

**University of Illinois at  
Urbana-Champaign  
Waste Characterization Study  
August 2023 – February 2024**

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**Presented To:**

**Facilities and Services**

**University of Illinois at Urbana-Champaign**

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**I ILLINOIS**

Illinois Sustainable Technology Center

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# Illinois Sustainable Technology Center (ISTC)

## Zero Waste Illinois

The [Illinois Sustainable Technology Center](#) (ISTC) is housed within the Prairie Research Institute at the University of Illinois at Urbana-Champaign (UIUC). ISTC provides information, resources, and technical assistance to help organizations improve their environmental footprint. Within ISTC, the [Technical Assistance Program \(TAP\)](#) makes companies and communities more competitive and resilient with sustainable business practices, technologies, and solutions. TAP works at the intersection of industry, science, and government to help organizations achieve profitable, sustainable results.

The TAP [Zero Waste Illinois](#) team provides a variety of cost-effective, sustainable material management services to assist clients throughout Illinois and beyond in their journey to zero waste. We help organizations achieve zero waste at every step by being a resource for innovative disposal and reuse of materials, and by conducting waste audits and assisting with materials management planning, supply chain optimization, and stakeholder engagement.

## Background

As part of the UIUC campus community itself, TAP's Zero Waste Illinois program has a long history of collaborating with UI Facilities and Services (F&S) and other campus sustainability stakeholders to better manage materials and reduce waste and associated negative environmental impacts resulting from campus operations. Beginning in 2014, ISTC worked with F&S on a two-phase building waste characterization study, which involved sampling and characterizing waste streams from eight buildings, including two residence halls, one academic building with laboratories, one academic building without laboratories, an administrative building, the student union, a bookstore, and a mixed-use event building. Each building was also audited for availability and location of refuse and recycling bins. Additionally, employee and student occupants of the study buildings were surveyed, to gauge knowledge of current programs, gaps in service, and overall satisfaction with the campus recycling program. With this data, ISTC made recommendations to improve waste reduction and diversion for the individual buildings, as well as campus-wide recommendations. In 2019, ISTC also conducted an indoor solid waste and recycling collection and infrastructure assessment and improvement study, which among other recommendations, spurred the acquisition and deployment of new three-bin recycling collection stations to improve the consistency of recycling infrastructure, in an effort to increase both the quantity and quality of recyclable materials recovered on campus. Summaries of these and other waste reduction, diversion, and education projects conducted by ISTC for the UIUC campus, along with links to relevant reports and other results can be found online at <https://tap.istc.illinois.edu/category/university-of-illinois-at-urbana-champaign/>.

In Fall 2021, members of the ISTC TAP's Zero Waste Illinois team began discussions with representatives from F&S, the Institute of Sustainability, Energy, and Environment (iSEE), and the Illini Union (one of the

buildings included in the aforementioned campus building waste characterization study) about conducting follow-up campus waste audits. These discussions included interest in ascertaining: the efficacy of the newer three-bin recycling stations (which have not yet been deployed to all campus buildings) in improving recycling behavior; whether recovery of recyclables has changed over time in buildings previously audited; and current levels and types of contamination in the recycling stream. This new waste characterization effort considers current campus waste management conditions, previous efforts, and examples of ISTC's more recent work assisting other universities with the development of solid waste management plans. The following proposal reflects discussions of specific buildings to include in the next waste characterization study, types of stakeholder engagement to incorporate, and desirable features of the resultant report to optimize the report's value in sharing study results and recommendations with the campus community.

## Activity Zone Approach

ISTC's activity zone approach will be used for this waste characterization study. An activity zone is a classification of a building according to its main function and service while acknowledging that there may be additional services housed within the building as well. Examples might include "academic," "academic with labs," "administration," "residential," etc. Once activity zones are defined, the study team can select representative buildings from each activity zone from which to sample and audit waste. Audit data from those representative buildings is used to formulate recommendations for waste reduction, collection improvement, and diversion strategies. Those recommendations for improvement can then be applied to other buildings that fall within the same activity zone categorization. This allows a campus to examine waste data from a moderate list of buildings, rather than from each building on campus, and make materials management plans that will impact broad areas of campus.

F&S has identified four main activity zones and a tentative list of representative buildings on which the waste characterization study will focus. **These elections are:**

- **Academic.** These are buildings that primarily serve as spaces for student instruction. These buildings also may have offices, conference rooms, lounges, and computer labs. Representative buildings of interest in this activity zone are the **Business Instructional Facility** and the **Campus Instructional Facility**.
- **Academic + Laboratory.** These are buildings which house research and/or instructional laboratories. They may also house laboratories, offices, conference rooms, and lounges. Representative buildings of interest in this activity zone are **Roger Adams Laboratory** and **Noyes Laboratory**.
- **Multi-Activity.** These buildings serve more than one substantial function. This could be a combination of athletic facilities, study space, food services, etc. Representative buildings within this activity zone are the **Illini Union** and the **Activities and Recreation Center (ARC)**.
- **Student Living.** This is comprised of buildings that serve as on-campus student housing. Representative buildings within this activity zone are **Lincoln Avenue Residence Halls** and **Allen Residence Hall**.

# Proposed Work Plan

August 2023 – February 2024

## Task 1: Stakeholder Engagement and Review of Current Practices

### Objective

Assess current waste management practices across the UIUC campus, identify waste streams and process flows, gauge the knowledge of campus community members regarding current practices, and obtain input from stakeholders on barriers to and opportunities for campus waste reduction and collection improvement.

### Approach

The UIUC campus includes various colleges and schools, associated research facilities and affiliated units. The University also provides residential accommodation, runs food service operations, and has athletic and special venues. There are thus complex material flows across campus, with each facility type producing diverse waste streams at varied volumes. To capture a clear picture of current practices, ISTC proposes an initial assessment with the following concurrent subtasks:

- **Review historical hauling data** to gain an understanding of the flow at a macro level on campus. This will help elucidate current reporting methodologies, hauling routes and frequencies.
- **Conduct short interviews and walk-throughs** with staff from various operational departments on campus with guidance from F&S. Based on the Activity Zones identified by F&S, these operational units and departments may include Building Service Workers, UI Housing, Campus Recreation, the Division of Research Safety, and the Department of Chemistry. These consultations with staff will outline individual aspects of waste management with which they might already be, or have the capacity to become, involved. Additional campus units not listed here but recommended by F&S as being involved with major additional aspects of waste management, would also be consulted.
- **Review current and planned (i.e., regardless of waste characterization data) efforts related to waste reduction and diversion.** This will help convey the status quo for waste management on campus and be included in the final public-facing waste characterization study report.
- **Conduct focus group sessions** with representative students, staff, and faculty that regularly use buildings designated for auditing to help gauge knowledge of current practices and expectations, as well as garner stakeholder suggestions for ways to reduce waste and improve collection of recyclables. One focus group session will be conducted per Activity Zone examined in the waste characterization study, for a total of four focus group sessions.

Focus group sessions may not necessarily be completed prior to the waste characterization study. Note that if sessions are completed prior to the waste audit, participants in those sessions can be invited to complete volunteer shifts during the waste sorting process. If sessions will be completed after the waste audit, session participants should not include volunteers that participated in the sorting process, as their knowledge and opinions will be impacted by their participation in the sort.

- F&S will work with other campus stakeholders (e.g., iSEE) to recruit participants for focus group sessions (8-15 participants per session). ISTC will assist with developing messaging for participants (e.g., providing information about the purpose of the session, any prompts, or questions to consider prior to coming to the session, etc.).
- ISTC will work with F&S to develop and finalize questions for focus group sessions. ISTC will coordinate review of the questions and focus group session procedure by the Institutional Review Board (IRB).
- ISTC will be responsible for conducting each focus group session and note taking. The sessions will be planned as in-person sessions, with an option to become virtual sessions if necessitated by scheduling issues, health and safety concerns, etc.

### **Deliverables**

- A draft summary of current practices including details on campus solid waste collection, highlights of current and planned waste reduction efforts, process flow diagrams and responsible parties for recyclables and landfill-bound waste streams, to be included in the final report/waste management plan. This will be completed prior to commencement of the waste characterization study.
- A draft summary of focus group feedback, arranged by themes which emerged during discussions. This will also be included in the final report/waste management plan. This draft summary will be provided within 30 days of the final focus group session.

These drafts will be reviewed with F&S and revised as needed prior to inclusion in the final public-facing report produced during Task 2 below.

## **Task 2: Waste Characterization Study and Final Report Preparation**

### **Objective**

Conduct a waste characterization study for the activity zones elected by F&S that accurately identifies waste composition, with detailed breakdown of types of materials generated, to create a waste generation profile for those activity zones.

### **Approach**

The buildings selected for inclusion by F&S include some buildings that were included in the previous campus building waste characterization study to allow temporal comparison of waste stream data. Where possible (based on number of selected buildings and three-bin station deployment), the buildings selected for activity zones include one with and one without the newer three-bin recycling collection stations, to allow comparison of quantity and quality of the recycling stream across these different conditions.

ISTC will conduct a waste characterization assessment (waste audit) for activity zones elected by F&S, by characterizing all landfill and recycling streams generated in audited buildings during designated sampling days. The ASTM standard test method for determination of the composition of unprocessed

municipal solid waste through manual sorting (ASTM D5231) will be used as the guiding document to conduct sampling and sorting.

**Material Categories:** ISTC will work with F&S to identify sorting categories according to material acceptance and project objectives. In waste characterization studies at other institutes of higher education, ISTC has hand sorted samples into 25 categories as illustrated below. ISTC’s budget assumes sorting no more than 35 material categories.

GROUP	FIBER	ORGANIC	METAL	PLASTICS	GLASS	MISCELLANEOUS
RECOVERABLE Currently Recyclable or Compostable	1.Corrugated Cardboard	5.Food Scraps	9.Aluminum Cans	13.Plastic Beverage Containers	18.Glass Beverage Containers	21.Bulbs/Lamps
	2.Office Paper	6.Food Soiled Paper	10.Tin/Steel Cans	14.Other Plastic Containers	19.Other Glass Containers	22.Regulated Electronic Goods
	3.Miscellaneous Paper	7.Yard Material	11.Other Metal Containers	15.Film Plastic		23.Batteries
NON-RECOVERABLE Currently Landfilled	4.Composite Paper	8.Composite Organics	12.Composite Metal	16.Plastic Foodservice Ware	20.Composite Glass	25.Bulky Items
				17.Composite Plastic		

**Sample Collection & Weight:** ISTC and F&S will work with Building Service Workers (BSWs) at audited buildings to ensure that landfill-bound waste and recycling stream bags are placed in separate containers for collection on designated sampling days (e.g., a swing pan separate from a building’s designated dumpster or recycling carts). Sampling days will be scheduled with the regular waste collection schedule for audited buildings in mind, to ensure that materials set aside on a sampling day are from that day only (i.e., not representative of multiple days, as would be the case just prior to a regular waste pickup day). F&S will coordinate collection of the separated samples and delivery to the sorting location.

Consistent with the ASTM method and industry standards, ISTC recommends individual samples weigh between 200 to 250 pounds. It is also recommended that samples be collected from each audited building for at least two days to ensure a representative sample of materials. ISTC will work with F&S to determine the exact number of sample collection days for each activity zone, based on previous waste generation data for each audited building, to ensure appropriate sample weights are obtained, and that samples are representatives with limited bias.

**Sorting Location:** All samples will be hand sorted on the UIUC Campus. Sorting will be conducted within ISTC's Waste Characterization Trailer or other enclosures available at the facilities. The enclosed trailer is equipped with a custom-built sorting table, LED lights, a floor scale, and auxiliary equipment required to perform the waste sorts.

Prior to the sorting events, ISTC will work with UIUC staff to ensure that the sorting area is adequately equipped with electricity, heating, ventilation, lighting, running water, and sewer services, as well as proper safety equipment and systems.

It is anticipated that sorting will occur at the Waste Transfer Station site to streamline transportation of samples by F&S and appropriate disposal or collection of trash or recyclables from samples after sorting is complete.

**Sorting:** ISTC staff, along with any volunteers, will sort and weigh the materials according to the predetermined sorting categories. ISTC will use its waste audit trailer which includes all supplies, equipment, and personal protective equipment (PPE) for material sorting, weighing, and documentation. The ISTC waste audit trailer will stay on-site at the sorting location during the duration of the project. It is expected that 10-15 volunteers (students, faculty, F&S staff or interns, or other interested campus community members) will be recruited by F&S and/or iSEE, to assist with conducting the waste sort. Volunteers will sign up for shifts that last a minimum of two hours.

ISTC will provide on-site training and required PPE to volunteers upon their arrival for their sorting shifts. Training will include review of a health and safety plan (see Appendix C) sent to volunteers via email prior to their shifts. Each volunteer will be required to sign off on their agreement to comply with the health and safety plan, as well as to sign a likeness release form (so that any photos including them may be used in the final report or related materials).

Everyone on the sorting team is assigned specific material categories to handle to ensure consistent collection of materials. Pairs of sorting team members will stand across from each other during the sort and periodically check on each other's physical condition. For further details, see Appendix C.

**Data Recording:** One ISTC staff member will be responsible for weighing and recording weights for all samples, to maintain consistency. Immediately after the sort, data from paper logs will be reviewed for each sample to ensure that individual entries are unique; that notes on any unusual aspects of the sample are legible and understandable; and that a minimum volume of waste according to the ASTM standard, as recorded on the presort weight sheet, was sorted. Photos will be taken of any unusual/unidentifiable components of the sorted waste to assist with later analysis. In general, photos will be taken throughout the sorting process, for use in the final waste characterization report, and subsequent campus waste-related education and outreach efforts.

**Data Analysis & Report Preparation:** ISTC will analyze the waste audit data to prepare an assessment report to create a new baseline of material generation data that can be used to benchmark current processes and diversion rates, contamination rates, guide improvements and modifications, and verify

and measure current programs. When analyzing waste audit data, ISTC will produce visualizations identifying potential material fates (e.g., avoidable, currently recyclable, landfill bound, potentially recyclable, compostable), to better inform opportunities for waste reduction and diversion. For buildings that were included in previous waste characterizations on campus, comparisons of the current waste stream components to those found in the previous study will be made.

Waste characterization data will be considered together with materials management, process flow data, and stakeholder input from Task 1 to formulate recommended strategies to reduce waste generation and increase material diversion, as well as methods to monitor and track progress for each stream audited will also be included. These recommendations will be organized by location (campuswide or specific activity zones) and potential impact on waste reduction and/or diversion (low, medium, or high).

Wherever adequate data is available or can be calculated, ISTC will provide cost impacts for each alternative scenario, which will account for avoided hauling costs, incurred costs, and associated GHG emissions reductions using EPA's WARM model.

The final public-facing report will not only include waste characterization data and analysis, and recommendations for improvement, but also finalized summaries of current practices and feedback received in focus group sessions from Task 1.

ISTC will review the report with F&S and accommodate one round of revisions as necessary.

### **Deliverables**

- Waste characterization coordination and sorting
- A public-facing recycling and waste reduction opportunity assessment report that includes:
  - Finalized summaries of current practices (including process flow diagrams) and focus group session feedback (from Task 1).
  - Waste characterization data along with various data visualizations.
  - Recommended strategies to reduce waste generation and increase material diversion, as well as methods to monitor and track progress for each stream audited will also be included. These recommendations will be organized by location (campus wide or specific activity zones) and potential impact on waste reduction and/or diversion (low, medium, or high).
- All supporting raw data, tables, graphics, and photos created during the project.



## Timeline

Task	Aug. 2023	Sep. 2024	Oct. 20224	Nov. 2023	Dec. 2023	Jan. 2024	Feb. 2024
1. Stakeholder Engagement & Review of Current Practices							
2. Waste Characterization Study & Final Report Preparation							

## Budget

### 4 Activity Zones, 8 buildings

Personnel (fully burdened rates)	\$34,783.00
(2) ISTC Zero Waste Staff to Conduct Focus Group Sessions	
(3) ISTC Zero Waste Staff Conducting the On-Site Audit	
(4) ISTC Zero Waste Staff Assisting in Report Development	
Travel	\$2375.00
Equipment & Supplies	\$800.00
<b>Total Project Costs</b>	<b>\$37,958.00</b>

## Appendices

### Appendix A. Summary of Project Responsibilities

#### ISTC Responsibilities

- Conduct waste characterization planning meetings and building walkthroughs.
- Coordinate waste characterization sampling and sorting procedures and protocol and provide all necessary training, equipment, and supplies.
- Assessment and Opportunity Report summarizing waste characterization data and detailing opportunities for improving recycling and organics diversion. The report will also include sections on current conditions/practices and feedback from focus group sessions.
- Meeting between ISTC and UIUC F&S to discuss waste characterization results and potential opportunities.
- All supporting raw data, tables, graphics, and photos created during the project.

#### UIUC F&S Responsibilities

- Support walkthroughs for waste characterization planning and understanding of current practices.

- Provide adequate space(s) for ISTC to be able to sort waste characterization samples at the campus Waste Transfer Station.
- Ensure that only key personnel at facility will be notified of the waste characterization to ensure an unbiased and holistic sample.
- Assist with the coordination of material collection during designated audit days / timeframes, as well as the disposal of the audited waste after the assessment. Transport samples from each building being examined to the sorting location.
- Support audit sorting with F&S staff, interns, or other campus volunteers.

## Appendix B. Zero Waste Illinois Specialists



**Savannah Feher** is a Senior Scientific Specialist at ISTC. In her role at ISTC, Savannah supports research and sustainability reporting for a variety of clients ranging from universities to manufacturers. In addition, she assists in waste assessments and implementation planning for the Zero Waste program. Savannah has assisted in the

conduction, sorting, data processing and report development for waste audits performed for the [University of Illinois at Chicago \(UIC\)](#) and, [Missouri State University](#), Lewis & Clark Community College as well as at two food manufacturing facilities. Savannah's data analysis and client outreach and surveying recently contributed to the development of the [Illinois Materials Management Advisory Committee Report to the General Assembly](#). Savannah was previously a Sustainability Education intern with the Missouri Botanical Gardens Earthways Center where she participated in community outreach and youth education as well as design and content editing of teaching guides. She graduated from Illinois Wesleyan University in 2017 with a B.A. in Environmental Studies and received a Graphic Design minor.



**Zach Samaras** is a Technical Assistance Engineer based in Chicago. In his role at ISTC, Zach supports Zero Waste & Energy Efficiency research, engagement, and on-site assessments. He is currently focused developing a [farm-to-food bank](#) program for Feeding Illinois in order strengthen Illinois's food system, feed hungry people, and reduce food waste on farms. Zach also conducts Waste Reduction, Pollution Prevention and Energy Efficiency site assessments at manufacturing facilities and

water treatment plants throughout Illinois. He previously worked as an Illinois Solar For All Outreach Specialist for the North River Commission, working to ensure environmental justice communities have a role in the transition to renewable energy. He is a graduate of Indiana University and has a Master's in Environmental Sustainability from Loyola University Chicago.



**Joy Scrogum** is an Assistant Research Scientist, Sustainability, with 21 years of experience in pollution prevention (P2) outreach and sustainability technical assistance. Joy works primarily on zero waste initiatives, helping businesses, organizations, and individuals identify and implement strategies for waste reduction and efficiency. She recently contributed to the [Forest Preserves of Cook County Sustainability & Climate Resiliency Plan](#), the [Forest Preserves of Cook County Clean Energy Framework](#), and [Exploring the Development of an Illinois Farm to Food Bank Program](#), as part of ISTC's Farm to Food Bank project with Feeding Illinois. Relevant to this proposal, Joy has been part of ISTC's analysis and materials management planning work with the University of Illinois Urbana-Champaign and Chicago campuses, Northwestern University, and Missouri State University. Joy has an M.S. in Natural Resources and Environmental Sciences from the University of Illinois at Urbana-Champaign, is a [LEED Green Associate](#), and a [Sustainability Excellence Professional \(SEP\)](#). She has been recognized as the [2022 Fred Granek Memorial P2 Ambassador](#) by the National Pollution Prevention Roundtable (NPPR).

**TBD**, a Senior Scientific Specialist, Sustainability.

## Appendix C. Health and Safety Plan for Waste Stream Characterization Field Studies

### Objectives

This plan is designed to foster a safe environment and minimize risk for all parties involved in the waste stream characterization study. It was designed to outline the following objectives:

- To describe the roles, responsibilities, and expectations for all parties involved
- To outline the required personal and environmental safety equipment
- To provide training and documentation of the proper procedures for collecting, moving, sorting, characterizing, weighing, and disposing of wastes
- To provide contingency plans for hazards that might be discovered during the study
- To enable a safe working environment by providing emergency information in one place

### Roles and Responsibilities

#### On-site Manager (OM)

The OM is the ISTC staff member responsible for coordinating activities on a sorting day (this could be different people from day to day). The OM is responsible for the health and safety of the entire team working on the physical sort. The OM is solely responsible for providing training for all workers involved in the waste sorting process. (*See Sorting Procedures Manual section*)

Before the sort, the OM will be responsible for inspecting the sorting site for any possible hazards that could impact the health and safety of the team. This process will involve identifying the locations of the following:

- Suitable sorting area
- Emergency telephone & contact phone numbers

- Drinking water source
- Restrooms & break facilities
- Storm shelter
- Traffic patterns in the sorting area

The OM will be the first person on site and will be responsible for securing the sorting area by marking any boundaries or hazards. They will also make note of any other equipment or activities that take place in the shared space as to mitigate unsafe interactions between the sorting crew and the normal operations of the host facility. During the physical sort, the OM will be responsible for managing the collection, inspection, and weighing of waste to be sorted. The OM has the direct authority to ask anyone found in violation of the health and safety policy to cease activity and leave the sorting site immediately.

### Sorter

The sorter is the heart of the operation and is responsible for the collection, identification, and separation of the materials provided to the team by the OM. They are responsible for adhering to the training provided at the beginning of their shift. This includes wearing all the required personal protection equipment, following written procedures, and taking direction from the OM during the workday. Any sorter found in violation of the safety procedures risks disciplinary action or the possibility of immediate dismissal from the sort by the OM.

## Safety Equipment

### Personal Protective Equipment (PPE)

During sorting activities there will be a basic level of PPE that will be required for anyone that enters the sorting area. Due to the nature of the work, there will be some instances where the basic PPE are inadequate, and the team will need to wear enhanced PPE to protect from exposure to potentially hazardous conditions.

- **Basic PPE**
  - Protective cotton coveralls
  - Protective eyewear
  - Boots
  - Nitrile inner glove
  - Cut / puncture resistant gloves
- **Enhanced PPE**
  - Tyvek (or equivalent) protective suit
  - N95 Respirator
  - Reflective vest (if in high traffic area)
  - Ear plugs (if needed)
  - Hard hat (if overhead hazards exist)
  - Steel toed boots

### Site Safety Equipment

In the university laboratory environment, there is potentiality for known unknowns to exist in the waste stream, therefore adequate protections must be in place in order to manage any material that could be a waste from a specific building.

- **Personal Safety**
  - Industrial First Aid Kit
  - Eye-Wash kit
  - Baby wipes
  - Cellphone
  - Insect repellent
  - Cooler (with cold water & ice)
  - Tent or shelter
  - Traffic cones / barricades
  - Yellow caution tape
  - Fire extinguishers (Class A & D)
  - Hand rake
  - Heaters (if necessary)
  - Fans (if necessary)
  - Emergency notification information
  
- **Hazard Containment**
  - Large tongs
  - Dustpan
  - Squeegee (for liquids)
  - Sorting Table
  - Trash can (lined with black bag) labelled for biohazards
  - Rubbermaid containment tote
  - Decontamination spray (10% Chlorine bleach / 90% Water)
  - Large sharps container

## Field Sorting Protocols

### Site Control

During the preliminary phase of the project, the OM will work with the facility's manager to select an adequate site for the sorting activity to take place. A weather check for the forecast will be noted to avoid severe weather or unsuitable working conditions in the field. Upon arriving to the site, the OM will secure the area where the sorting is to take place by placing traffic cones around the area. If there is a foot traffic pattern that will be interrupted by the sorting activity, adequate precautions must be taken to re-direct the traffic by using caution tape and traffic cones.

### Sample Control

Once the site has been secured the OM will inspect the source containers to identify any potential hazards. If any hazards are found, they will be documented and photographed for the record. After the container has been inspected the OM will remove the material to be sorted and transport it to the sorting area where it will be weighed before it is put onto the sorting table. The OM is solely responsible for opening each bag to be sorted, in a directed effort to minimize team exposure and maximize protection from unknown hazards. Categories for sorting will be pre-determined before any activity begins, and examples for each category will be readily available during the training process.

### Sample Security

Each bag will be opened by the OM using a safety bag cutter to cut open the top of the bag, taking

care not to open any subsequent bags that may be contained inside the larger bag. This procedure is necessary to ensure that biohazard bags are left whole during the process. After the bag has been opened, the contents will be spread out onto the sorting table using a hand rake. During this time the material will be photographed and inspected to verify the absence of hazards, and it is only after the bag has been cleared by the OM that the team can begin the sorting process.

### Sorting Protocol

Once cleared by the OM the team members will further spread the material onto the sorting table with hand rakes, taking time to pick out any large objects that can easily be categorized.

## Safety Protocols

### Red Biohazard Bags

If disposed of properly these bags will not pose a threat to the sorting team, but precautions still need to be taken to eliminate exposure. Once a red biohazard bag has been found the OM will use tongs to remove the bag from the waste sorting table and will dispose of it into a labelled trash container lined with a black trash bag.

### Chemical Containers

If non-empty chemical containers are found during the waste sorting procedure, they will be placed into the designated Rubbermaid containment container and the Division of Research Safety (DRS) will be called to come collect the hazard.

### Radiological Hazards

In the university setting there are some facilities that generate radiological waste material, therefore special precautions will be taken to eliminate risk of exposure. Before any work begins at a site that uses radiological material, the OM will follow training to verify that the waste is absent of radiation. This inspection should also examine the recycling materials that are leaving the building. If during the sort, the team finds an in-tact radiological warning sticker on a bag, the sort will immediately be halted and the radiation section of the division of research safety will be called to assess the situation.

## Sorting Procedures Manual

Due to the visual nature of material identification, the majority of the necessary training will be performed on the job site. To expedite the process of sorting, each team member will be responsible for picking out only few types of components. When each team member has specific materials that they are expected to pick, the likelihood of proper identification is increased. The following is a generalized procedure, as each application will differ.

1. The OM will inspect the sorting area for any possible hazards; once cleared the team will

spread the contents out onto the table with hand rakes and tongs.

2. The team member(s) will pick through the material, selecting only the materials that meet their assigned requirements.
3. Once the material is selected it will be deposited in the pre-selected container.
4. After the entire sample has been sorted, or the sorting container has reached maximum volume, the OM will weigh and record the data.
5. The team will empty the material back into a proper bagged container, where it will be re-deposited into the dumpster.

The following is an example of the agreement each non-ISTC staff sorter will be asked to sign when reporting for their shift.

#### Agreement to Comply with the Health and Safety Plan

1. All waste sorting personnel should: be in good physical condition, have had a recent physical examination, maintain a current tetanus booster, not be sensitive to odors and dust, and be able to read warning signs/labels on waste containers.
2. There will be absolutely no eating, smoking, or drinking during sorting activities. Food and liquids are to be away from the sorting area. Hands and faces should be washed thoroughly before eating or drinking.
3. The "line of sight buddy system" must always be maintained at the sorting site. The "line of sight buddy system" is as follows: sorters are grouped into pairs and each member is to periodically assess the physical condition of his/her "buddy".
4. Always wear the following before beginning the sorting procedure: both pairs of gloves, safety glasses, and protective cotton or Tyvek overalls. The OM will inform if site requires additional PPE such as dust mask and *steel toed boots*.
5. Do not attempt to identify unknown chemical substances present in the waste stream: red colored bags, vials of chemicals, unlabeled pesticide/herbicide containers, and substances (e.g., chemicals, or needles) in unlabeled plastic/glass bottles/jugs.
6. A hazardous waste is waste that poses substantial or potential threats to public health or the environment. If hazardous wastes are detected, notify the OM and DRS will be notified.
7. Biohazardous wastes are generally disposed of in red, plastic bags. Treated biohazardous wastes (by incineration, autoclave, chemical sterilization, etc.), are also usually in red bags. If biohazardous wastes are detected, the sort will be halted and the OM will be notified, appropriate action will be carried out by the OM.
8. A potential hazard that can arise in waste sampling is the presence of biohazardous wastes that are not in red bags, referred to as "fugitive regulated wastes". Sorters must be on alert for the indicators of fugitive biohazardous wastes: hypodermic needles, needle covers, medical tubing, articles contaminated with red (blood) colored substances, and medical device packaging. If fugitive biohazardous wastes are detected, the sort will be halted and the OM

will be notified.

9. When sorting glass, remove the large pieces first, and then remove the clear glass. Never use your hands to dig down through the waste. Use a rake or small shovel to pull/push the material to the side and continue sorting.
10. At the end of each shift, remove all disposable PPE (if any) into a plastic trash bag, and place the bag into a solid waste receptacle. All sorters must shower at the end of each shift.

I \_\_\_\_\_ (print name) have read and understand the health and safety plan and will follow the procedures and protocols detailed in the plan for waste characterization at all designated sites.

I \_\_\_\_\_ (print name) hereby grant the University of Illinois permission to use my likeness in a photograph, video, or other digital media (“photo”) in any and all of its publications, including web- based publications, without payment or other consideration.

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(Signature)