 5. Electric Lighting Conditions | 13. Thermal Conditions |
| 6. Function | 14. Vibration and Movement |
| 7. Furnishings | 15. View Conditions |
| 8. Indoor Air Quality | |

However, there are about 25 IEQ (see Table 3) questions that represent the IEQ criteria. Some of the criteria are broader such as Function or Indoor Air Quality, and there is only one 'overall' question about it to which employees respond. Other criteria have additional questions to provide greater detail about the condition. For example, Thermal Conditions has an 'overall' question and three other questions related to temperature, humidity, and air velocity (draft). Acoustic conditions is also an 'overall' question with others related to employees' ability to hear desired sounds and ability to limit undesired sounds. Lighting conditions has questions related to daylighting conditions and electric lighting conditions and the quantity and control of each.

2.2 Limitations

Employees' participation is voluntary, and responses are self-reported. As is true with all survey research, the responses indicate employees' perceptions. There were no physical measurements of the environment taken, e.g., temperature, humidity, or lighting levels.

3.0 Sample Description

3.1 Building Description

The SAFL facility is located at 2 3rd Avenue SE, Minneapolis, Minnesota, in the St. Anthony Falls Historic District. The SAFL facility was originally built in 1938 to serve as a hydraulics research laboratory at the

University of Minnesota. This survey represents the result of employees' satisfaction with the renovation project completed in 2012. The renovation project was designed to repair the existing research facility, accommodate modern amenities, reflect current building codes and safety guidelines, and support new research directions in sustainable energy and environmental restoration management. The current design of the facility includes an atmospheric boundary layer wind tunnel on the upper level, offices and administration space on the main level, and a gated water intake system on the lower level that captures and releases portions of the water flow from the adjacent Mississippi River.



Figure 1 SAFL on the Mississippi River (Photo credit: University of Minnesota Infrastructure Renovation)

3.2 Description of Respondents

The SAFL facility has approximately 220 employees at this location, which varies somewhat over the academic year. The response rate to the questionnaire was approximately 10% (N=23). Of those responding, 76% were male and 24% were female. The mean age of respondents was 36.67 years, with a range of 23 to 67 years. Employees were asked how long they have worked at the SAFL, the amount of time spent in the facility, and the number of hours they spend in their primary workspace.

Of the years worked at the SAFL, 62% of the employees indicated that they had worked in the facility over 3 years, 19% worked at the SAFL between 2 – 3 years, and 19% had worked in the SAFL facility less than a year. Relating to hours worked during a typical week at the SAFL, 52% of the employees reported they spend 40+ hours a week in the facility, 35% spend 30-40 hours in the facility, 5% spend 20-29 hours in the facility, and 8% spend less than 20 hours in the facility. Relating to the percentage of time employees spend per week in their primary workspace, 39% of the employees reported they spend more than 75% of their time per week in their primary workspace, 26% spend 51-75% of their time per week in their primary workspace, 30% spend 25-50% of their time per week in their primary workspace, and 5% spend less than 25% of their time per week in their primary workspace.

The SAFL facility provides offices, cubicles, desks, and work areas in laboratory environments as primary workspaces. Results indicated 9% of the employees had private offices, 55% share private offices with others, 23% worked in cubicles (workstations), 4% worked at a desk in an open office area, and 9% had

work areas in laboratory spaces. Employees also indicated that 83% of their primary workspaces were located within 15 feet of an exterior window; 13% of the employees' primary workspaces were not within 15 feet of an exterior window; and 4% did not know the distance between their primary workspace and an exterior window.

4.0 Findings and Discussion

4.1 SAFL Facility (Site, Building, and Interior) Overall Satisfaction, Work Performance, and Health

Employees responded to questions concerning their overall satisfaction with the SAFL facility (site, building, and interior) related to their work performance and their health. Results indicated that employees were satisfied ($M = 5.14$) with the SAFL facility (building, site, and interior). They also reported that their overall work performance was enhanced ($M = 5.0$), and their overall health was neither enhanced or hindered ($M = 4.48$) by the facility (site, building, and interior). Table 1 and Figure 2 show a summary and interpretation of their responses.

Table 1 Overall satisfaction, work performance, and health related to the SAFL facility

SAFL facility (site, building, and interior)	N	Mean (1-7)	SD	Interpretation
Overall satisfaction	23	5.14	1.39	Satisfied
Overall work performance	23	5.00	1.65	Enhances
Overall health	23	4.48	1.53	Neither Enhances or Hinders

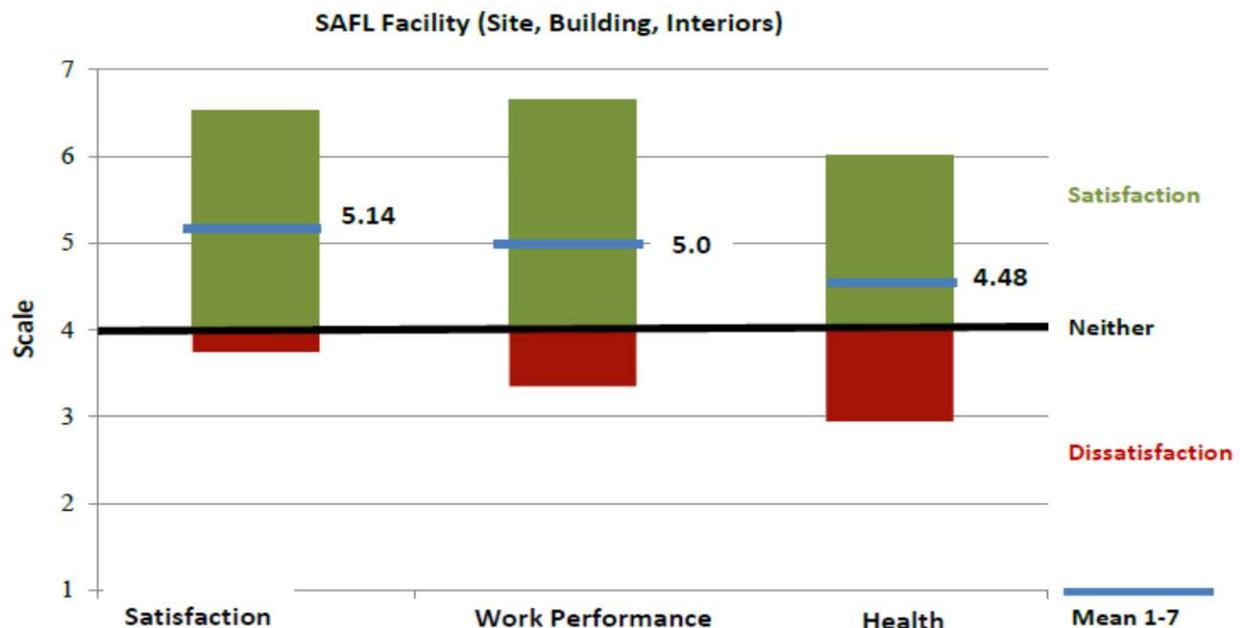


Figure 2 Overall satisfaction, work performance, and health related to the SAFL facility

4.2 Primary Workspace: Overall Satisfaction, Work Performance, and Health

Employees responded to questions concerning their overall satisfaction and overall perceptions of their work performance and health related to their primary workspace (e.g., private office, cubicle, or other primary workspace). Table 2 and Figure 3 show a summary and interpretation of their responses. Results indicated that employees were **satisfied (M = 4.74)** with their primary workspace, their overall **work performance** was **enhanced (M = 4.61)** by their primary workspace, and their overall **health** was **enhanced (M = 4.52)** by their primary workspace.

Table 2 Overall satisfaction, work performance, and health related to primary workspace

Primary Workspace	N	Mean (1-7)	SD	Interpretation
Overall satisfaction	23	4.74	1.60	Satisfied
Overall work performance	23	4.61	1.67	Enhances
Overall health	23	4.52	1.41	Enhances

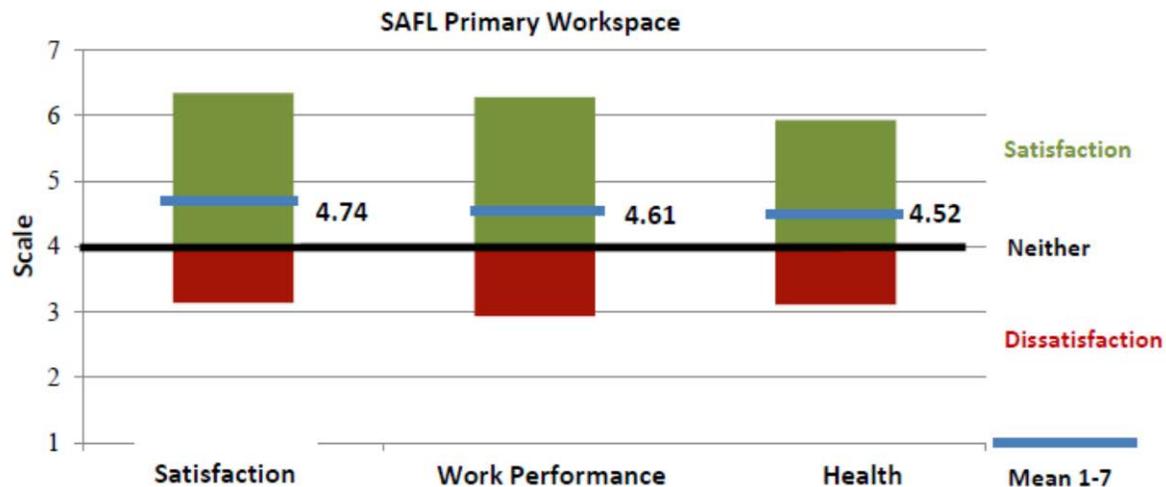


Figure 3 Overall satisfaction, work performance, and health related to primary workspace

4.3 Primary Workspace: Satisfaction with Indoor Environment Quality (IEQ)

Employees responded to questions concerning their satisfaction with IEQ criteria (function, thermal conditions, indoor air quality, acoustic conditions, etc.) related to their primary workspace (e.g., private office, workstation, or other primary workspace). Table 3 and Figure 4 show a summary of the means, the standard deviation, and interpretation of their responses.

Results indicate that employees were satisfied with IEQ criteria 1-18 associated with their primary workspaces, neither satisfied nor dissatisfied with IEQ criteria 19-22, and dissatisfied with IEQ criteria 23-25. Four IEQ criteria were identified with means associated with being neither satisfied nor dissatisfied [overall privacy (M=4.43), overall furnishings (M=4.39), air velocity (drafty or stagnant) (M=4.3), and the ability to limit undesired sounds (M=4.26)]. IEQ criteria means resulting in employees' satisfaction ranged from 5.65 (amount of electric lighting) to 4.52 (overall view conditions) and IEQ means resulting

in dissatisfaction ranged from 3.78 (overall thermal conditions) to 3.57 (adjustability of thermal conditions).

Table 3 Satisfaction related to IEQ criterions in primary workspace

IEQ Criterions	N	Mean (1-7)	SD	Interpretation
1	23	5.65	1.03	Satisfied
2	23	5.48	1.27	Satisfied
3	23	5.39	1.44	Satisfied
4	21	5.33	1.49	Satisfied
5	23	5.30	1.40	Satisfied
6	23	5.17	1.53	Satisfied
7	23	5.04	1.55	Satisfied
8	23	5.00	1.35	Satisfied
9	22	4.95	1.50	Satisfied
10	23	4.91	1.31	Satisfied
11	23	4.83	1.67	Satisfied
12	23	4.83	1.72	Satisfied
13	23	4.74	1.48	Satisfied
14	20	4.70	1.78	Satisfied
15	23	4.70	1.49	Satisfied
16	22	4.55	1.90	Satisfied
17	23	4.52	1.50	Satisfied
18	23	4.52	2.25	Satisfied
19	23	4.43	1.70	Neither S or D
20	23	4.39	1.44	Neither S or D
21	23	4.30	1.79	Neither S or D
22	23	4.26	1.71	Neither S or D
23	23	3.78	1.98	Dissatisfied
24	23	3.74	1.98	Dissatisfied
25	23	3.57	2.00	Dissatisfied

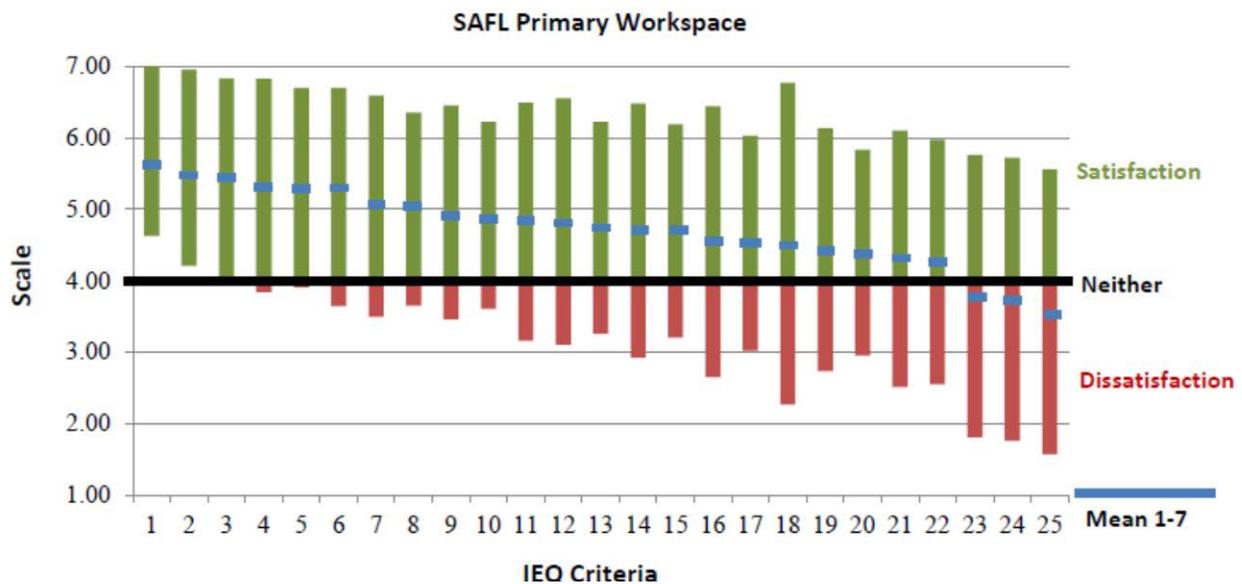


Figure 4 Satisfaction with individual IEQ criterion associated with employees' primary workspace. The numbers refer to the IEQ criteria included in Table 3.

4.4 IEQ Satisfaction Scorecard

The IEQ Satisfaction Score is determined by developing weighted factors of all categories, which is more representative of a fair overall IEQ score. For example, it might be more important for an employee to have satisfying thermal conditions than to have satisfying indoor air quality. Thus, if the employee gives a high thermal satisfaction score and a lower indoor air quality satisfaction score, the overall IEQ satisfaction will be scored much higher than one with the inverse statistics.

The weighted scoring system was developed by employing the following procedures:

1. Factor analysis (a multivariate statistical procedure) was conducted to determine the importance of various IEQ categories.
2. The factor loading of selected IEQ criteria was regarded as the individual weight.
3. The weighted sum score was used to calculate the final mean score illustrating how well a particular building performed in terms of satisfying its occupants' IEQ needs. This becomes the IEQ Satisfaction Score.

As shown in Figure 5, the IEQ Satisfaction Score for SAFL is **4.67**.



Figure 5 Employees' IEQ Satisfaction Score for the primary workspace in the SAFL facility

Overall, employees showed a moderately low level of satisfaction with the overall IEQ score, as indicated by the weighted mean score of **4.67**. Results indicated that the **overall vibration and movement** was the criterion that contributed most to the IEQ Satisfaction Score, followed by **function**, and **appearance (aesthetics)**. They determine IEQ satisfaction more strongly than other categories. Overall **electric lighting, cleaning and maintenance**, and **overall thermal conditions** were the categories that contributed the least to the IEQ Satisfaction Score.

The **IEQ Satisfaction Score** of **4.67** validates the overall satisfaction (Table 2) mean score of **4.74** with the primary workspace. Both scores indicate low levels of satisfaction with the primary workspace. The IEQ Score is lower as it may reflect some other factors beyond IEQ such as satisfaction or dissatisfaction with other considerations, e.g., the location or size of primary workspace. The IEQ Satisfaction Score gives us more refined knowledge.

5.0 Physical Activity Engagement and Commuting Practices

In the final section of the survey, employees responded to questions regarding their overall physical activity while at SAFL facility (site, building, and interior) and their commuting practices.

5.1 Physical Activity Engagement

Providing employees with opportunities for alternative paths of travel around the workplace, e.g., taking stairs as opposed to the elevator provides opportunities to engage in additional types of physical activities. Engaging in physical travel throughout the work environment can be associated with healthier lifestyles. Results for the employees' physical activity are included in Table 4.

Table 4 Overall physical activity (walking, stair use, etc.) affected by the SAFL facility

SAFL facility (site, building, and interior)	Mean (1-7)	SD	N	Interpretation
Overall physical activity (walking, stair use, etc.)	5.40	1.18	23	Enhances

Results indicated that employees felt that the SAFL facility enhanced ($M = 5.4$) their physical activities (walking, stair use, etc.). Further, of the 23 respondents to this question, 33% said the facility enhanced their overall physical activity; 40% said the facility neither enhanced or their overall physical activity and 27% indicated that the facility hindered their ability for physical activity.

5.2 Commuting Practices

Employees' commuting practices examine primary modes of travel, commuting distance one-way, and the ability to use alternative modes of commuting. Alternative modes of commuting responses provide insight into employees' commuting behaviors. These data provide researchers, building owners, and employers with information related to employees' commuting practices and the impact on the carbon footprint. These data, while not specific to the IEQ data, are addressed in the B3 guidelines.

The SAFL facility is located on the University of Minnesota Twin Cities campus and the metropolitan downtown hub. As such, it is near public transportation offered by the University campus connector, public transit, biking and walking paths, and a major freeway system. Table 5 provides results on employees' primary mode of transportation. Table 6 summarizes commuting distances between home and the SAFL facility. Table 7 summarizes employees' ability to commute using alternative choices (walk, public transit, bike, van or carpool, etc.) between home and the SAFL facility.

Table 5 Commuting Practices - Primary mode of transportation for daily commute

Daily Commuting Practices	Drive alone (or with children < 16)	Carpool or van	Motorcycle / Moped	Public transit	Bicycle	Walk
Primary mode of transportation	61%	9%	9%	4%	13%	4%

Related to employees' daily commuting practices, 61% of the employees drove alone (or with children under 16), followed by 9% who used a van or carpooled, 9% who used a motorcycle or moped, 4% who used public transit, 13% who used a bicycle, and 4% who walked to work at SAFL.

Table 6 Commuting Practices – Distance traveled to SAFL facility one way

Commuting distance: miles 1-way	0-5 miles	6-15 miles	16-30 miles
One-way: Home-to-SAFL	48%	39%	13%

Results indicated that 48% of the employees commuted 0-5 miles one-way between home and the SAFL, followed by 39% who commuted 6-15 miles, and 13% who commuted between 16-30 miles to the SAFL facility.

Table 7 Commuting practices – SAFL location and alternative commuting behaviors

Alternative commuting practices	Mean (1-7)	SD	N	Interpretation
Ability to commute in an alternative way	5.15	1.64	23	Satisfied

Results indicated that employees were satisfied ($M = 5.15$) by the location of the SAFL in their ability to commute to work in alternative ways, e.g., walk, bicycle, public transit, van or carpool, etc. Further, of the 23 respondents to this set of questions, 9% said the location hindered their commuting options, 26% indicated the location neither hindered or enhanced their ability for alternative commuting, and 65% indicated the location enhanced their ability to commute in alternative ways.

6.0 Conclusions

6.1 Summary

A post-occupancy evaluation was conducted of employees of SAFL approximately three years after it was first occupied. Of the total of 220 employees working at SAFL in June of 2014, approximately 10% of the employees (N=23) responded to the survey.

The survey included questions related to employees' overall satisfaction with the facility (site, building, and interior) and influence of the facility on their overall work performance and health. Employees were satisfied with the facility ($M = 5.14$); they found the facility enhances their overall work performance ($M = 5.00$) and that the facility neither enhances nor hinders their overall health ($M = 4.48$). Next, employees were asked these same questions about their primary workspaces (private office, cubicles, laboratory, etc.). Employees indicated an overall satisfaction ($M = 4.74$) with their primary workspaces and that their overall work performance ($M = 4.61$) and health ($M = 4.52$) were enhanced by their primary workspace.

Given the range of satisfaction from 4.5 – 7, employees satisfaction scores were in the moderate range ($M = 5.14$) for the facility and a low level of satisfaction for their primary workspace ($M = 4.74$), however both scores are considered positive. Employees' perception of their work performance in the facility (site, building, interior) were also higher ($M = 5.0$) than perceptions of their work performance in their primary workspaces ($M = 4.61$). Finally, employees' perception of their health related to the facility (site, building, interiors) were much similar ($M = 4.48$) to their perception of their health with the primary workspace ($M = 4.52$).

Most of the survey questions related to employees' satisfaction with the IEQ criteria in their primary workspaces (private office, cubicles, laboratory, etc.). Employees' responses showed they were satisfied

with the majority of the IEQ criteria. The results indicate a moderately high level of satisfaction with some IEQ criteria [amount of electric lighting (**M = 5.65**)] and low levels of satisfaction with other IEQ criteria [appearance (aesthetics) and view conditions (**M = 4.52**)]. Employees responded that they were neither dissatisfied nor satisfied with the following IEQ criteria: overall privacy (**M = 4.43**), overall furnishings (**4.39**), air velocity (drafty or stagnant) (**M = 4.30**), and ability to limit undesired sounds (**M = 4.26**). Lastly, employees' were dissatisfied with the overall thermal conditions (**M = 3.78**), temperature (**M = 3.74**), and adjustability of thermal conditions (**M = 3.57**) with their primary workspace.

From the employees' responses, an IEQ Score was developed and shows respondents' satisfaction with all criteria and the contribution of each criterion to the satisfaction score. For SAFL, the IEQ Satisfaction Score was **4.67**, with satisfaction with **overall vibration and movement, function, and appearance (aesthetics)** of their workspaces as the three categories that influenced employees' satisfaction level most. Consistent with the IEQ criteria scores, **electric lighting, cleaning and maintenance, and overall thermal conditions** contributed the least to the IEQ Satisfaction Score. Overall, the mean score (4.67) reflects a low level IEQ Satisfaction Score with the overall IEQ criteria with the employees' primary workspaces.

The final section of the survey examines employees' physical activity and commuting practices. Employees reported that SAFL enhances (**M = 5.4**) their **physical activity**, which is one of the sustainable design criteria that influence occupant behavior. Employees' commuting practices showed a **strong preference for driving alone** (or with children under 16) (**61%**), with other employees' using carpools or vans (**9%**), motorcycles or mopeds (**9%**), public transit (**4%**), bicycles (**13%**), or walking (**4%**) to SAFL. All employees' commuting distances were reported at or below 30 miles to the SAFL, with **48%** commuting between 0-5 miles, **39%** commuting between 6-15 miles and 13% commuting between 16-30 miles one-way. Lastly, employees indicated that the location of the SAFL facility enhanced (**M = 5.14**) their ability to commute in alternative ways.

6.2 Recommendations

The satisfaction scores are certainly in the positive direction, however, improvement may be possible. It is also notable that for those criteria that most influence positive satisfaction, **vibration and movement, function, and appearance (aesthetics)** attention can continue to be paid to these criteria. For IEQ categories that have physical measurement possible, e.g., thermal, acoustic, and lighting, it is recommended that these measurements be taken in both overall workspaces and primary, individual workspaces. Recommendations follow:

There are several strategies that can be used as a follow-up to this survey that will help dig deeper into the criteria that showed low satisfaction or dissatisfaction.

- Determine if any task areas differ now from original intent.
- Identify employees' specific concerns via focus groups
- Log complaints and sort into areas of concern that can be acted upon. For any criteria/complaints that are measurable, e.g., thermal conditions, lighting conditions, conduct onsite measurements using Illuminating Engineering Society standards for employees' tasks.

Acoustic Conditions

- Identify acoustic criteria for overall requirements.

- Develop any additional special acoustical performance requirements to support functional programming of building, e.g., sources of recurrent noise that need to be controlled, special user populations that may have distinct auditory performance limitations, or multiple uses of building spaces that may have different acoustic criteria. Investigate and choose appropriate acoustics modeling software for the project.
- Measure acoustic performance onsite with full systems running. Log noise and other sonic environment complaints.

Lighting Conditions

- Identify performance criteria that are to be met to achieve goals.
- Develop additional quality lighting criteria as needed for special facility issues such as employees' ages, duration of task, influence of daylight quality or quantity.

Personal Adjustability

- Determine if adjustability issues arise with temperature, lighting, or furnishings via focus group.
- Identify personal, individual problem areas and relate to other IEQ issues via log of complaints.
- Provide education to employees about adjustability of any applicable adjustment options, e.g., furnishings, air diffusers, lighting, temperature control, etc.

Privacy Conditions

- Consider adding noise masking equipment and/or visual screening depending on nature of complaints.
- Compare acoustic privacy problem areas with acoustic measurements to pinpoint specific problem areas.

Thermal Conditions

- Determine special thermal comfort requirements or problems that may be encountered in the building due to work activities, sitting, or design considerations.
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- Review conditions that affect thermal comfort using ASHRAE Standard 55-2004 or Human Factors Design Handbook.
- Log complaints related to thermal conditions.

It seems obvious that employees' satisfaction can be improved by addressing the criteria that had 'dissatisfied' or 'neither dissatisfied nor satisfied' scores. The above recommendations can help address change in these criteria. The areas employees were dissatisfied with (**overall thermal conditions, temperature, and adjustability of thermal conditions**) are all in the thermal arena can all be addressed by the above recommendations. Exploring these areas in more detail and making adjustments may increase overall satisfaction at the primary workspace.

This study investigated employees' satisfaction with the facility and primary workspaces. IEQ satisfaction is individual, but the results of the survey show a central tendency of moderate satisfaction to satisfaction with the facility and most of the IEQ criteria. The results can be used as a diagnostic tool to aid in improving IEQ conditions for employees and to set the benchmarks from which improvement can be measured in the future.

Appendix A. Open-Ended Responses

Employees had the opportunity to raise specific concerns on the overall facility and their primary workspaces. Important information can be gleaned from the open-ended responses. Qualitative responses can appear as the employees are satisfied or dissatisfied; it does not mean they represent the overall sentiment from employees.

For example thermal conditions, appearance, IAQ, vibrations/movement, and function reflected positive employees' satisfaction in their primary workspaces making the case that the open-ended responses reflect a small sample of the population.

SAFL Facility (Site, Building, Interior)

Building Services & Amenities

- My work location isn't very close to a bathroom so that can be a hassle sometimes.

Lighting

- It's weird how the lights turn off...would appreciate knowing how to keep them turned on.

Spatial Layout Organization

- I think if I had an office in addition to lab space that much of this would improve.
- There are not enough private spaces or small spaces to hold meetings or attend to personal matters. Reserving a meeting room is excessive for this task since the rooms are so large.

Thermal

- The building's been having air conditioning problems since the renovation, and our office is no exception. Sometimes it's unbearably hot, some time's its freezing cold. And you can't turn it off--it always is shooting out air. You can adjust the angle slightly, but if you sit beneath a vent you're gonna get blown on.
- The air system can't be turned off, so it is either hot air all the time or cold air all the time. It won't stay at a temperature. It's a waste of energy and ridiculous to have ac in the winter and heat in the Summer

Overall Positive

- SAFL is a beautiful place to work and I feel lucky to be there every time I arrive or leave.

SAFL Primary Workspace

Building Services Amenities

- It has been greatly enhanced. Only issue I have is that the lower parking lot is dangerously icy all winter. I know this is Excel's parking lot, but it doesn't make it easier to get around.
- The focus of the renovation was primarily to bring the building up to code and improve experimental spaces. There was really very little done to improve the physical environment, especially in the primary work spaces.

Appendix B. Glossary

Descriptive statistics

Statistics used to summarize large sets of data (i.e., means, frequencies, medians). Descriptive statistics describe only the sample under consideration and are not intended to infer results to the larger population.

Factor analysis

A multivariate statistical procedure that is used to identify and group together general dimensions or factors that underlie a large number of variables in a set of data. The procedure transforms the variables into new principal components or orthogonal factors. Variables within each factor are related to each other but have no relationship to variables in other factors.

Frequency

A descriptive statistic provides information about how many of a particular response or measurement is observed.

Likert-type scale

A measurement technique, employed in questionnaires and interviews, that utilizes a range of standardized response categories such as strongly agree, agree, etc.

Mean

The average score of a set of data is calculated by adding all scores together, then dividing by the number of scores.

N

The number of subjects or participants responding to the questions in the study

Reliability

The repeatability or replicability of findings; the same results are produced each time. Instruments and procedures should produce the same results when applied to similar people in similar situations, or on a second occasion.

Standard deviation

A statistic used to measure the variability of a group of scores (how different scores are from each other and the mean). For example, if the range of scores is 1-7 and the mean (average) is 5.0 with a standard deviation of 1.0, then the scores are closely clustered around the mean, i.e., there is one unit of variation among all scores. If the mean was 5.0 and the SD was 3.0, there is a broader range of variation among the scores...a smaller SD means the scores are similar and the mean score is likely to be more accurate and more useful (this is better!).

Validity

The extent to which an instrument or procedure measures what it is intended to measure (internal validity). The generalizability of results to another population (external validity).