



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

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MEMORANDUM

TO: Kansas State University Landfill File

THROUGH: *BK 4-22-10* Brad Roberts, *mk 4/21/10* Mostafa Kamal, Bill Bider

FROM: Christy McCormick

Bill Bider 4-21-10

SUBJECT: 04/09/2010 Meeting

On April 9, 2010, a meeting was held at Kansas State University (KSU) regarding the Old Chemical Waste Landfill (OCWLF). Present at the meeting from KDHE was Christy McCormick, Brad Roberts, Mostafa Kamal, Bill Bider, and Tom Conley. Present from EPA was Lisa Gotto. Present from Allied environmental, consultant to KSU, was Paul Clark and Jeff Wilson. Present from KSU was Kelly Phillips, Steve Galitzer, Ron Bridges, Bruce Schubert, and Ronnie Grice. An agenda for the meeting is attached to this memo.

The meeting began with Bill Bider outlining the regulatory roles of KDHE and EPA, highlighting that KDHE is the lead agency with EPA advising and providing technical support. After a presentation by Paul Clark on the history of the OCWLF, Bruce Schubert outlined how KSU will go about funding the removal of the landfill, which involves asking the Kansas Board of Regents to authorize KSU to address OCWLF clean-up as a capital improvement project. With Regents' approval, KSU will submit the funding requirements for approval by the legislature in 2011. KSU is hoping to get everything approved so the removal of the OCWLF can occur in Fiscal Year 2012. After the discussion on the financing, Bruce Schubert and Ronnie Grice left the meeting.

The rest of the meeting was filled with presentations on the current remedial proposal for groundwater remediation and the removal of the landfill. KSU is considering the remedial method of pump and treat with activated carbon and ultraviolet/ozone treatment. A trench would be dug downgradient from the landfill to intercept the contaminant plume. Contamination beyond the trench would be monitored as KSU expects the 1,4-Dioxane to disperse over time. Next, Allied presented the outline for removal of the landfill. Both presentations are attached to this memo.

The meeting concluded with KDHE outlining the submittals still required by KSU. It was agreed by KDHE and EPA that an email will suffice for the CMS Work Plan that is due April 30. Also, KDHE, EPA and Allied will have a conference call to discuss the CMS sometime prior to

Meeting with Kansas State University Regarding the Old Chemical Waste Landfill
KDHE's Preliminary Agenda
IGP Building - Conference Room
April 9, 2010 2:00-3:30 PM

- I. Introductions
 - EPA – John Smith, Lisa Gotto
 - KSU – Bruce Shubert, Steve Galitzer, Kelly Phillips, Paul Clark, Jeff Wilson
 - KDHE/BEH – Tom Conley
 - KDHE/BWM – Bill Bider, Mostafa Kamal, Brad Roberts, Christy McCormick

- II. Regulatory Agency Roles and Authority – Bill Bider and John Smith

- III. History of the Landfill - Paul Clark
 - A. How it got started
 - B. What was disposed
 - C. Discovery of Contamination
 - D. Site investigation to date

- IV. Path Forward Funding - Bruce Shubert
 - A. State Institution & Funding Mechanisms
 - B. What is required
 - C. What KSU will do to fund the project

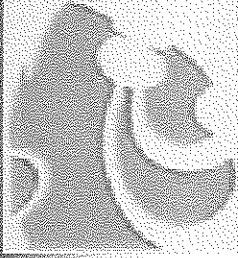
- V. Path Forward Administratively - Christy McCormick, Tom Conley
 - A. Decommissioning Plan
 - 1. Radioactive Materials License
 - 2. Kansas Regulations Requiring a Decommissioning Plan
 - B. Public Involvement

- VI. Path Forward Implementing Corrective Action - Jeff Wilson
 - A. Groundwater Remediation
 - 1. Current proposed method
 - 2. Implementation Considerations
 - 3. Groundwater Response Cost Estimate
 - 4. Timeline for clean-up
 - 5. Continued Monitoring

 - B. Removal of the Landfill - Paul Clark
 - 1. Hazardous Waste Storage Building Removal
 - 2. Stormwater Control
 - 3. Source Term Evaluation
 - 4. Remedial Cost Estimate/Financial Plan
 - 5. Contract Bidding and Award
 - 6. Final Status Survey

- VII. Status of Deliverables - Christy McCormick, Paul Clark
 - A. Final Timeline
 - B. CMS/Interim Measures Workplan
 - C. Decommissioning Plan

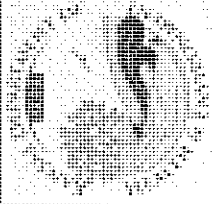
- VIII. Additional Questions/Comments



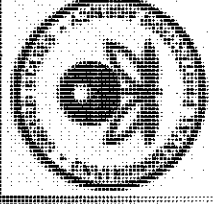
OLD CHEMICAL WASTE LANDFILL HISTORY

KANSAS STATE UNIVERSITY
MANHATTAN CAMPUS

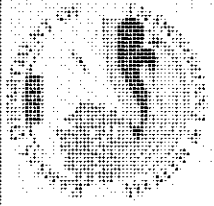
April 9, 2010



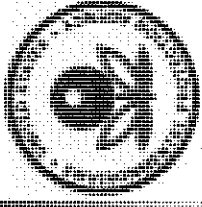
LANDFILL DEVELOPMENT



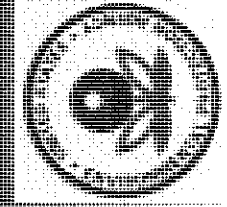
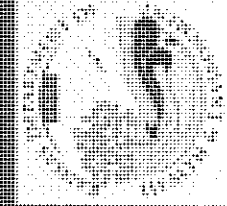
- July 1961 - Earliest Landfill Development document
- Atomic Energy Commission Recommendations / No Standards (Many Universities/Similar Methods)
- K-State establishes the “Atomic Burial Plot” on ground controlled by the Agronomy Farm
- December 1961 - First isotope burial occurs
- February 1962 - Site is registered with the Kansas Board of Health
- 1962 to 1978 - 35 Burial Events Occur at the Site



LANDFILL DEVELOPMENT

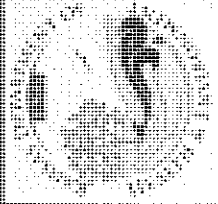


- May 1978 - Landfill could no longer receive hazardous waste for burial without a permit (Internal Corr.)
- October 1981 – KKSU implements policy to stop land disposal of liquid scintillation flours (Inter-departmental announcement) ; Looks at Interim Status option.
- November 1984 – KKSU requests to terminate Interim Status (IS)
- June 1986 – RCRA IS officially terminated.
- February 9, 1987 – last radioactive waste burial occurs.

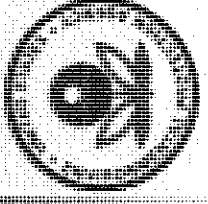


LANDFILL DEVELOPMENT

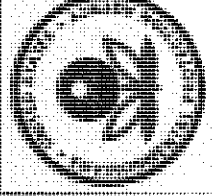
- 1987 – Site is graded (spring / summer) and construction pad for new Hazardous Waste Storage Building (HWSB) installed.
- 1987-1988 HWSB Constructed (<90 day storage)
- 1988 – RCRA Facility Assessment (Termination of Interim Status) identifies groundwater concern.



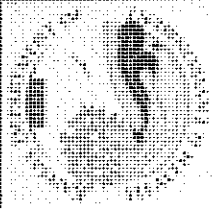
LANDFILL DEVELOPMENT



- **Disposed Materials:**
 - Low-level Radioactive Waste (LLRW)
 - Non-radioactive Waste (College Lab Waste)
- **Chemicals of Concern (GW):**
 - 1,4-Dioxane
 - Chlorobenzene
 - 1,2-Dichloroethane
 - cis-1,2-Dichloroethene (cDCE)
 - Tetrachloroethene (PCE)
 - Trichloroethene (TCE)
 - Vinyl chloride
 - Tritium @ MW-4

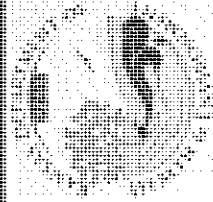


1970 AERIAL

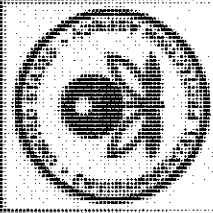


Source: K-State Archives

April 2010



1974 AERIAL

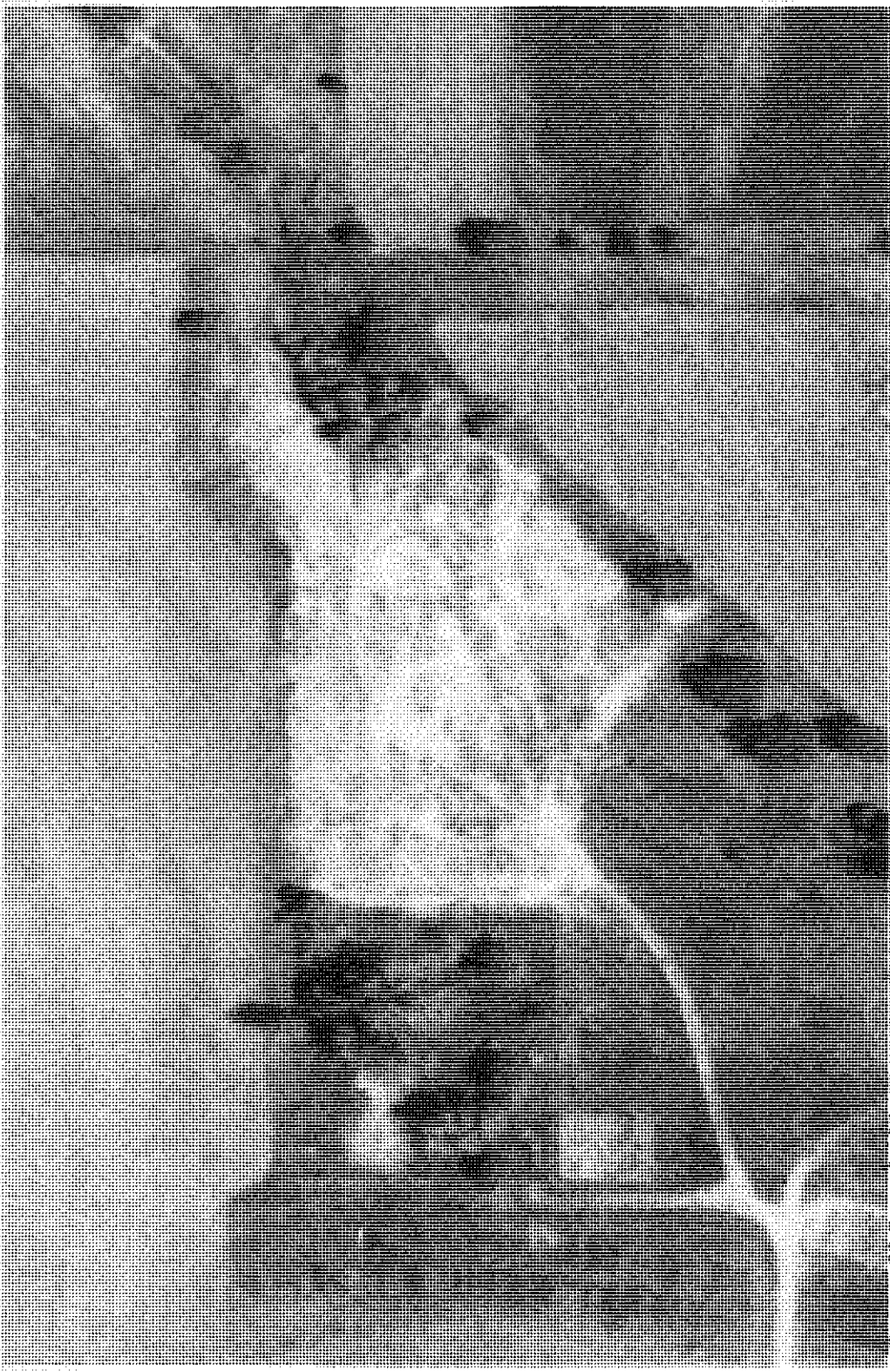
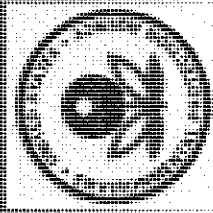
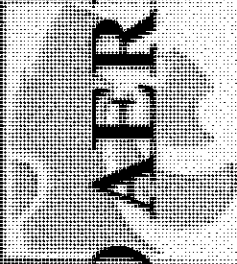


Source: K-State Archives

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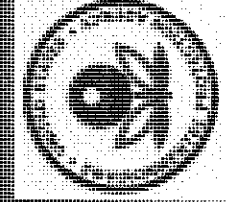


1979 AERIAL

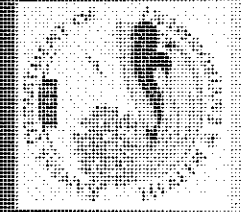
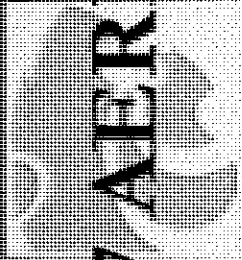


Source: National Archives

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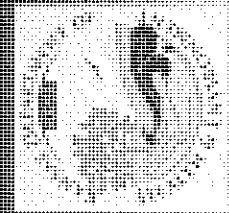


1987 AERIAL

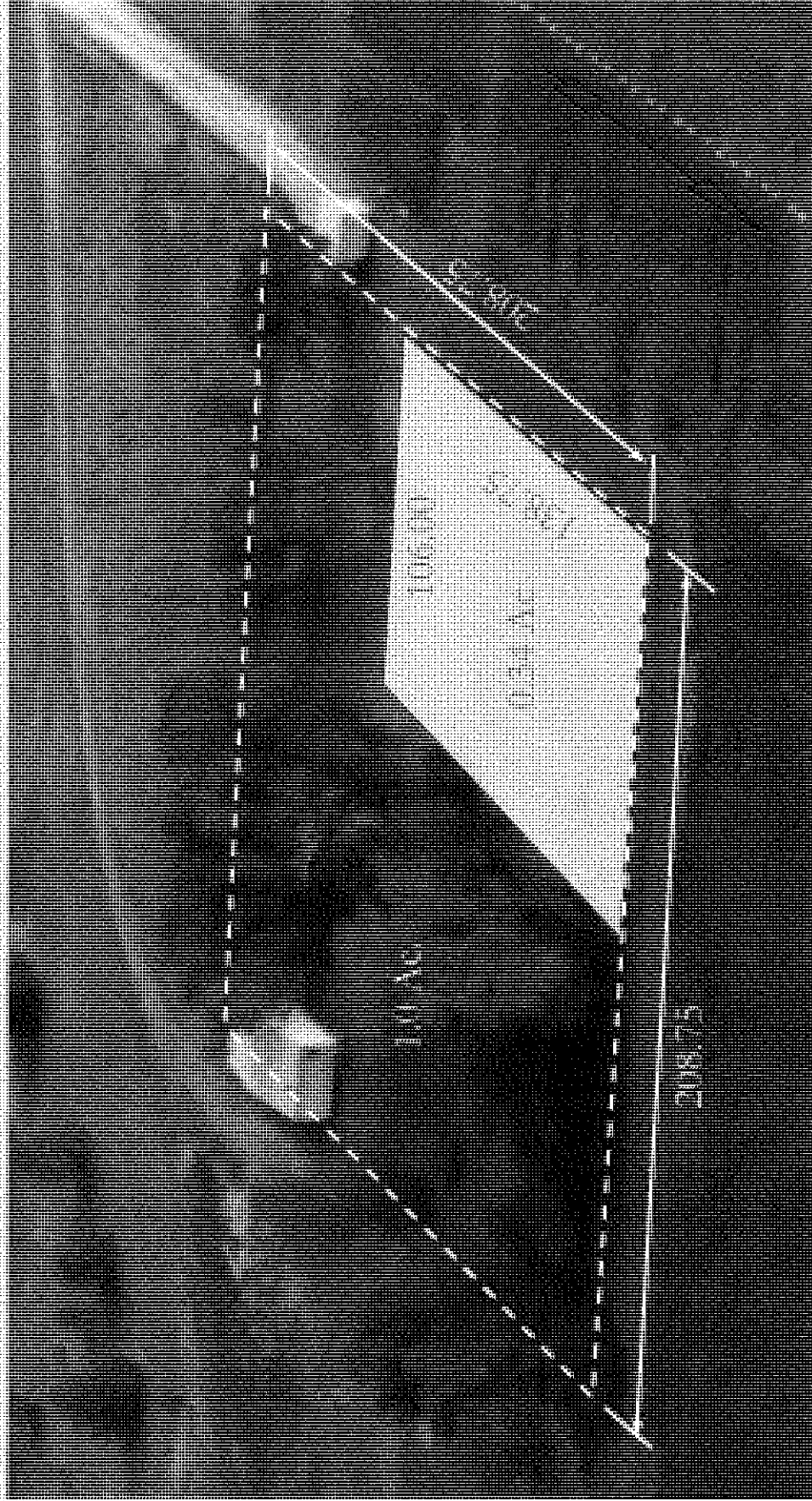
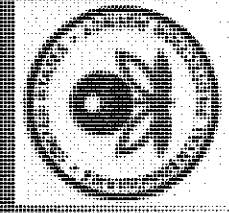
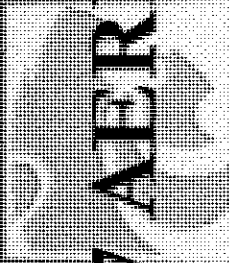


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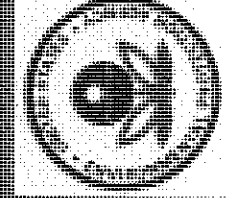


1987 AERIAL

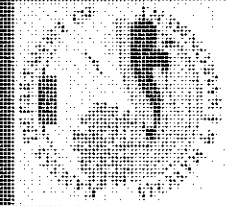


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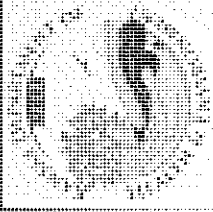
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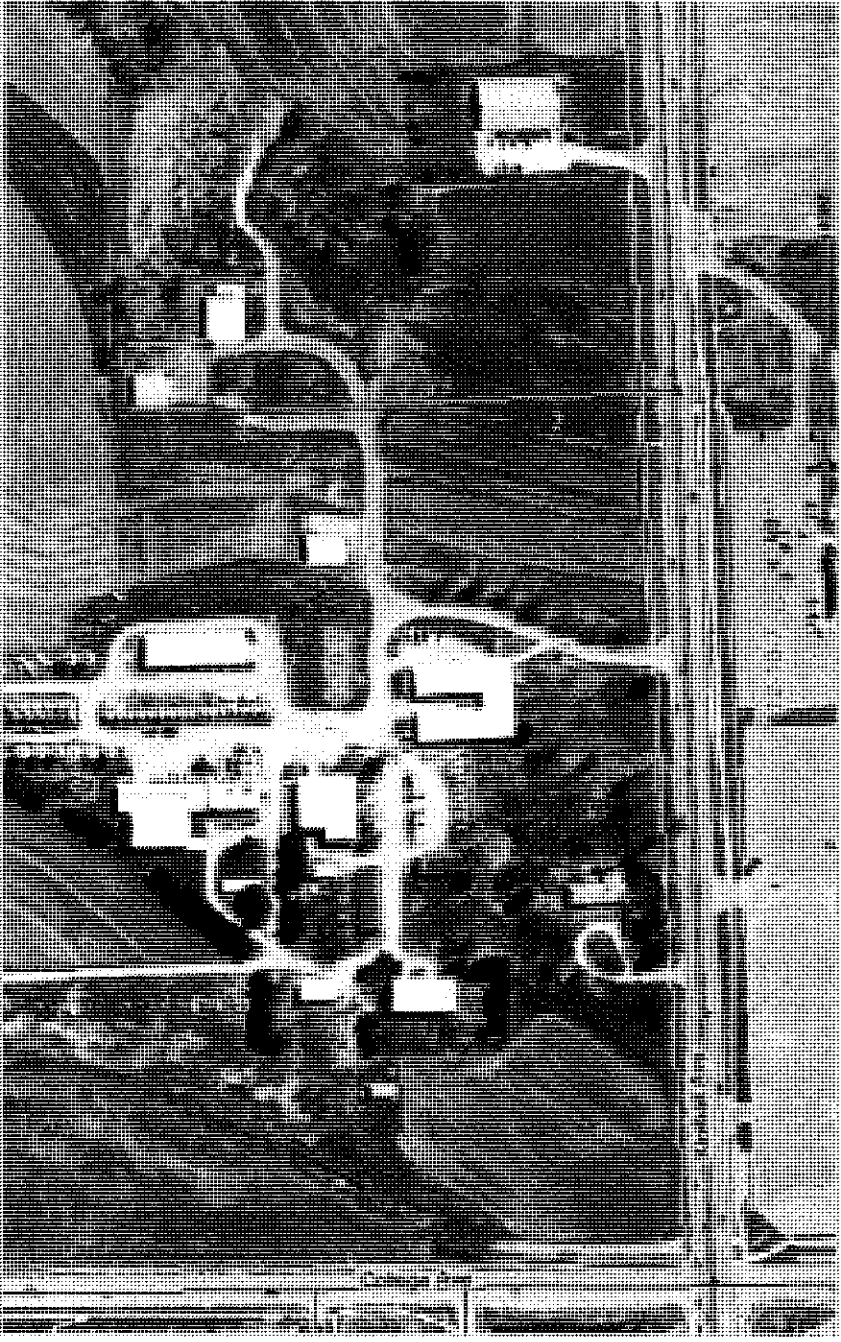
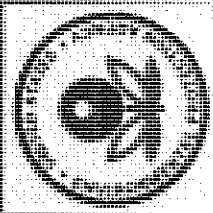
1995 AERIAL



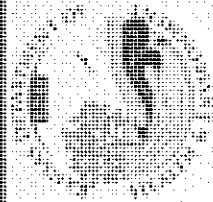
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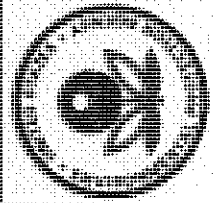
2001 AERIAL



Source: Riley County GIS

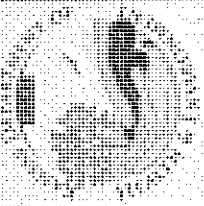
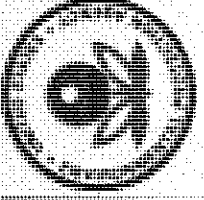


2005 AERIAL



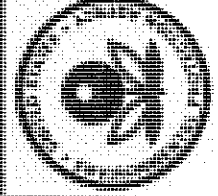
Source: Internet / Acme Mapper

C. 2009 AERIAL

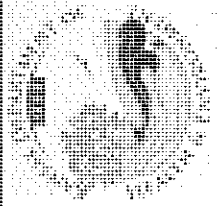
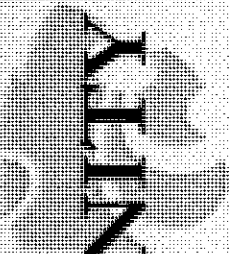


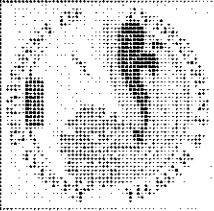
Source: Internet; Acme Mapper April 2010

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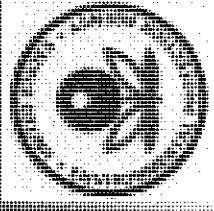


VICINITY MAP

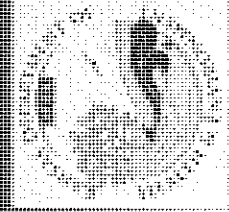




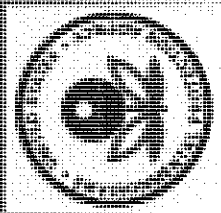
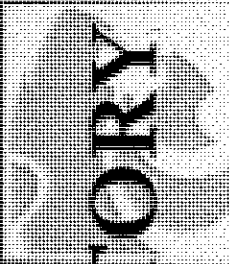
REGULATORY HISTORY



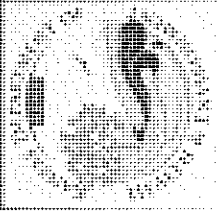
- 1980 – K-State Receive RCRA Interim Status for HW Storage
- 1984 – First Monitoring Well Installed
- 1986 – KDHE approves closure of RCRA Storage Facility
- 1988 – EPA / KDHE requests RCRA Facility Assessment
- 1988 – *Discovery* - 1 Solid Waste Management Unit Identified
- 1987-88 – Design/Construction of Current HW Storage Building
- 1989 – Consent Agreement 89-E-41 signed with KDHE BWM (Hydrogeological Investigation)
- June 1989 – Restrictive Covenant for 0.34 Acres Filed
- 1990 – Set of monitoring wells installed (through MW-11)



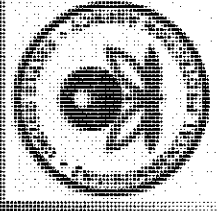
REGULATORY HISTORY



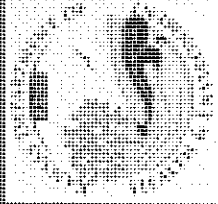
- 1990 – Consent Agreement 90-E-37 signed (adds Remedial Action Plan)
- 1997 – Plume Delineation Work Plan (MW-12 Installed)
- 1998 – Initial GW Monitoring Plan
- 2000 – Initial GW Monitoring Annual Report (MW-13 Installed)
- 2001 to 2004 – Geoprobe & Additional Wells (through MW-28)
- 2005 – 2006 – Monitored Natural Attenuation Evaluation
- 2006 – KS BAR Involvement - Initial Radioactivity Sampling (GW & Vegetation)
- 2008 – Geophysical Survey Performed to Determine Landfill Limits



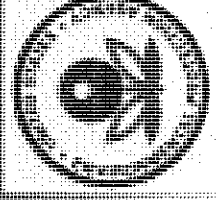
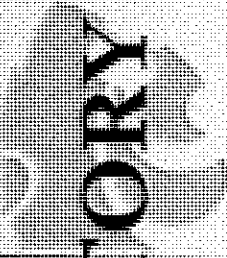
REGULATORY HISTORY



- 2008 – Comprehensive Remedial Plan (comparable to RCRA FS document; follows KDHE BER Corr. Action Study outline)
- 2008 – Initial version of the Quality Assurance Project Plan (QAPP) Approved
- 2008 – Background Radiation Survey & Dose Modeling Work Plan Prepared & Approved
 - Recognizes Radioactive Materials License 38-C011-01
 - Need for site-specific Background Measurements & Dose Assessment
 - Recognizes Title 10 Chap. 61 & Possible Stability Concern & Danger to Water.
 - Introduced Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) concepts to Regulatory Treatment of OCWLF



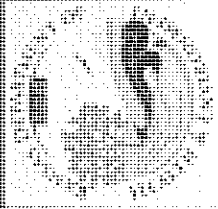
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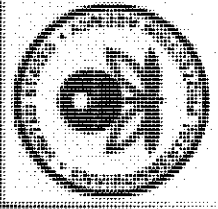
- 2008 – Monitoring Well 29, 30, 31 Installed
- 2009 - Background Radiation Survey & Dose Modeling Work

Findings

- Landfill Limits Defined within general Restrictive Covenant Area (0.34 acres).
- Dose Assessment via RESRAD & RESRAD Offsite models indicate (under present day conditions) no elevated radiation dose above regulatory levels of concern would occur to Workers or Occupant.
- Background measurements were found to be near levels of detection for fixed-based laboratory-grade instruments.
- Under ALARA review (As Low As Reasonably Achievable), Final Status Survey Results should approximate background levels.
- Sampling indicates Radiation in soil immediately outside OCWLF are at background levels.
- Derived Concentration Guideline Levels (DCGLs) ~ Background



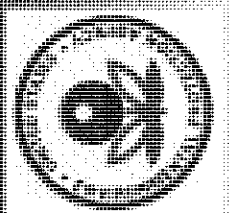
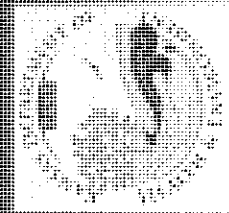
REGULATORY HISTORY



- 2009 - 2010 – Proposal to Removal Landfill & Implement GW

Interim Response Measure.

- 2009 – K-State Contracts AEC to prepare Decommissioning Plan that will Contain Remedial Action Plan
- 2010 – K-State issues Timeline based on anticipated Proposal for Removal
- 2010 – EPA Requests Corrective Measures Study (CMS) to provide platform for Public Participation

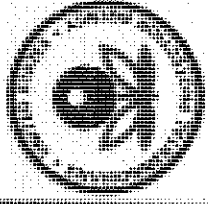
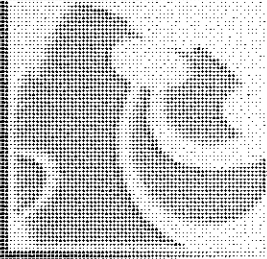
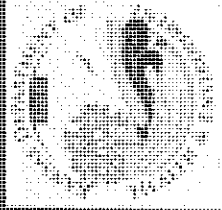


OLD CHEMICAL WASTE LANDFILL

Groundwater IRM

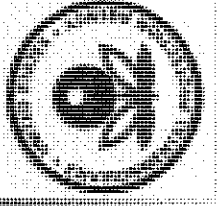
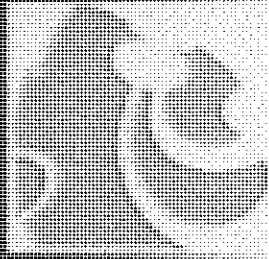
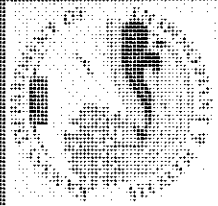
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APRIL 9, 2010



OCWLF Groundwater IRM

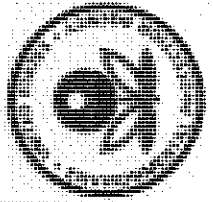
- GW Flow
 - Upper Aquifer
 - Clays, Silts, Very Fine Sand
 - Low Hydraulic Conductivity and Yield
 - Lower Aquifer
 - Sands and Gravels
 - Strong vertical gradient (Artesian)
- Contaminants of Concern
 - VOCs; Chlorinated Hydrocarbons => Easily Treated
 - 1,4 Dioxane => Treatment Limited to Advanced Oxidation Processes



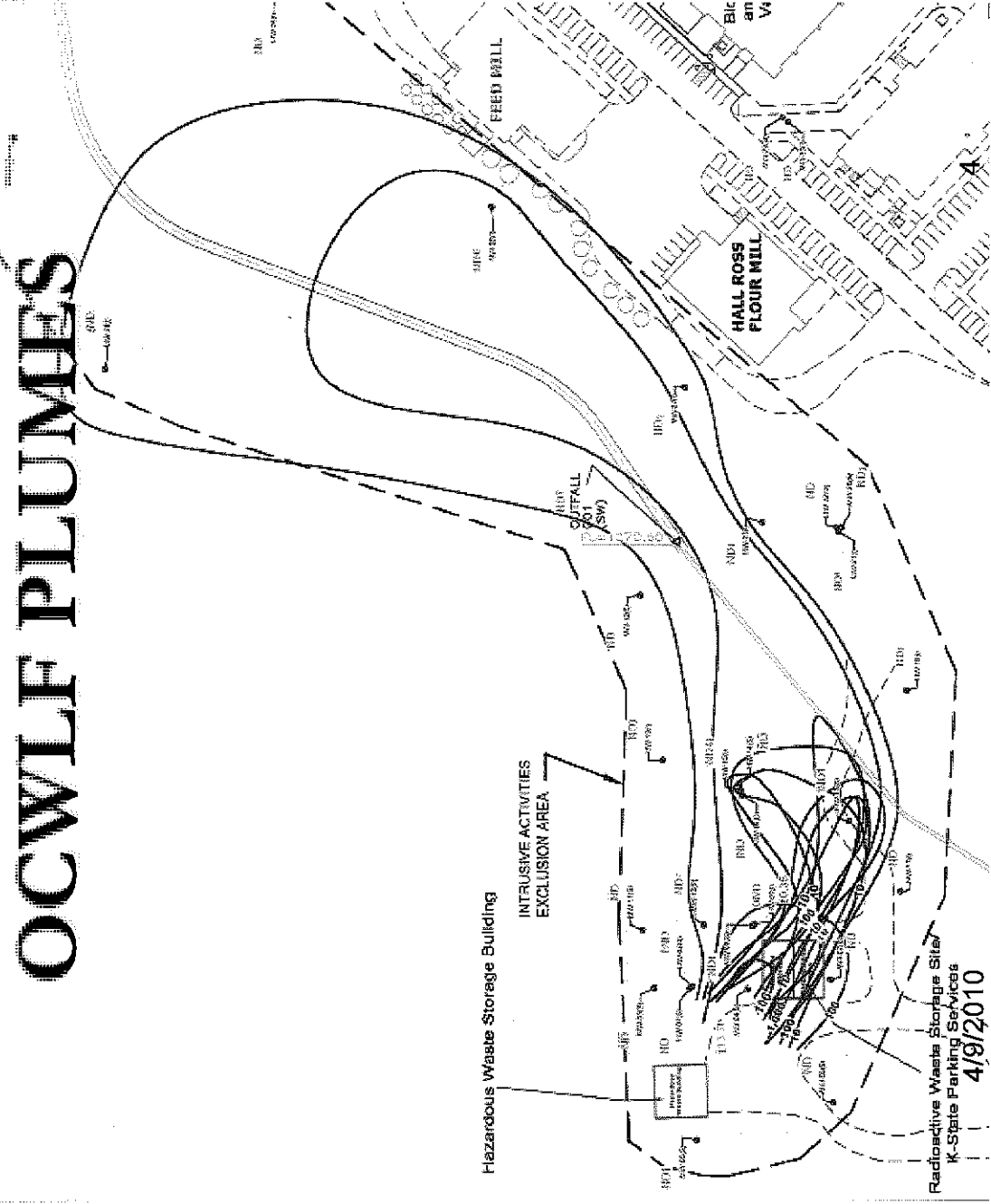
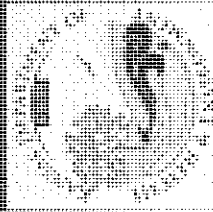
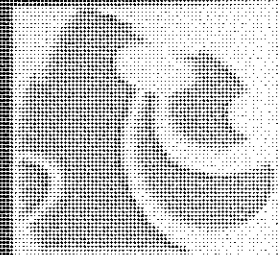
OCWLF Groundwater IRM

- Contaminant Distribution and Transport
 - Confined to upper aquifer
 - VOCs; Chlorinated Hydrocarbons => 300 ft in 30+ years
 - 1,4 Dioxane => 1200 ft in 30+ years

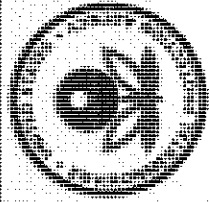
- Remedial Options
 - In-Situ Options
 - Bioremediation, Chemical Oxidation, Phytoremediation => Limited by Aquifer
 - Ex-Situ Options
 - Pump and Treat (Extraction Wells) => Limited by Aquifer Properties
 - Interceptor Trench Extraction, Treat, Discharge = Best Option



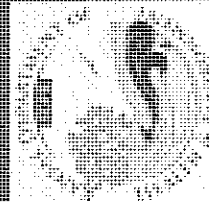
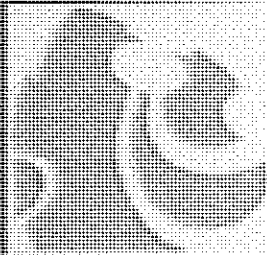
OCWLF PLUMES



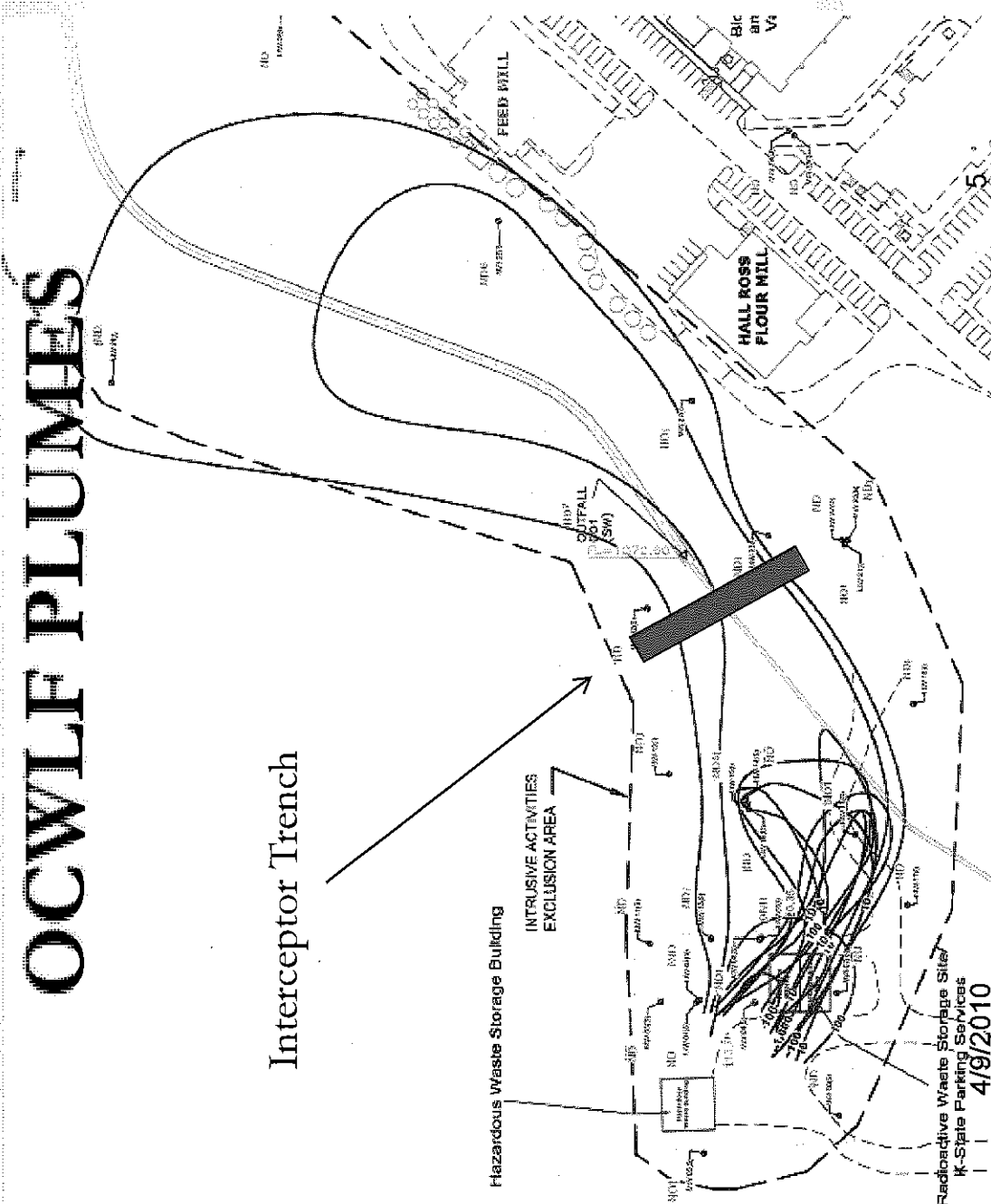
Radioactive Waste Storage Site/
K-State Parking Services
4/9/2010



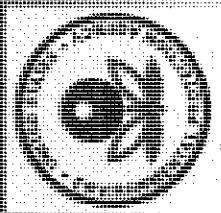
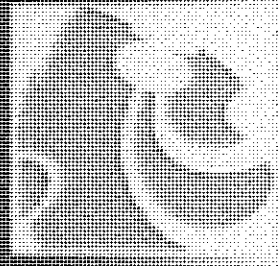
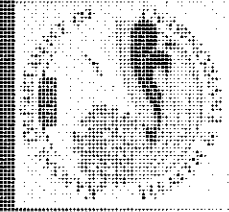
OCWLF PLUMES



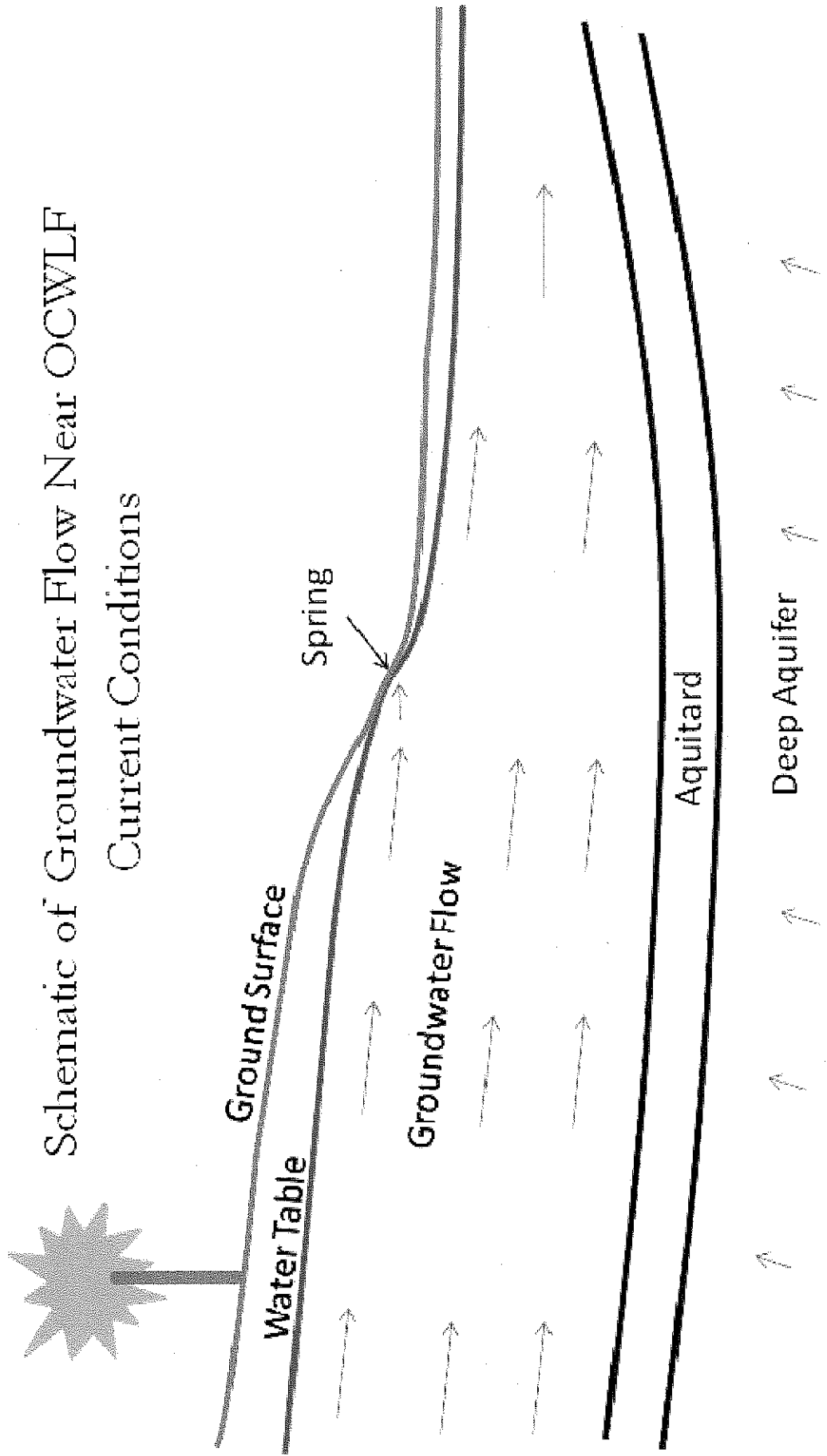
Interceptor Trench

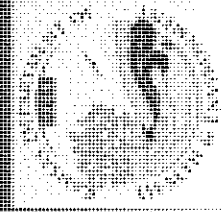
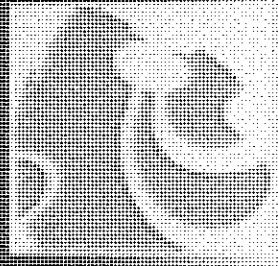
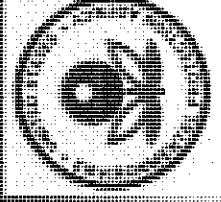


Radioactive Waste Storage Site/
K-State Parking Services
4/9/2010

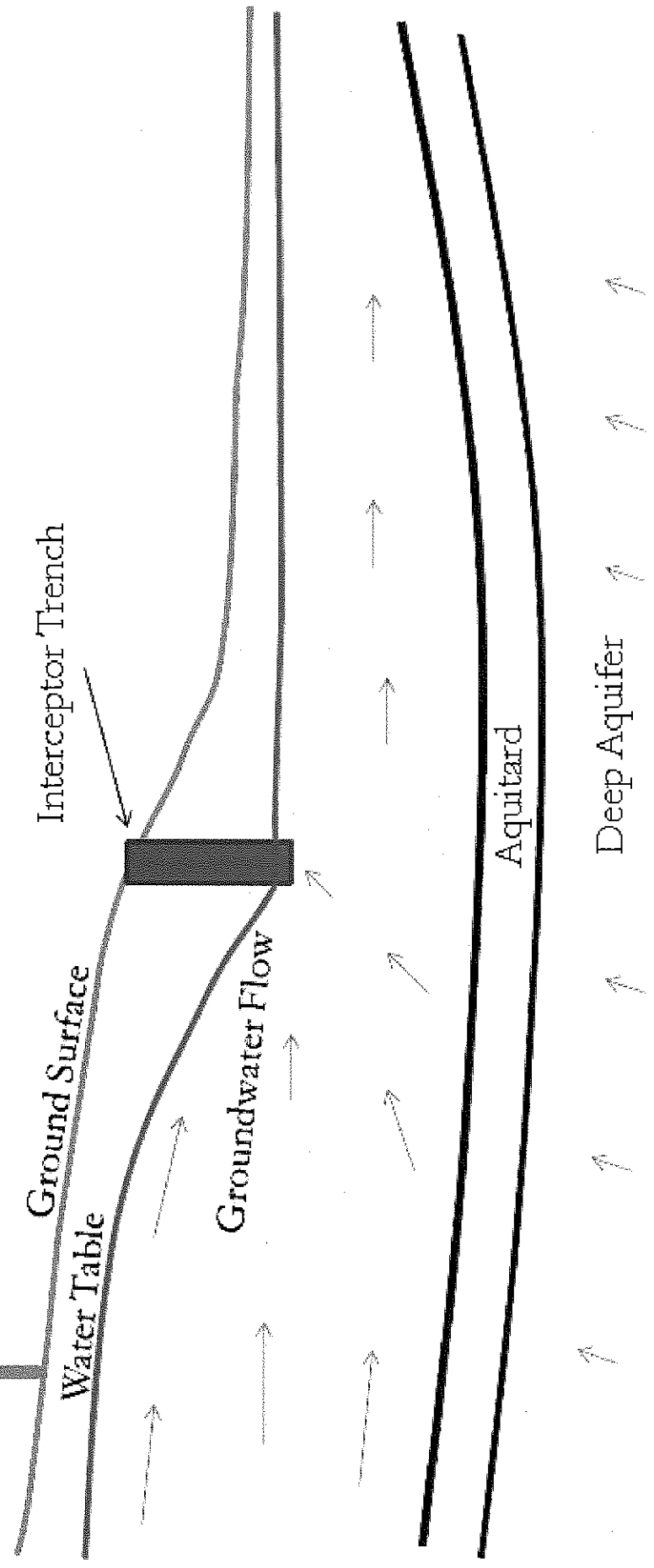
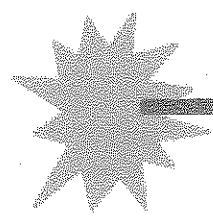


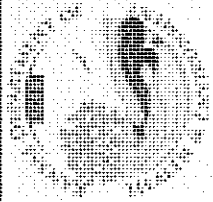
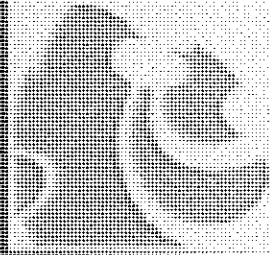
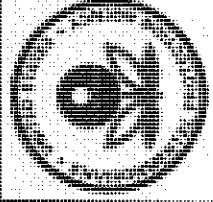
Schematic of Groundwater Flow Near OCWLF Current Conditions



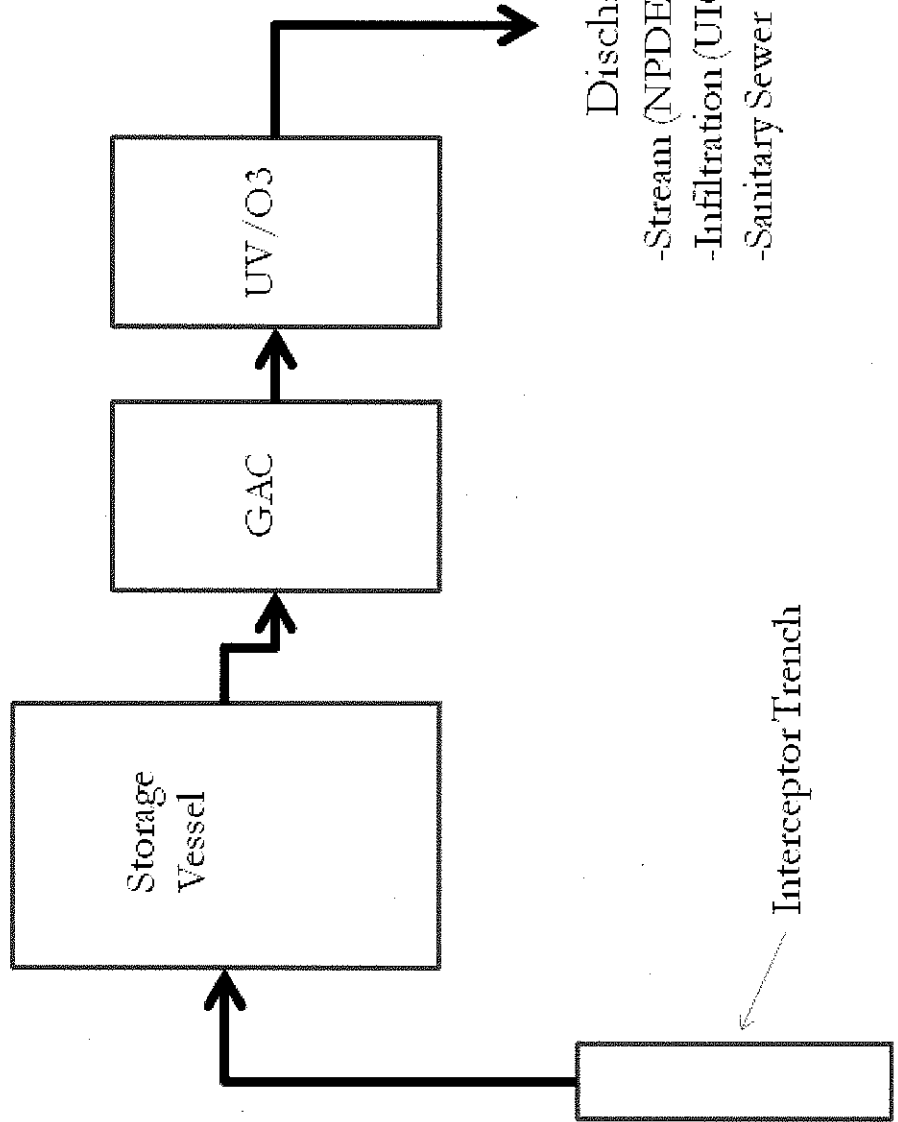


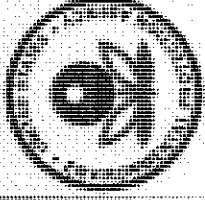
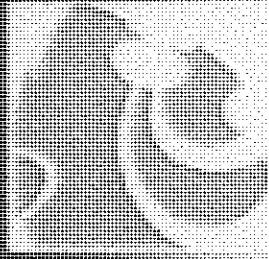
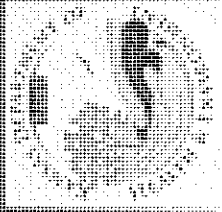
Schematic of Groundwater Flow Near OCWLF Post-IRM Conditions





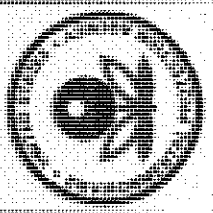
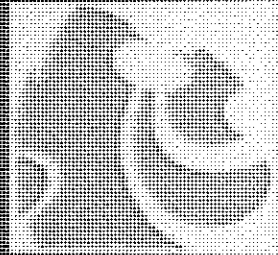
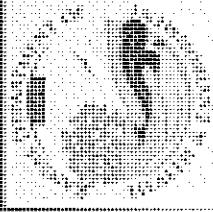
Treatment System Flow Diagram



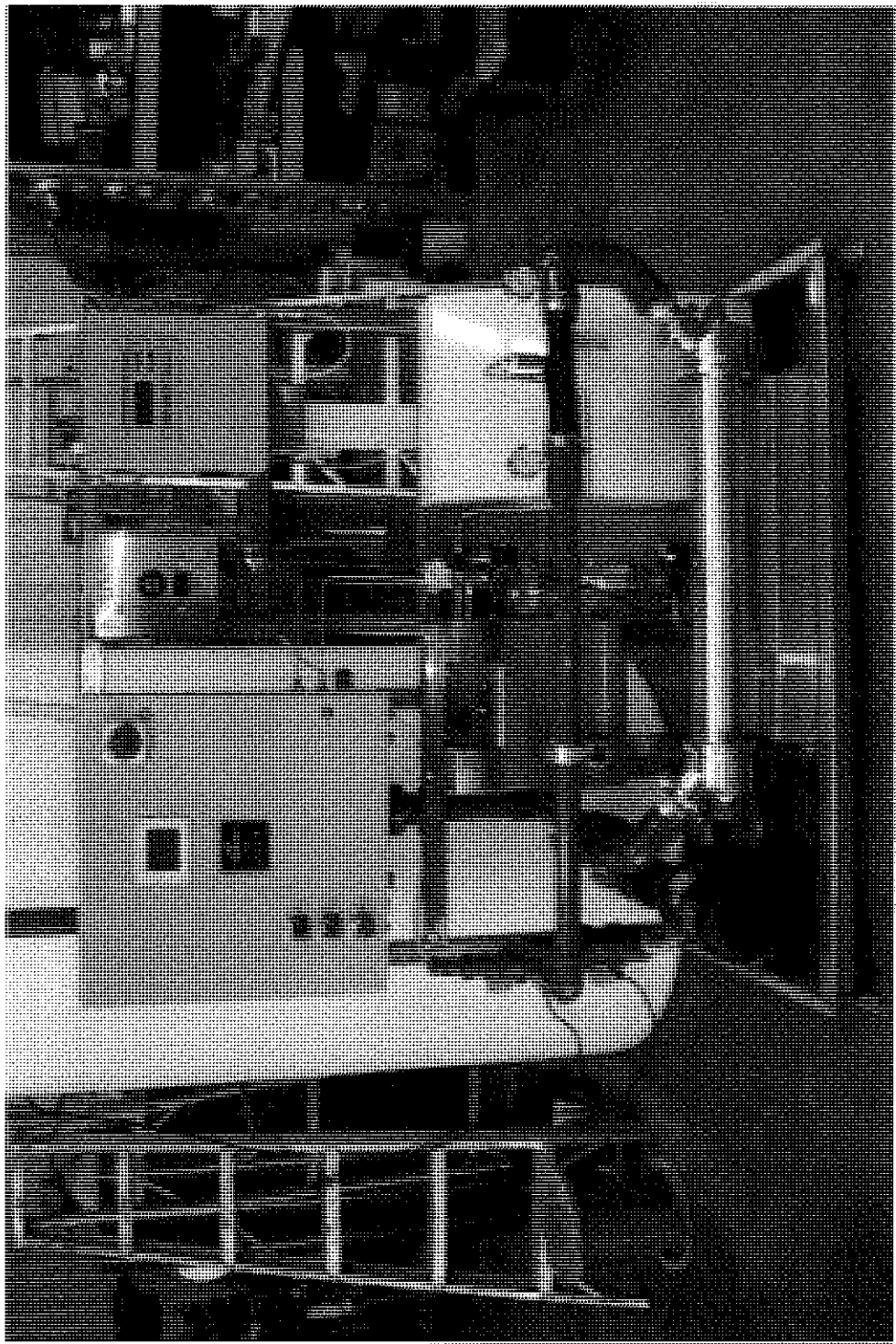


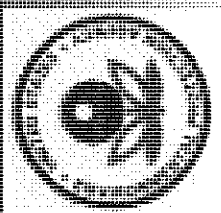
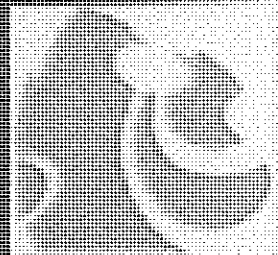
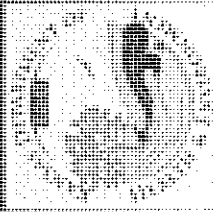
OCWLF Groundwater IRM

- Discussion
- Costs
- Timeline for Cleanup
- Continued Monitoring

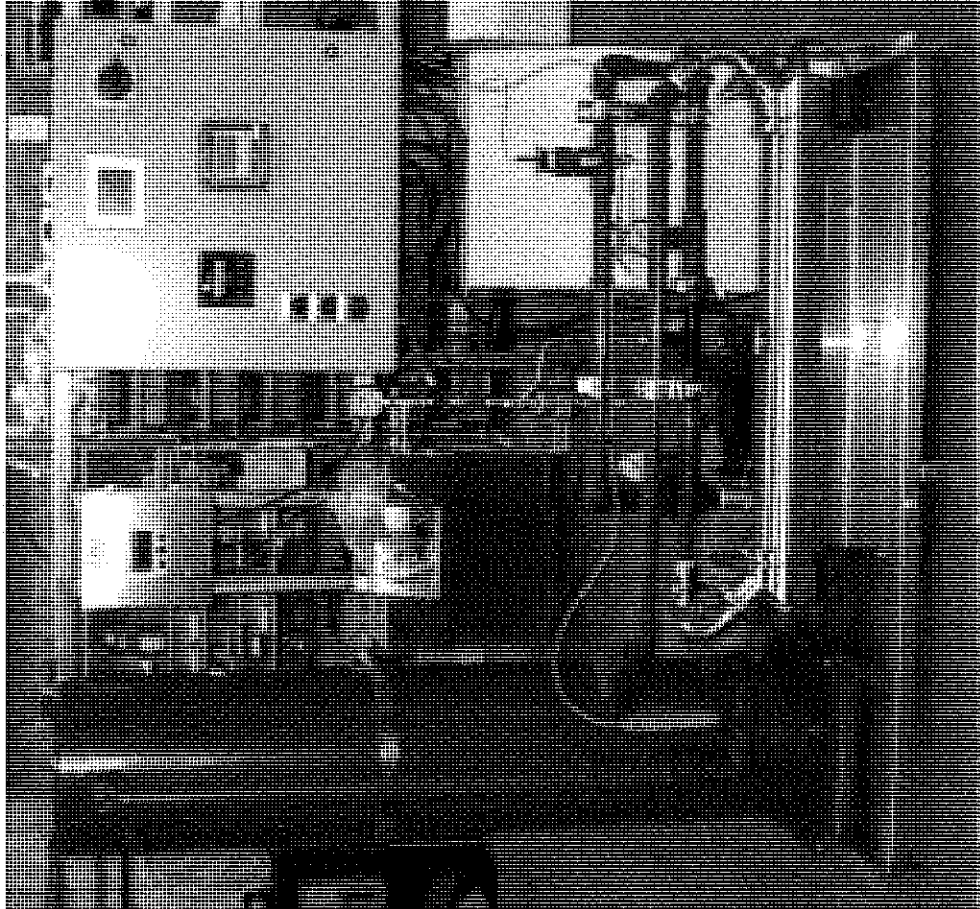


Ozone Treatment Skid

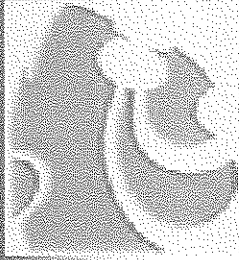




UV Treatment Skid



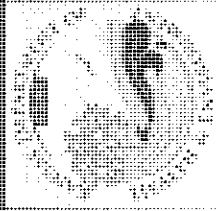
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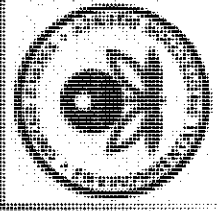
OLD CHEMICAL WASTE LANDFILL REMOVAL

KANSAS STATE UNIVERSITY
MANHATTAN CAMPUS

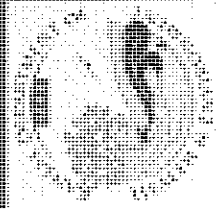
April 9, 2010



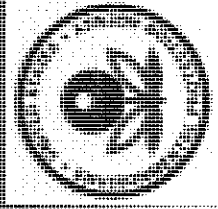
LANDFILL REMOVAL



- Six Elements to Removal
 1. Hazardous Waste Storage Building Demolition
 2. Stormwater Control
 3. Source Term Evaluation (Data Gap)
 4. Remedial Cost Estimate / Financial Plan
(Contract Bid Documents)
 5. Contract Bidding & Award
 6. Final Status Survey

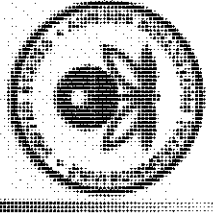


LANDFILL REMOVAL



- HWSB Demolition
 - Utility Assessment – Complete
 - Concept Design – Complete
 - Initial Engineer's Estimate – Complete (\$50,000)
 - Demolition Timeframe: 3-4 Weeks
 - Predecessors: Relocate Occupant (HWSB)

LANDFILL REMOVAL



- Stormwater Control (Prevent Waste Generation)
 - Improve grading to deflect run-on
 - Site Preparation for Proposed Temporary Structures
 - Initial Engineer's Estimate – Complete (\$28,800)
 - Construct Temporary Structures
 - Two 50 ft x 50 ft Structures (\$240,000 or less)
 - Concrete Slab Demolition (\$13,600)
 - Disassemble & Move/Store (\$65,000)
 - Predecessors: HSWB Demolition

LANDFILL REMOVAL

Temporary Building (Concept)

CONTRACTOR TO PROTECT FENCE FROM DAMAGE ANY DAMAGE TO FENCE SHALL BE REPLACED BY CONTRACTOR AT CONTRACTOR'S EXPENSE

CONSTRUCT 90' X 120' TEMPORARY ENCLOSURE

UNDERGROUND WATER SERVICE TO BE DEMOLISHED

UNDERGROUND ELECTRICAL SERVICE LINE TO BE DEMOLISHED

CONTRACTOR TO INSTALL FENCE AROUND TEMPORARY SHELTER

DEMOLISH ASPHALT PAVEMENT INSIDE HATCHED AREA

CONSTRUCT 80' X 120' TEMPORARY ENCLOSURE

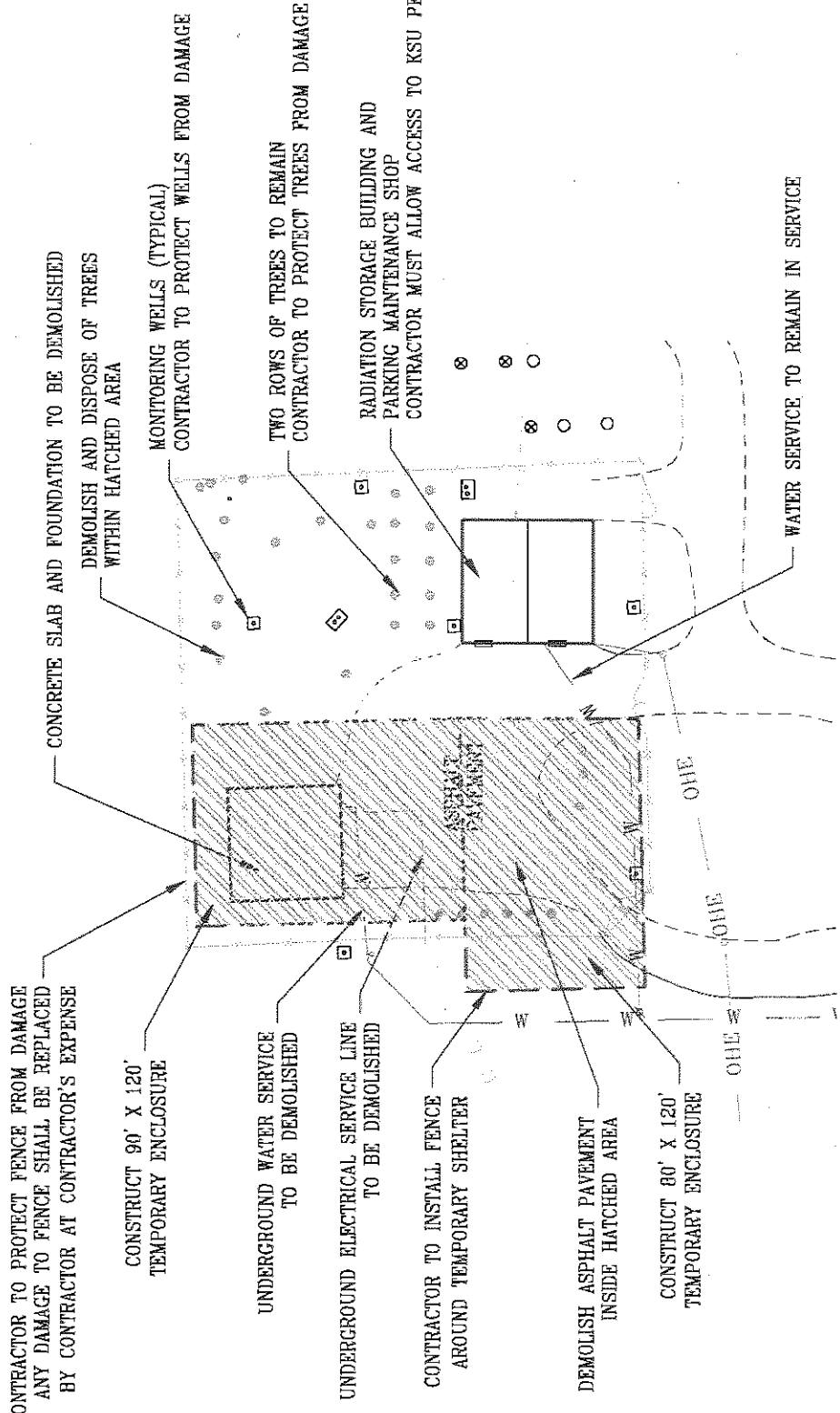
CONCRETE SLAB AND FOUNDATION TO BE DEMOLISHED DEMOLISH AND DISPOSE OF TREES WITHIN HATCHED AREA

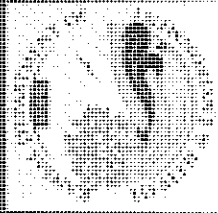
MONITORING WELLS (TYPICAL) CONTRACTOR TO PROTECT WELLS FROM DAMAGE

TWO ROWS OF TREES TO REMAIN CONTRACTOR TO PROTECT TREES FROM DAMAGE

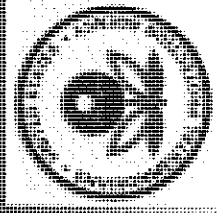
RADIATION STORAGE BUILDING AND PARKING MAINTENANCE SHOP CONTRACTOR MUST ALLOW ACCESS TO KSU PERSONNEL

WATER SERVICE TO REMAIN IN SERVICE

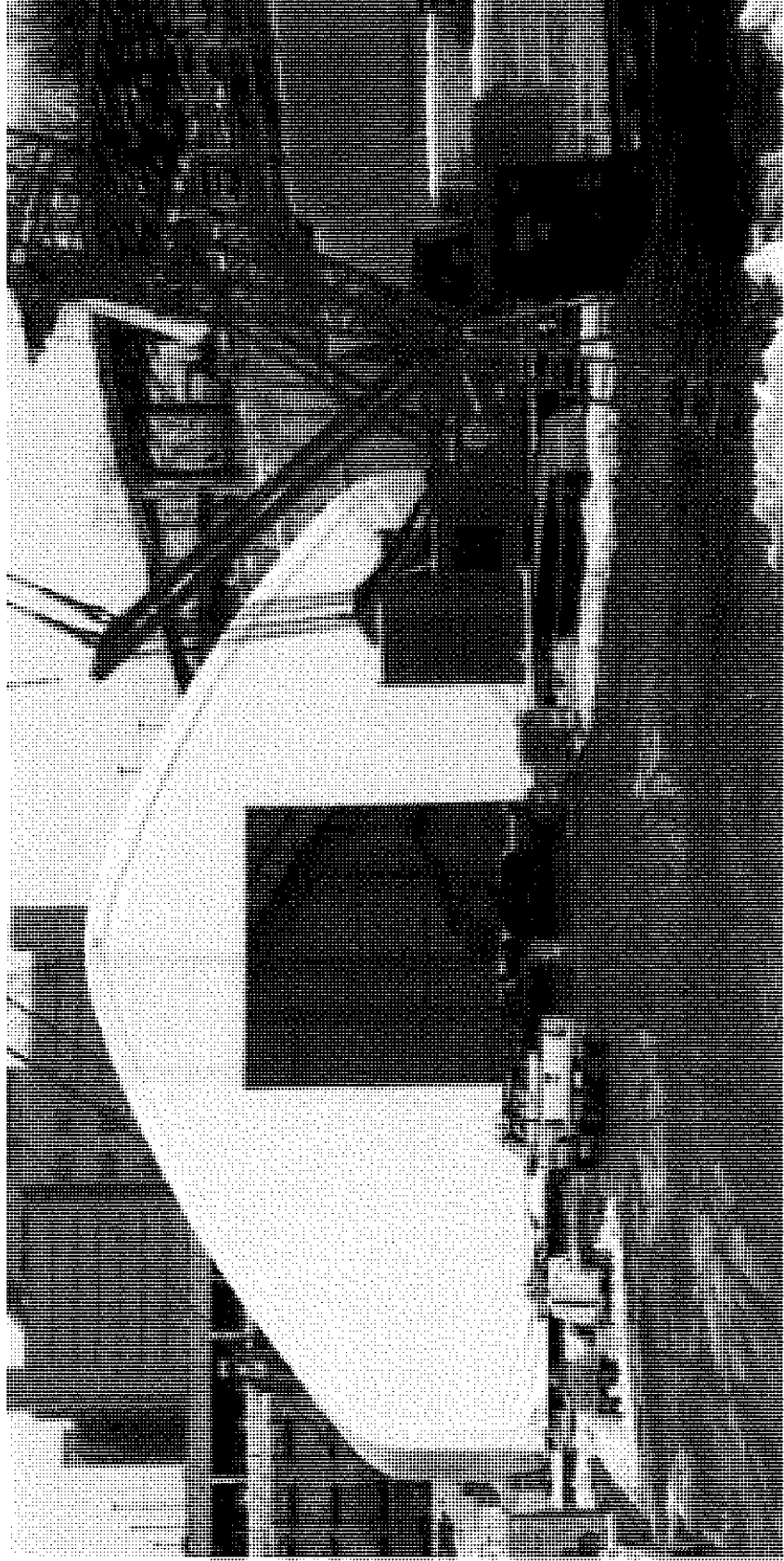




LANDFILL REMOVAL

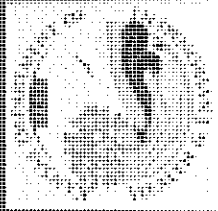


■ Temporary Building (Concept)

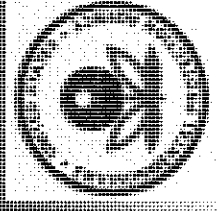


Source: Clearspan Website

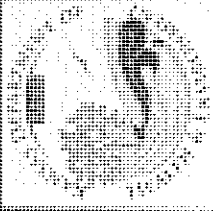
April 2010



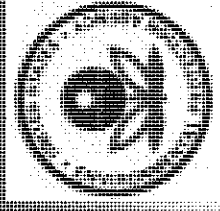
LANDFILL REMOVAL



- Source Term Evaluation
 - Survey Through Soil Cover (“Cap”)
 - Characterize Cover Material for Segregation (Rad. & Chemical)
 - Waste Sampling Via Probes or Other Means (Test Trench)
 - Goal: Characterize the Radioactive Concerns for Waste Separation & Disposal
 - Predecessors: Temporary Building Construction



LANDFILL REMOVAL



- Cost Estimate / Contract Documents
- Predecessors: Applicable or Relevant and Appropriate Requirements (ARARs) Review & Final Design. (Decommissioning Plan Should be at 40 to 60 % stage)
- Removal anticipated to be upwards of \$4MM (discussions with Energy Solutions & Un. Ark.)
- State Formal Contracting Process
- Removal Concludes with Final Status Survey