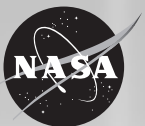


Appendix A: Baseline Space Shuttle Food and Beverage List

Abbreviations

A/S	Artificial Sweetener
(B)	Beverage
(FF)	Fresh Food
(IM)	Intermediate Moisture
(I)	Irradiated
(NF)	Natural Form
(R)	Rehydratable
(T)	Thermostabilized

	Chicken, Teriyaki (R)
	Cookies,
	Butter (NF)
	Shortbread (NF)
	Crackers, Butter (NF)
	Eggs,
	Scrambled (R)
	Mexican Scrambled (R)
	Seasoned Scrambled (R)
	Frankfurters (T)
	Fruit,
	Apple, Granny Smith (FF)
	Apple, Red Delicious (FF)
	Applesauce (T)
	Apricots, Dried (IM)
	Banana (FF)
	Cocktail (T)
	Orange (FF)
	Peach Ambrosia (R)
	Peaches, Diced (T)
	Peaches, Dried (IM)
	Pears, Diced (T)
	Pears, Dried (IM)
	Pineapple (T)
	Strawberries (R)
	Trail Mix (IM)
	Granola Bar (NF)
	Ham (T)
	Ham Salad Spread (T)
	Jelly,
	Apple (T)
	Grape (T)
	Macaroni and Cheese (R)
	Noodles and Chicken (R)
Beef w/BBQ Sauce (T)	
Beef, Dried (IM)	
Beef Patty (R)	
Beef Steak (I)	
Beef Stroganoff w/Noodles (R)	
Beef, Sweet n Sour (T)	
Beef Tips w/Mushrooms (T)	
Bread (FF)	
Breakfast Roll (FF)	
Brownies (NF)	
Candy,	
Coated Chocolates (NF)	
Coated Peanuts (NF)	
Gum (NF)	
Life Savers (NF)	
Cereal,	
Bran Chex (R)	
Cornflakes (R)	
Granola (R)	
Granola w/Blueberries (R)	
Granola w/Raisins (R)	
Grits w/Butter (R)	
Oatmeal w/Brown Sugar (R)	
Oatmeal w/Raisins (R)	
Rice Krispies (R)	
Cheddar Cheese Spread (T)	
Chicken,	
Chicken, Grilled (T)	
Chicken Salad Spread (T)	
Chicken, Sweet n Sour (R)	



Nuts,
Almonds (NF)
Cashews (NF)
Macadamia (NF)
Peanuts (NF)
Trail Mix (IM)

Peanut Butter (T)

Potatoes au Gratin (R)

Puddings,

Banana (T)
Butterscotch (T)
Chocolate (T)
Tapioca (T)
Vanilla (T)

Rice and Chicken (R)

Rice Pilaf (R)

Salmon (T)

Sausage Patty (R)

Shrimp Cocktail (R)

Soups,

Chicken Consomme (B)
Mushroom (R)
Rice and Chicken (R)

Spaghetti w/Meat Sauce (R)

Tortillas (FF)

Tuna,

Tuna (T)
Tuna Salad Spread (T)

Turkey,

Turkey Salad Spread (T)
Turkey, Smoked (I)
Turkey Tetrazzini²

Vegetables,

Asparagus (R)
Broccoli au Gratin (R)
Carrot Sticks (FF)
Cauliflower w/Cheese (R)
Celery Sticks (FF)
Green Beans and Broccoli (R)

Green Beans/Mushrooms (R)
Italian (R)
Spinach, Creamed (R)
Tomatoes and Eggplant (T)

Beverages (B)

Apple Cider

Cherry Drink w/A/S

Cocoa

Coffee,

Black
w/A/S
w/Cream
w/Cream and A/S
w/Cream and Sugar
w/Sugar

Coffee (Decaffeinated),

Black
w/A/S
w/Cream
w/Cream and A/S
w/Cream and Sugar
w/Sugar

Coffee (Kona),

Black
w/A/S
w/Cream
w/Cream and A/S
w/Cream and Sugar
w/Sugar

Grape Drink

Grape Drink w/A/S

Grapefruit Drink

Instant Breakfast,

Chocolate
Strawberry
Vanilla

Lemonade

Lemonade w/A/S

Lemon-Lime Drink

Orange Drink

Orange Drink w/A/S

Orange-Grapefruit Drink

Orange Juice

Orange-Mango Drink

Orange-Pineapple Drink



Peach-Apricot Drink

Pineapple Drink

Strawberry Drink

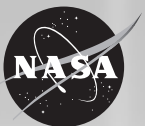
Tea,

- Plain
- w/A/S
- w/Cream
- w/Lemon
- w/Lemon & A/S
- w/Lemon & Sugar
- w/Sugar

Tropical Punch
Tropical Punch w/A/S

Condiments

- Catsup (T)
- Mayonnaise (T)
- Mustard (T)
- Pepper (Liquid)
- Salt (Liquid)
- Tabasco Sauce (T)
- Taco Sauce (T)



Appendix B: International Space Station Daily Menu Food List

Refrigerated

Dairy

Cheese
Cheese slices
Cream cheese
Sour cream
Yogurt, fruit

Fruits

Apple
Grapefruit
Kiwi
Orange
Plum

Frozen

Meat and Eggs

Beef:

Beef, brisket, BBQ
Beef, enchilada with spanish rice
Beef, fajita
Beef, patty
Beef, sirloin tips with mushrooms
Beef, steak, bourbon
Beef, steak, teriyaki
Beef, stir fried with onion
Beef, stroganoff with noodles
Luncheon meat
Meatloaf with mashed potatoes and gravy

Lamb:

Lamb, broiled

Poultry:

Chicken, baked
Chicken, enchilada with spanish rice
Chicken, fajita
Chicken, grilled
Chicken, oven fried

Chicken, pot pie
Chicken, stir fried with diced red pepper
Chicken, teriyaki with spring vegetables
Duck, roasted
Meatball, porcupine (turkey)

Pork:

Bacon
Bacon, Canadian
Ham, baked with candied yams
Pork, chop, baked with potatoes au gratin
Pork, sausage, patties
Pork, sweet and sour with rice

Seafood:

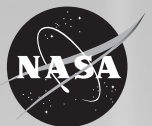
Fish, baked
Fish, grilled
Fish, saut ed
Lobster, broiled tails
Scallops, baked
Seafood, gumbo with rice
Shrimp, cocktail
Tuna, noodle casserole

Eggs:

Egg, omelet, cheese
Egg, omelet, vegetable
Egg, omelet, ham
Egg, omelet, sausage
Egg, omelet vegetable and ham
Egg, omelet, vegetable and sausage
Eggs, scrambled with bacon, hash browns sausage
Quiche, vegetable
Quiche, lorraine

Pasta mixtures:

Lasagna, vegetable with tomato sauce
Noodles, stir fry
Spaghetti with meat sauce
Spaghetti with tomato sauce
Tortellini with tomato sauce, cheese



Other:

Egg rolls
Enchilada, cheese with Spanish rice
Pizza, cheese
Pizza, meat
Pizza, vegetable
Pizza, supreme

Fruit

Apples, escalloped
Peaches, sliced with bananas, blueberries
Peaches with bananas, grapes, strawberries
Strawberries, sliced

Soups

Beef, stew
Broccoli, cream of
Chicken, cream of
Chicken noodle
Mushroom, cream of
Won ton

Grains

Biscuits
Bread
Cornbread
Dinner roll
Garlic bread
Sandwich bun, wheat/white
Toast, wheat/white
Tortilla

Breakfast items:

Cinnamon roll
French toast
Pancakes, buttermilk
Pancakes, apple cinnamon
Waffles

Pasta:

Fettuccine alfredo
Macaroni and cheese
Spaghetti

Rice:

Fried
Mexican/Spanish
White

Starchy Vegetables

Corn, whole kernel
Potato, baked
Potatoes, escalloped
Potatoes, oven fried
Potatoes, mashed
Yams, candied
Succotash
Squash corn casserole

Vegetables

Asparagus tips
Beans, green
Beans, green with mushrooms
Broccoli au gratin
Broccoli
Carrot coins
Cauliflower au gratin
Chinese vegetables, stir fry
Mushrooms, fried
Okra, fried
Peas
Peas with carrots
Squash, acorn with apple sauce and cinnamon
Zucchini, spears, fried

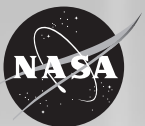
Desserts

Cakes:

Angel food cake
Brownie, chocolate
Chocolate fudge
Shortcake
Yellow cake with chocolate frosting

Dairy:

Ice cream, chocolate
Ice cream, strawberry
Ice cream, vanilla
Yogurt, frozen



Pies and Pastry:

Cheesecake, chocolate
Cheesecake, plain
Cobbler, peach
Pie, apple
Pie, coconut cream
Pie, pecan
Pie, pumpkin

Beverages

Apple juice
Grape juice
Grapefruit juice
Lemonade
Orange juice

Condiments

Margarine
Grated cheese

Cereals

Hot cereal:

Oatmeal
Cream of wheat
Grits

Thermostabilized

Fruit

Applesauce
Fruit cocktail
Peaches
Pears
Pineapple

Salads

Chicken salad
Tuna salad
Turkey salad

Vegetable:

Bean salad, three
Pasta salad
Potato salad, German
Sauerkraut

Soups

Chili
Clam chowder
Egg drop
Miso, Japanese
Vegetable

Desserts

Pudding, butterscotch
Pudding, chocolate
Pudding, lemon
Pudding, tapioca
Pudding, vanilla

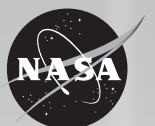
Condiments

Barbecue sauce
Catsup
Chili con queso
Cocktail sauce
Cranberry sauce
Dill pickle chips
Dips, bean
Dips, onion
Dips, ranch
Honey
Horseradish sauce
Jelly, assorted
Lemon juice
Mayonnaise
Mustard
Mustard, hot Chinese
Orange marmalade
Peanut butter (chunky, creamy, whipped)
Picante sauce
Sweet and sour sauce
Syrup, maple
Taco sauce
Tartar sauce

Beverages

Fruit juices:

Cranberry
Cranberry apple
Cranberry raspberry
Gatorade, assorted
Pineapple
Pineapple grapefruit
Tomato
V-8



Milk:

Skim
Low fat
Chocolate (low fat or skim)
Whole

Natural Form

Fruit

Apples, dried
Apricots, dried
Peach, dried
Pear, dried
Prunes
Raisin
Trail mix

Grains

Animal crackers
Cereal, cold
Chex mix
Crackers, assorted
Baked chips, tortillas
Baked chips, potato
Pretzels
Goldfish
Tortilla chips
Potato chips
Rye krisp, seasoned

Desserts

Cookies:

Butter
Chocolate chip
Fortune
Rice krispies treat
Shortbread

Snacks

Beef jerky

Nuts:

Almonds
Cashews
Macadamia
Peanuts

Candy:

Candy-coated chocolates
Candy-coated peanuts
Lifesavers
Gum (sugar free)

Eva Food

In-suit fruit bar

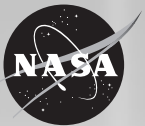
Rehydratable

Beverages

Apple cider
Cherry drink
Cocoa
Coffee (assorted)
Grape drink
Grapefruit drink
Instant breakfast, chocolate
Instant breakfast, vanilla
Instant breakfast, strawberry
Orange drink
Orange mango drink
Orange pineapple drink
Tea (assorted)
Tropical punch

Irradiated Meat

Beef steak
Smoked turkey



Appendix C:

Gemini Standard Menu (4-day cycle)

Day 1, 5, 9

Meal A

Peaches
Bacon Squares (8)
Cinnamon Toast Bread
Cubes (4)
Grapefruit Drink
Orange Drink

Meal B

Salmon Salad
Chicken and Rice
Sugar Cookie Cubes (4)
Cocoa
Grape Punch

Meal C

Beef and Potatoes
Cheese Cracker
Cubes (4)
Chocolate Pudding
Orange-Grapefruit Drink

Day 2, 6, 10

Meal A

Fruit Cocktail
Sugar-Coated Cornflakes
Bacon Squares (8)
Grapefruit Drink
Orange Drink

Meal B

Potato Soup
Chicken and Vegetables
Tuna Salad
Pineapple Fruitcake (4)
Orange Drink

Meal C

Spaghetti and Meat
Sauce
Ham and Potatoes
Banana Pudding
Pineapple-Grapefruit
Drink

Day 3, 7, 11

Meal A

Peaches
Bacon Squares (8)
Strawberry Cubes (4)
Cocoa
Orange Drink

Meal B

Cream of Chicken Soup
Turkey and Gravy
Butterscotch Pudding
Brownies
Grapefruit Drink

Meal C

Pea Soup
Beef Stew
Chicken Salad
Chocolate Cubes (4)
Grape Punch

Day 4, 8

Meal A

Fruit Cocktail
Sausage Patties
Bacon Squares (8)
Cocoa
Grape Drink

Meal B

Potato Soup
Pork and Scalloped
Potatoes
Apple Sauce
Orange Drink

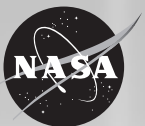
Meal C

Shrimp Cocktail
Chicken Stew
Turkey Bites (4)
Dry Fruitcake (4)
Orange-Grapefruit Drink



Appendix D: Space Shuttle Standard Menu (4 days of a 7-day menu)

<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>
<p>Meal A Dried Peaches Cornflakes Orange-Pineapple Drink Cocoa</p> <p>Meal B Ham Cheese Spread Tortilla x2 Pineapple Cashews Strawberry Drink</p> <p>Meal C Chicken a la King Turkey Tetrazzini Cauliflower w/Cheese Brownie Grape Drink</p>	<p>Meal A Dried Pears Beef Patties Scrambled Eggs Vanilla Instant Breakfast Orange Juice</p> <p>Meal B Peanut Butter Apple or Grape Jelly Tortilla x2 Fruit Cocktail Trail Mix Peach-Apricot Drink</p> <p>Meal C Frankfurters Macaroni and Cheese Green Beans w/ Mushrooms Peach Ambrosia Tropical Punch</p>	<p>Meal A Dried Apricots Breakfast Roll Chocolate Instant Drink Grapefruit Drink</p> <p>Meal B Turkey Salad Spread Tortilla x2 Peaches Granola Bar Lemonade</p> <p>Meal C Spaghetti w/Meat Sauce Italian Vegetables Butterscotch Pudding Orange Drink</p>	<p>Meal A Dried Peaches Bran Chex Orange-Mango Drink Cocoa</p> <p>Meal B Dried beef Cheese Spread Applesauce Peanuts Tropical Punch</p> <p>Meal C Teriyaki Chicken Rice and Chicken Green Beans and Broccoli</p>



Appendix E: International Space Station Standard Menu (4 days of a 30-day menu)

<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>
<p>Meal A Eggs Scrambled w/Bacon, Hash Browns, Sausage Toast Margarine Jelly, Assorted Apple Juice Coffee/Tea/Cocoa</p> <p>Meal B Chicken, oven-fried Macaroni and Cheese Corn, whole kernel Peaches Almonds Pineapple-Grapefruit Juice</p> <p>Meal C Beef Fajita Spanish Rice Tortilla Chips Picante Sauce Chili con Queso Tortilla Lemon Bar Apple Cider</p>	<p>Meal A Cereal, cold Yogurt, fruit Biscuit Margarine Jelly, assorted Milk Cranberry Juice Coffee/Tea/Cocoa</p> <p>Meal B Soup, cream of broccoli Beef Patty Cheese Slice Sandwich Bun Pretzels Cried Apples Vanilla Pudding Chocolate Instant Breakfast</p> <p>Meal C Fish, saut ed Tartar Sauce Lemon Juice Pasta Salad Green Beans Bread Margarine Angel Food Cake Strawberries Orange-Pineapple Drink</p>	<p>Meal A French Toast Canadian Bacon Margarine Syrup Orange Juice Coffee/Tea/Cocoa</p> <p>Meal B Cheese Manicotti w/ Tomato Sauce Garlic Bread Berry Medley Cookie, shortbread Lemonade</p> <p>Meal C Turkey Breast, sliced Mashed Sweet Potato Asparagus Tips Cornbread Margarine Pumpkin Pie Cherry Drink</p>	<p>Meal A Cereal, hot Cinnamon Roll Milk Grape Juice Coffee/Tea/Cocoa</p> <p>Meal B Quiche Lorraine Seasoned Rye Krisp Fresh Orange Cookies, Butter</p> <p>Meal C Soup, won ton Chicken Teriyaki Chinese Vegetables, stir- fry Egg Rolls Hot Chinese Mustard Sweet n Sour Sauce Vanilla Ice Cream Cookies, fortune Tea</p>



Appendix F:

Space Tortilla Formulation (Recipe)

<u>Ingredients</u>	<u>% by Mass</u>
Wheat	61.79
Water	26.58
Glycerin	4.02
Shortening	3.71
Mono/Diglycerides	1.24
Salt	0.99
Baking Powder	0.87
Dough Conditioner	0.31
Fumaric Acid	0.19
Potassium Sorbate	0.15
Carboxymethyl Cellulose	0.12
Calcium Propionate	0.03
	<hr/>
	100.00%

Preparation:

1. Dry ingredients are combined in a mixer using the wire beater attachments on a stir setting for 1 minute.
2. Shortening and mono/diglycerides are then added and blended to cornmeal consistency. Mix about 3—5 minutes using the wire beater attachment on speed 2.
3. Fumaric acid and potassium sorbate are weighed separately, added to 100 ml water, and set aside.
4. Glycerin and the remainder of water are combined and added to the mix using the dough hook attachment.
5. The fumaric acid and potassium sorbate solution is added to the dough and mixed on speed 2. Mix for about 10 minutes.
6. After mixing, allow the dough to rest 5 minutes, and then divide into 32 equal portions using a dough divider.
7. Round each individual piece by hand, place into muffin pans, and cover with plastic wrap.
8. Place into a 35.5-degree Celsius proofing chamber for 1 to 2 hours.
9. Dust each dough ball lightly with flour, and then form in a tortilla press.

Cooking:

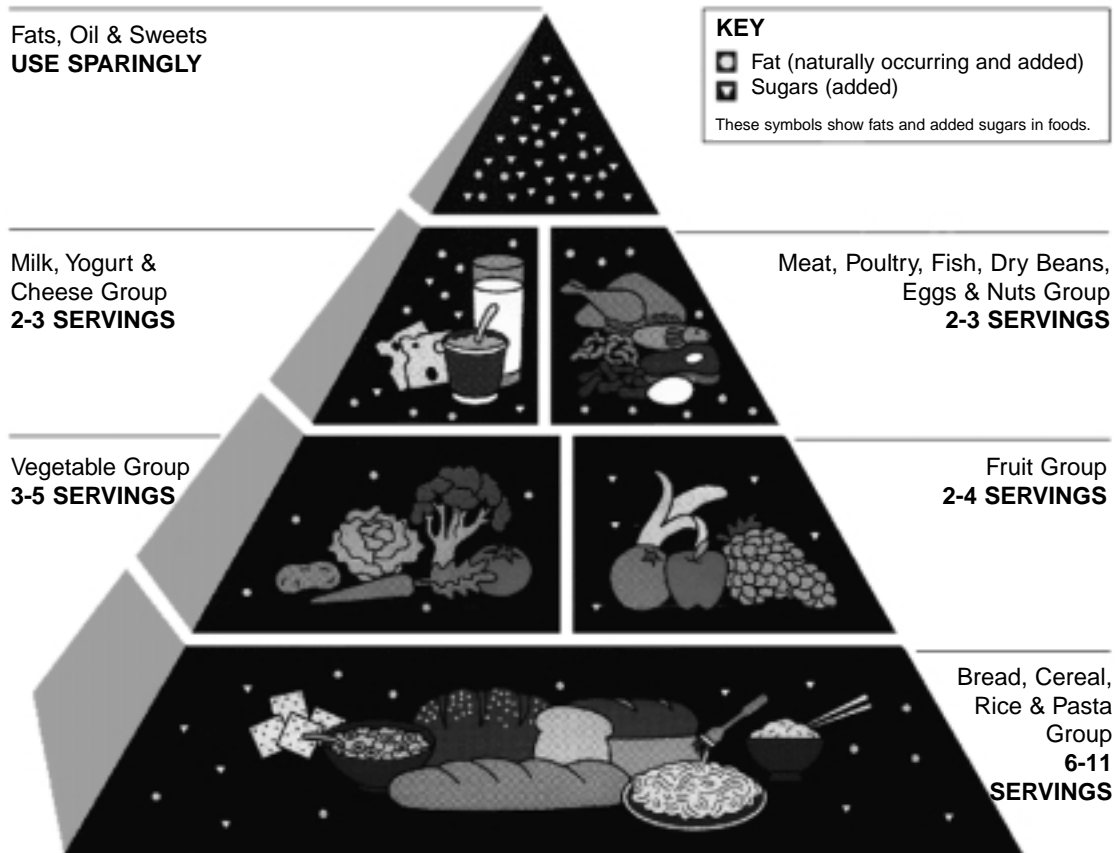
10. Place pressed tortilla in a preheat frying pan (190—204 degrees Celsius).
11. When uncooked surface begins to bubble, flip tortilla to cook the other side.
12. After both sides are baked, remove tortillas to a cool surface lined with waxed paper and allow to cool. Turn the tortillas to prevent condensation from forming between the waxed paper and the tortilla.

Packaging:

13. After cooling to room temperature, two tortillas are folded in half and placed in a three-ply foil laminate pouch (outside diameter: 6 1/2 X 8 1/8).
14. Insert an oxygen absorber into each pouch before the sealing operation.
15. Place the filled pouch in a vacuum seal chamber and back-flush with nitrogen three times and seal at 10 in. Hg vacuum.



Appendix G: USDA Food Guide Pyramid



Source: U.S. Department of Agriculture/Department of Health and Human Services



References

Andrews, Sheila Briskin, and Audrey Kirschenbaum, *Living In Space, Book I*, EP-222, NASA, Washington, DC, 1987.

Andrews, Sheila Briskin, and Audrey Kirschenbaum, *Living In Space, Book II*, EP-223, NASA, Washington, DC, 1987.

NASA, Space Shuttle Food Systems, NASA Facts, NF-150/I-86, 1986.

Hartung, T.E., *et. al.*, Application of Low Dose Irradiation to a Fresh Bread System for Space Flights, *Journal of Food Science* 38 (1973): 129—132.

Visit <http://www.jsc.nasa.gov/pao/factsheets/#NP> to download the following NASA Publication and Fact Sheet:

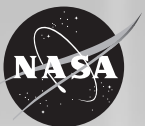
NASA, Food for Space Flight, NASA Facts, NP-1996-07-007-JSC, Johnson Space Center, Houston, TX, July 1996.

NASA, Living in the Space Shuttle, NASA Facts, FS-1995-08-001-JSC, Johnson Space Center, Houston, TX, June 1996.

Please visit <http://spacelink.nasa.gov/space.food> for a wealth of information on the NASA space food program. Also visit NASA Spacelink (<http://spacelink.nasa.gov>) to find the following food lists as well as other information related to the NASA space food program:

¥ Apollo Food and Beverage List

¥ Skylab Food and Beverage List



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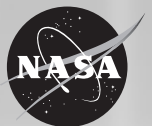
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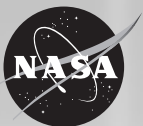
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NASA Television (NTV)

NASA Television (NTV) features Space Shuttle mission coverage, live special events, interactive educational live shows, electronic field trips, aviation and space news, and historical NASA footage. Programming has a 3-hour block Video (News) File, NASA Gallery, and Education File beginning at noon Eastern and repeated three more times throughout the day.

The Education File features programming for teachers and students on science, mathematics, and technology, including *NASA... On the Cutting Edge*, a series of educational live shows. Spacelink is also host to the NTV Education File schedule at: <http://spacelink.nasa.gov/NASA.News/>

These interactive live shows let viewers electronically explore the NASA Centers and laboratories or anywhere scientists, astronauts, and researchers are using cutting-edge aerospace technology. The series is free to registered educational institutions. The live shows and all other NTV programming may be taped for later use.



NTV Weekday Programming Schedules (Eastern Times)

<i>Video File</i>	<i>NASA Gallery</i>	<i>Education File</i>
12—1 p.m.	1—2 p.m.	2—3 p.m.
3—4 p.m.	4—5 p.m.	5—6 p.m.
6—7 p.m.	7—8 p.m.	8—9 p.m.
9—10 p.m.	10—11 p.m.	11—12 p.m.

Live feeds preempt regularly scheduled programming. Check the Internet for program listings at:

<http://www.nasa.gov/ntv/> N T V Home Page

<http://www.nasa.gov/> Select Today at NASA and What's New on NASA TV?

<http://spacelink.nasa.gov/NASA.News/>—Select TV Schedules

Via satellite GE-2 Satellite, Transponder 9C at 85 degrees West longitude, vertical polarization, with a frequency of 3880.0 megahertz (MHz) and audio of 6.8 MHz or through collaborating distance learning networks and local cable providers.

For more information on NTV, contact:

NASA TV

NASA Headquarters

Code P-2

Washington, DC 20546-0001

Phone: (202) 358-3572

For more information on the educational live shows, contact:

NASA . . . *On the Cutting Edge*

NASA Teaching From Space Program

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E-mail: edge@aesp.nasa.okstate.edu

How to Access NASA's Education Materials and Services, EP-1998-03-345-HQ

This brochure serves as a guide to accessing a variety of NASA materials and services for educators. Copies are available through the ERC network, or electronically via NASA Spacelink. NASA Spacelink can be accessed at the following address: <http://spacelink.nasa.gov>

