

## HSR 2007 MISSIONS Version Sept 20, 2007.

Be sure to Read the HSR Field Setup and Mission Description document.

**Roof Solar Panel:** Move the Roof Solar Panel ONTO the roof of the House by the sea for 30 points.

**Personal Vehicle Choice:** Move the Hydrogen Car TO the white property or all-black driveway of the House by the sea and move the truck TO the farm to be re-purposed. The car in its target is worth 25 points only if the truck is in its target (One Robot Division). The car in its target is worth 40 points only if the truck is in its target (Two Division) The farm is the white area isolated between both rivers.

**Hydro-Dam:** Place the Dam so it is TOUCHING both banks of any river section east of Base for 25 points. The Dam must be upright. When the match is over, the referee places (or projects) the Flood upstream of the Dam and there is a single maximum 10 point deduction if any houses are being TOUCHED by the Dam or Flood. The Dam is never considered a stray object.

**Wind Turbines:** Place one Wind Turbines so it is TOUCHING the farm. Place one Wind Turbine so it is TOUCHING the white property of the House by the sea. The Wind Turbines must be upright. Scoring Wind Turbines are worth 20 points each.

**Grid Connection:** Place the Power Lines so they are TOUCHING the white of the Power Plant's property and the white of one of the adjacent communities. The Power Lines must be upright. A community connected to the Power Plant's property in this way is worth 15 points.

**Solar Power Satellite:** Lower one of the Satellite's panels for 15 points. If your robot is the first to do this, 5 points are added.

**Coal Mining:** Get the loaded Rail Car to roll down the Railroad tracks. Only if and when the loaded Rail Car TOUCHES the stoppers at the end, the team is allowed to retrieve it TO Base by hand for 10 points.

**Oil Drilling:** Move all the Oil Barrels OFF the Oil Platform for 15 points. The oil barrels (2 white, 1 gray) will be placed in random order on the platform. (see Oil barrel mission for more to do with oil barrels)

**Corn Harvest and Processing:** Move all the Corn (including the gray version) OUT of the Farm for 15 points. (see Oil barrel mission for more to do with oil barrels). Corn is arranged in random order. The corn may not be returned to base.

**Uranium Mining:** Move all the Uranium (including the gray version) OUT of the farm for 15 points. Uranium is arranged in random order. The uranium may not be returned to base.

**Tree Planting:** Move Trees so they are TOUCHING any of the tree markings on the mat. There are 25 tree markings. Trees must be upright. Pieces may NOT be connected or attached to the Trees. Planted Trees are worth 20 points each if planted in one of the 9 markings in community A or B (see HSR Field Setup). Planted Trees are worth 30 points each if planted in one of the 16 markings in the remaining communities (see HSR Field Setup).

**Power Plant Supply:** Move fuel TO the Power Plant's property.

- Black Coal: 2 points for each piece of black coal.
- Green Uranium: 10 points each
- Yellow Corn: 10 points each
- White Oil Barrels: 15 points each in One Robot Division. 20 points each in Two Robot Division
- Gray energy source: -5 points each (4 gray oil barrels, 1 gray corn, 1 gray uranium)

**Oil Barrels:** Oil Barrels may NEVER come into base. If they do, they are removed by the referee. In addition to the 3 barrels (2 white, 1 gray) on the platform, there are 3 barrels on the cargo area of the ship in the ocean (2 white, 1 gray), also arranged in random order. (See HSR Field Setup). The remaining 5 barrels (2 gray, 3 white) are placed as shown on the dock in always the same order as shown (2 gray closest to river).

**Bad Fuel Sequestering:** Gray fuel moved TO the coal mining property is worth:

- Gray Oil barrels: 10 points each
- Gray corn: 10 points
- Gray uranium: 10 points.
- Red coal: 2 points each (yes, if the coal is never moved during the match, these red coals count)

**Rescue Penalty:** If you rescue the robot, the referee takes one barrel away, starting with the closest to base. White will be taken before gray. Oil barrels in the target of either the power plant or coal mining property, are safe from removal. Oil barrels of either color in either target are safe. So a grey barrel in the power plant is safe from removal. There is a single maximum 40 point deduction if any Oil Barrel from anywhere is TOUCHING any water or property with a house.

**Parking Lot:** The parking lot is designated as a storage area with respect to the Housekeeping rule, so the team is allowed to move objects to and from the parking lot by hand for storage only. The robot is allowed to enter and exit the parking lot, but it is not allowed to make contact with scoring objects nor strategic objects there.

**No Fairness Bonus** for RCX or NXT.

## Bonus Points

### Head to Head placements.

- **1<sup>st</sup> Place.** 50 points added to best score in Head to Head.
- **2<sup>nd</sup> Place.** 30 points added to best score in Head to Head.
- **3<sup>rd</sup> place.** 20 points added to best score in Head to Head.
- **4<sup>th</sup> place.** 10 points added to best score in Head to Head.

## Further Definitions

**Please read the HSR Field Setup Document for definitions of Ocean Zone and Farm Zone.**

### Two Robot Division Definitions:

**Ocean robot:** The Ocean robot is the robot that can only travel within the Ocean Zone. It cannot extend into the Farm Zone. The Ocean robot must meet the robot definition rules and operates out of the Base per normal Base rules. It can complete any of the missions completely within the Ocean Zone.

**Farm Robot:** The Farm Robot is the robot that can only travel within the Farm Zone. Transfer/pickup of oil barrels or farm pickup from the Ocean robot must be outside the base (both robots outside the base). The Farm robot must meet the robot definition rules and operates out of the Base per normal Base rules. It can complete any of the missions within the Farm Zone.

**Rescue penalty.** These are treated the same, either robot incurring a robot return penalty will lose an Oil barrel.

## Rules

Please see the FLL Robot Rules (at [www.firstlegoleague.org](http://www.firstlegoleague.org)). All rules apply here with the following exceptions:

**6 ROBOT** The robot is defined as the RCX or NXT brick(s) and anything currently connected or attached to it. Mission models, strategic objects, separate pieces, and separate attachments are not part of the robot. The robot may have two bricks.

### 7 MATERIALS

With the exceptions noted in paragraph 7.5, EVERYTHING the team brings with it to the COMPETITION AREA of a tournament must be made entirely of LEGO elements in original factory condition. Electrical parts (which includes sensors) are limited in type and quantity to 2 "bricks" (any combination of RCX and NXT), Wires and converter cables are not limited. Stickers, paint, tape, glue, oil, etc. are not allowed, except marker can be used for owner identification in hidden areas only. This rule applies only to the competition area (except remote controls are not allowed anywhere).

In the Two Robot division, the team must have two independent robots, defined as above. Each Robot may have 2 "bricks" (any combination of RCX and NXT).

Objects functioning as remote controls are not allowed anywhere. There are no restrictions on the quantity or source of non-electric LEGO pieces. Wind-up/pull-back "motors" are allowed, and do not count as motors. Pneumatics are allowed. Stickers are not allowed except LEGO stickers applied per LEGO instructions.

7.5 Additional sensors allowed.

- Any of the following sensors from Hi Technic: (<http://www.hitechnic.com/>).
  - NXT Gyro
  - NXT IRSeeker

- NXT Compass
  - NXT Color sensor
  - NXT Acceleration Tilt sensor
- Any of the following sensors from MindSensors (<http://www.mindsensors.com/>)
  - Real time clock
  - NXT to RCX communication
  - Acceleration sensor (all 3 versions)
  - Dual infrared obstacle detector
  - Motor multiplexor
  - Compass sensor
  - Pneumatic pressure sensor
  - High precision (long, medium, and short) range IR sensors
- There are no limits to the quantities of these sensors.

**8 SOFTWARE** There are no limits on the software to be used to program the robot. Any package or language is legal.

## **Research Challenge**

See the Adventium Research Challenge Document (to be announced).