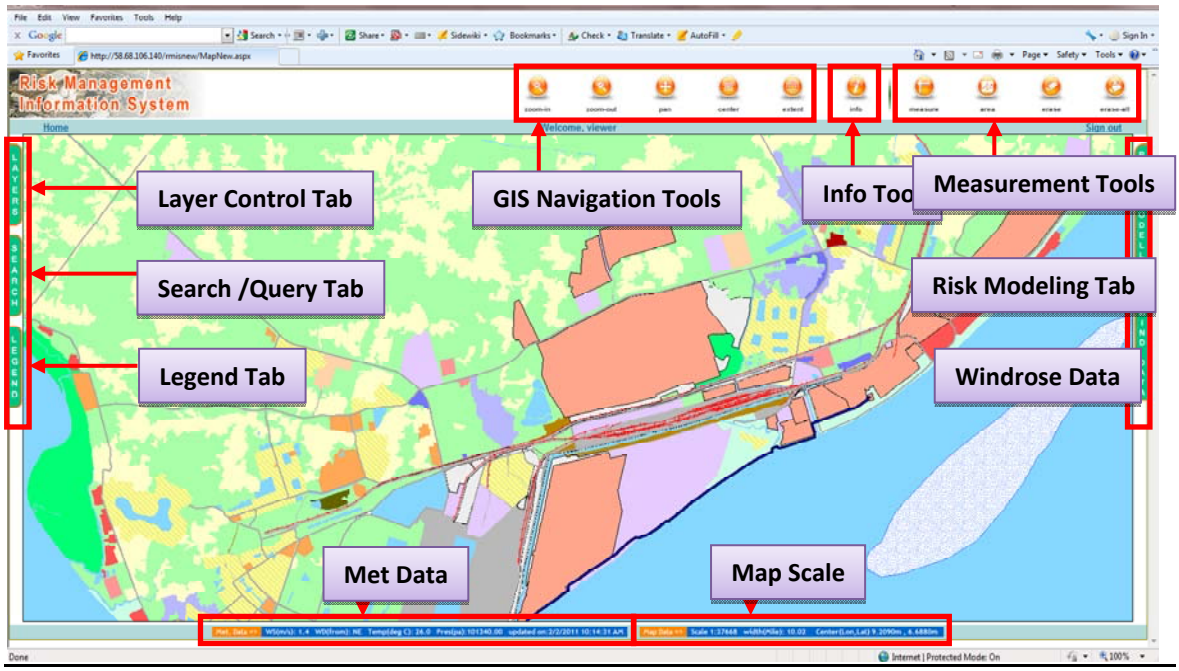
Risk Management Information System (RMIS)

EXERCISE – A

Application of RMIS for technological risk management – Exploring Information System Capabilities

This exercise deals with familiarization of the RMIS application software and using it for identification of industrial risks in Risk City. The exercise is designed to familiarize first users with the RMIS user interface and use it to identify the Maximum Accident Hazard industries (MAH), their chemical storages and the potential vulnerable receptors in the vicinity of these MAH industries. Users will also query on industries, chemical storages and emergency responders to obtain their primary information, equipment details, etc. using in-built search options. In addition, users will browse through the online MSDS application integrated with the RMIS. At the end, the instructor will demonstrate to users how to update industry primary information, hazardous storage details, emergency equipment details etc. and get to see the changes in RMIS in real time.

1. Open Internet Explorer (IE).
2. Type in http://58.68.106.140/rmisnew in the IE address bar.
3. Sign in to the system using username : **viewer** and password : **viewer01**



Map Functions

1. The RMIS application opens with the map zoomed to the full extent of the area of Risk City.
2. Based on your appreciation of Risk City (from earlier exercises), can you now identify the MAH industries, the river, the rail network, the roads and the villages on the map? Share your findings with other members of the group.
3. Click the Legend Tab on the left to open the map legend and confirm your findings.
4. Select the **zoom-in**  button on the toolbar and zoom into one of the MAH industries by drawing a rectangle on the industry that you want to zoom in.
5. Can you see the storages separately from each other? Storages are marked as orange dots within the MAH industry premises.
6. Click on the **extent**  button on the toolbar to zoom to the full extent of the map.
7. Select the **info**  button on the toolbar and click on a MAH industry on the map. Which facility name and associated information do you get to see on

the popup window? Also note the facility primary data (address, contact information, phone numbers etc.) and the list of hazardous storages.

Ans:

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8. Select the **zoom-in**  button on the toolbar and zoom-in on an MAH industry up to the extent so that you can identify the storages separately.

9. Now select **info**  button on the toolbar and click on one of the storages. Which storage name do you get in the popup window? To which industry does the storage belong? What is the name of the chemical that is stored?

Ans :

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10. Click on the chemical name in the popup window to open the Material Safety Data Sheet (MSDS) for the chemical. Can you identify the CAS No., Synonyms, and Formula for the chemical?

Ans :

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11. Select the **pan**  button on the toolbar and click anywhere on the map and drag it to the desired location within the map area.

Search Function

1. Click on *Search tab.*
2. Select **Industry** from the list of layers.
3. Select **Haldia Petrochemicals Limited** from the list of industries.
4. Click *Search*. The industry is selected spatially on the map and related attribute information is displayed, in a pop-up window, in different categories.
5. Can you identify the **Chemical** stored in HPL-TK17? What is the storage **Capacity** of HPL-TK17? Can you check the MSDS of the chemical? What is its Formula?

Ans :

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6. Click on the **HPL-TK17 hyperlink.** Notice that attribute information related to the storage tank is displayed in a pop-up window.
7. What is the **Maximum Storage Quantity** by Volume? Can you identify the **Storage Type** and **Storage Material**? What is the **Storage Shape**? After noting down the required information, close the storage tank information pop-up window.

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8. In the Industry information pop-up window, click on the **Map** hyperlink next to HPL-TK17. Can you locate the storage tank on the map? Can you zoom-in to identify the tank separately from other tanks?
9. On the *Search tab,* select **Chemical Storage**.
10. Select **LPG** from the list of chemicals and click *Search*.
11. From the popup window, write down the names of the facilities and storages where LPG is stored. Can you locate one of the storages on the map?

Ans :

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12. Now can you search for industries where LPG storage **Quantity** is greater than (**>**) **2000** MT? Write down the industry names.

Ans :

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13. Click on **Advanced Search**.
14. Select the **Quantity** option and choose greater than (>) option. Type 1000 in the value field.
15. From the **Chemical Nature List** select Flammable and Highly Toxic options as YES. Click on **Search**.
16. From the popup window can you list down the industry names and the chemicals that are stored in excess of 1000MT and have flammable and highly toxic nature?

Ans :

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17. Perform a similar search where **chemical nature** is **toxic** and storage **Quantity** is greater than equal to **18000 MT**. Is there any difference in selection of industries from the ones that were selected in the previous query? Write your observations in the space provided below.

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18. From the "Met Data Live Bar" at the bottom of the screen, note down the values of Wind Speed, Wind Direction, Temperature and Pressure. At what time has the fee been last updated.

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19. Click on the Wind Data tab.
20. From the windrose being shown, can you identify the predominant wind directions prevailing for today?

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21. Can you check the predominant wind directions for today at the following time periods: 12am-6am, 6am-12pm, 12pm-6pm? Can you distinguish any change?

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22. Can you check the average wind data for the month of January 2011 and comment on whether it matches with today's predominant wind directions?
23. Click on the *Logout* link to sign out of the RMIS. You will be taken to the sign in page.

Data Updation

This section of the exercise will be instructor led. The instructor will demonstrate to the participants, the process of updating industry and associated hazard information using RMIS. During the update process, the participants will also be able to use RMIS interactively to verify the updated information.

1. The instructor will update facility information for Haldia Petrochemicals – updation of plant manager's contact number and the emergency contact numbers.
2. The instructor will change information for tank HPL-TK04 – Average Fullness, Active Controls, and possible failure scenarios.
3. The participants will now verify the changed information using the information and search tools provided within RMIS.

Risk Management Information System (RMIS)

EXERCISE – B

Application of RMIS for technological risk management – Decision Support Capabilities

This exercise deals in use of the RMIS application software for evaluating chemical risks in Risk City. The exercise is aimed at industry users, emergency responders and the local administration that would use the Risk Modeling Module of the RMIS to be able to simulate various accident scenarios and generate hazard footprints. Subsequently they will also evaluate the vulnerabilities that might arise out of such scenarios. The purpose of the exercise is to enable industries, emergency responders and administration to quickly formulate emergency strategies and initiate appropriate response actions in the event of a chemical risk incident.

4. Open Internet Explorer (IE).
5. Type in http://58.68.106.140/rmisnew in the IE address bar.
6. Sign in to the system using username : **viewer** and password : **viewer01**
7. In order to model a risk scenario, click on the *Risk Modeling* tab.
8. You will have to first set the *Atmospheric Data* in order to model a hazard scenario.
9. Once the parameters for atmospheric data are set, click on the *Set Parameters button* followed by the *OK* button. Next, click on the *Hazard Modeler* tab.

Accident Scenario - Toxic Release

1. Click on the *Risk Modeling* tab. The Risk Mapping Wizard will open.
2. Within the wizard, click on the *Atmospheric Data* tab. Set *Wind Speed* at 6m/sec, *Temperature* at 35^{o}C, *Time of Event* at 11:00 am and *Cloud Cover* at Clear. Also, use the compass to set the *Wind Direction* to a position between West and North West.
3. From the list of industries, select **Sanjana Cryogenic Storages Limited.**

4. From the list of storages, select the **ammonia tank**.
5. RMIS will automatically show you a list of possible risk events, depending on the physical and chemical properties of the chemical stored and the environmental conditions of the selected storage tank. Select **Toxic Release** as the risk event and click *Next* ( ) button.
6. Note that the risk event summary is displayed in the information window within the Hazard Modeler. Review the information and write down the atmospheric Stability Class, Chemical Name, Risk Event, Chemical Properties, Maximum Storage Capacity, Average Fullness in MT, Environmental Condition of the Storage and the IDLH value of the chemical.

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7. Click *Next* button. From the Hazard Scenario options, select **Alternative** and click *Next* button again.
8. In this step, RMIS will prompt you to provide the amount of chemical released in the atmosphere, duration of release and the height of the rupture (from ground level) from where the chemical is escaping into atmosphere.

   For the purpose of this exercise, we will assume that 150 MT of ammonia has escaped into the atmosphere, over a period of 25 minutes from a rupture which is 15mts. high from the ground. Provide the values in the appropriate fields and click *Next* button.
9. The RMIS allows you to calculate potential vulnerability that could arise out of an accident scenario based on either population data averaged at the habitation

level or population data average from a cluster of buildings. For the purpose of this exercise, select **Habitation** option.

In addition, type 150 and 100 as IDLH values against the Moderate and Low fields, respectively. Click *Generate Risk Event* button.

10. RMIS will draw a directional hazard footprint on the map, aligned with the wind direction selected by you, and also display information related to the risk event in a popup window. Observe the results carefully and answer the questions below:
    a. What are the end point distances of the Red, Orange and Yellow zones?
    b. Can you relate the end point distance of the Red zone to the MSDS of the chemical?
    c. How many industries are affected by the toxic release?
    d. What is the total number of affected population?
    e. Can you identify any responder in the list of affected responder/receptors? If yes, can you locate the responder on the map?

    Ans :

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11. Close the popup window and click on the Erase All () button on the map navigation toolbox.
12. Click on *Atmospheric Data* tab. Change the time of the event to 11:00pm and set the Wind Direction to a position between West and North West. Click on the *Set Parameters* button followed by the *OK* button.

13. Next, click on the *Hazard Modeler* tab and note down the value of atmospheric Stability Class from information window within the Hazard Modeler. Why has it changed?

Ans :

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14. Click *Generate Risk Event* button.
15. Observe the results carefully and answer the questions below:
    a. What are the end point distances of the Red, Orange and Yellow zones? Why are they different from the earlier results?
    b. How many industries are affected by the toxic release?
    c. What is the total number of affected population?
    d. While most of the modeling parameters are same as the previous scenario, why is there a change in the affected population?
    e. Zoom-in on the area of the map affected by the Red Zone to see the buildings and industries falling under the zone more clearly.

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Accident Scenario – Vapour Cloud Explosion (VCE)

1. Click on the *Risk Modeling* tab. The Risk Mapping Wizard will open.
2. Click on the *Atmospheric Data* tab and set Wind Speed at 2m/sec, Temperature at 35^{o}C and Time of Event at 2:00 pm.
3. Once the parameters for atmospheric data are set, click on the *Set Parameters* followed by the button *OK* button. Next, click on the *Hazard Modeler* tab.
4. From the list of industries, select **Hindustan Petroleum Corporation Limited.**
5. From the list of storages, select **HPCL-T017.**
6. RMIS will automatically show you a list of possible risk events, depending on the physical and chemical properties of the chemical stored and the environmental conditions of the selected storage tank. Select **Vapour Cloud Explosion** as the risk event and click *Next* ( ) button.
7. Note the risk event summary is displayed in the information window within the Hazard Modeler. Write down the Chemical Name, Risk Event, Chemical Properties, Maximum Storage Capacity, Average Fullness in MT and the Environmental Conditions of the storage tank. Click *Next* button.

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8. From the Hazard Scenario options, select **Alternative** and click *Next* button.

9. For the purpose of this exercise, we will assume that 790MT of the chemical has evaporated into the atmosphere and is involved in the risk event. Type **790** in the Amount of Chemical Involved field and click *Next* button.
10. The RMIS allows you to calculate potential vulnerability that could arise out of an accident scenario based on either population data averaged at the habitation level or population data average from a cluster of buildings. For the purpose of this exercise, select *Habitation* option and click *Generate Risk Event* button.
16. RMIS will draw a buffer depicting the hazard footprint on the map and also display information related to the risk event in a popup window. Observe the results carefully and answer the questions below:
    a. What is the end point distance of the hazard footprint?
    b. Based on your earlier experience in modeling a similar scenario in ALOHA, in what respect is the hazard footprint different in RMIS?
    c. How many industries are affected by the risk event?
    d. What is the total number of affected population?
    e. Is any emergency responder affected by the risk event?

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11. Close the popup window and click on the Erase All () button on the map navigation toolbox.
12. Now select *Building* option and click *Generate Risk Event* button.
13. Observe the new results carefully. What is the total number of affected population? Why is there a change in the value?

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14. Close the popup window and click on the Erase All () button on the map navigation toolbox.
15. Click on *Atmospheric Data* tab of the Risk Mapping Wizard and change the time of the event to 7:00pm. Click on the *Set Parameters* button followed by the *OK* button. Next, click on the *Hazard Modeler* tab.
16. Select *Building* option and click *Generate Risk Event* button.
17. What changes do you observe in the total number of affected population? Why?

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Accident Scenario – Boiling Liquid Expanding Vapor Explosion (BLEVE)

1. Click on the *Risk Modeling* tab. The Risk Mapping Wizard will open.
2. Click on the *Atmospheric Data* tab and set Wind Speed at 2m/sec, Temperature at 35^{o}C and Time of Event at 2:00 pm.
3. Once the parameters for atmospheric data are set, click on the *Set Parameters* button followed by the button *OK* button. Next, click on the *Hazard Modeler* tab.
4. From the list of industries, select **Haldia Petrochemicals.**
5. From the list of storages, select **HPL-SP05.**
6. RMIS will automatically show you a list of possible risk events, depending on the physical and chemical properties of the chemical stored and the environmental conditions of the selected storage tank. Select **BLEVE** as the risk event and click Next ( ) button.
7. Note the risk event summary is displayed in the information window within the Hazard Modeler. Review the information and write down the Chemical Name, Risk Event, Chemical Properties, Maximum Storage Capacity, Average Fullness in MT, and the Environmental Conditions of the storage tank.

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8. From the Hazard Scenario options, select **Alternative** and click Next button.
9. Note, that only 30% quantity of chemical stored in a tank is normally involved in a BLEVE. Calculate 30% of the average fullness quantity you have written in Question 7 and type the value in the Amount of Chemical Involved field. Click *Next* button, when done.
10. The RMIS allows you to calculate potential vulnerability that could arise out of an accident scenario based on either population data averaged at the habitation

level or population data average from a cluster of buildings. For the purpose of this exercise, select *Habitation* option and click *Generate Risk Event* button.

11. Carefully observe the results on the map and the popup window.
    a. How many industries are affected by the risk scenario?
    b. What is the total number of affected population?
    c. How many responders are affected by the risk scenario?

    Ans :

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12. Now, you will re-generate the Risk Event and assess vulnerability based on buildings. Click on *Previous* () button, and increase the amount of chemical involved by 20% of its present value. Click on *Nex*t button and select *Buildings* option. Click on the *Generate Risk Event* button. Carefully observe the results on the map and the popup window.
    a. Is there any change in the number of industries affected? If yes, what is the name of the industry?
    b. What is the total number of population affected when you generate the risk event based on buildings? Why is there a change in number of people affected?

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